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Guidebook to the Biodiversity of Lintang Wetlands

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Wetlands INTERNATIONAL

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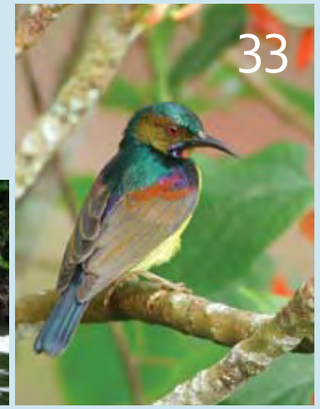

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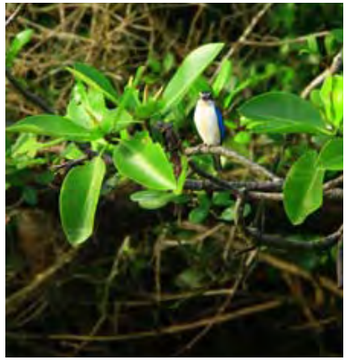


Introduction to Linting Wetlands

Linting Wetlands is a river ecosystem that is dominated by tidal mangrove forests. It is situated at the south-east corner in the state of Johor, Malaysia.

Located within the middle of the mangrove river ecosystem, lies the Belungkor Forest Reserve, which is surrounded by several fishing villages.

Approximately 80% of the local communities living here are fishermen who depend on the mangrove ecosystem for their daily livelihood.

Conservation Efforts in Linting Wetlands

Wetland areas in Malaysia are constantly under threat. Mangroves are degrading at a rate faster than any other forest type due to conversion for agriculture, plantation and development purposes.

With its extensive mangrove ecosystem, it is important that the Linting Wetlands is gazetted as a permanent forest reserve to protect and conserve it for their beauty, the role they play in maintaining the ecological balance and their role in providing resources to the local communities.

Wetlands International Malaysia has been working with the local communities on the wise use of these unique wetlands by developing community-based ecotourism and conducting rehabilitation activities in degraded mangrove areas.

This guidebook provides readers with a glimpse of the rich biodiversity found in Linting Wetlands and its surrounding tributaries and islands. It is hoped that with better understanding and knowledge of wetlands, it will enhance the appreciation and strengthen protection efforts of important wetland ecosystems.

Mangrove Ecosystems of Linting Wetlands

What are mangroves?

Mangroves are broadly defined as woody vegetation types occurring in marine and brackish environments.

The term 'mangrove' is used to define both the plants that occur in tidal forests, and to describe the community itself (Tomlinson, 1986; Wightman, 1989). They occur mainly in the tropics and sub-tropics.

Mangrove zonation

Mangrove vegetation typically displays band-like zonation patterns that have alternately been linked by various authors to soil type (mud, sand or peat), exposure to wave action, salinity, freshwater inflow from the hinterland and tidal influence.
While the width of a mangrove zone rarely exceeds 4 kilometres, a mangrove fringe may be found occurring upstream for many tens of kilometres, depending on the extent of saltwater intrusion, which in turn is determined by tidal amplitudes, river discharges and slopes.

Mangroves of Malaysia

Malaysia harbors approximately 11.7 percent of Southeast Asia's mangroves. In 1980, it extents to almost 670,000 hectares but has been reduced to about 570,000 by year 2000. However, the total area of mangrove forest gazetted as forest reserves and protected areas remain unclear (Giesen et al, 2007).

Importance of Mangroves

Mangroves are highly beneficial as they yield many valuable products while performing important functions that support coastal ecosystems and human populations. Some of their functions include:

• Shoreline protection

Mangroves are the first line of defense in protecting our shorelines from storm surges and waves.

• Sediment trapping/ Land stabilization

Mangroves play an important role in sediment binding and shoreline accretion. Sedimentation occurs as a result of water velocity reduction by mangrove vegetation and this process is intricately related to vegetation characteristics such as stem density and plant structure.

• Support to food web

Mangroves act as nurseries to many fish and invertebrates that begin their live cycle in these habitats. Besides providing food to young fry and larvae, the mangrove's extensive root network serves as a protective barrier for the young from predators.

• Carbon sequestration

Despite their low biomass, mangroves have the ability to sequester about 1.5 metric tons of carbon per hectare per year (Ong, 1993). Studies have shown that the upper layers of mangrove sediments have a high carbon content stored within them which will be released into the atmosphere if mangroves are lost or experience degradation from conversion and other anthropogenic activities.

• Economic livelihood

Mangroves support economically important coastal fisheries and are commonly utilized by coastal communities for harvesting wood and non-timber forest products including tannin, dyes and many other resources.

• Natural filtration system

Mangroves act as natural filters by absorbing excess nutrients and heavy metals. Thus, preventing these pollutants from contaminating natural waterways.

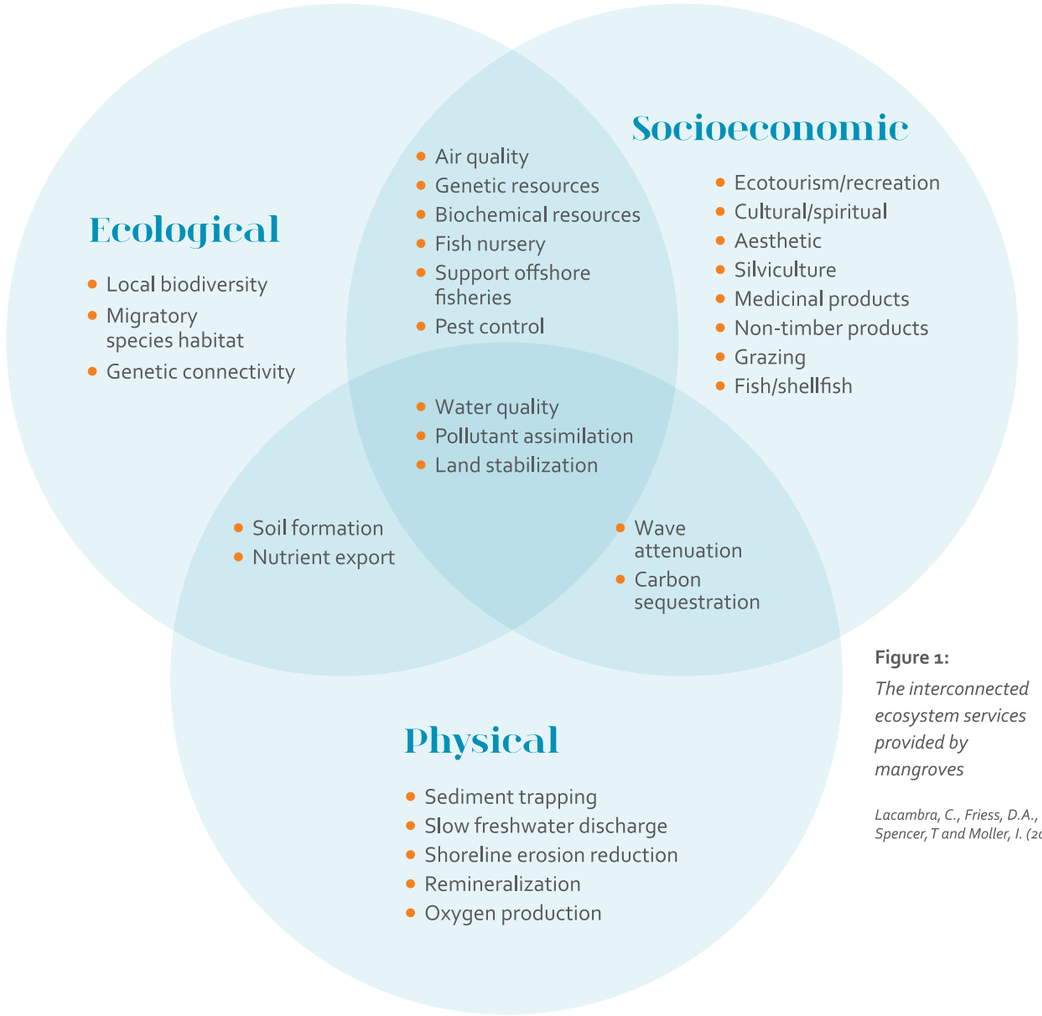


Figure 1:
The interconnected ecosystem services provided by mangroves

Lacambra, C., Friess, D.A., Spencer, T and Moller, I. (2013)

How Mangroves Adapt to Their Environment

Mangroves are mostly found in the tropics, lining the coastal areas, occupying the transition zone between land and sea. They live under extreme environmental conditions of high salinity levels, constant flooding, and unstable soils. In order to survive, mangroves have developed a number of features of help them overcome the challenges of their harsh living environment.

Excessive salt

Mangroves have little or no access to freshwater but live in areas of high salinity. To deal with excessive salt intake, many mangrove species have developed a series of mechanism to address the issue. Some mangrove species practice selective absorption through their roots system. When the roots come in contact with saltwater, the root membranes filter out the salt particles and and only water is absorbed.

Some species also actively remove salt from the tissues through special glands which in turn forms salt crystals on the leaf surface of the plants.

Loss of water

High temperatures in tropical climate means that mangroves are regularly exposed to transpiration and evaporation processes. Some species can restrict the opening of their stomata (small pores in the leaves where carbon dioxide and water vapour are exchanged during photosynthesis). This allows the mangroves to reduce the loss of water which is vital to its survival in a saline environment.

Mangroves are also able to turn their leaves to reduce surface area thus enabling them to reduce water loss through evaporation.

Unstable soil conditions

The muddy soils of mangrove swamps are often unstable and anaerobic. Regular changes within the soils depend on the prevailing sediment load from the river. To overcome adverse soil conditions, mangrove roots come in many different shapes and sizes. They provide structural support to the plants and facilitate gaseous exchange in the soft soils.

Low nutrient and low oxygen levels

In anaerobic (low oxygen) soil conditions, some mangrove species have pneumatophores which are filled with spongy tissue and contain small holes that allow oxygen to be transferred. During times of low nutrient availability, mangrove are able to grow more roots for greater nutrient absorption or grow new roots through the old ones to ensure that nutrient contents are not lost.

Reproduction adaptation

In a habitat of unstable soils coupled with long periods of saltwater inundation, it is difficult for mangrove species to reproduce successfully. Mangrove species are viviparous, meaning that they germinate before detaching themselves from the parent tree. Some seedlings are dispersed through water, floating for a period of time until they find soil and are able to put out roots but some develop heavy tap roots which penetrate directly into the mud when they drop.

Mangrove Vegetation

Family: Avicenniaceae

Scientific name: Avicennia alba

Local name: Api-Api putih

Uses:

- Used as low quality construction timber.
- Sap used to prevent pregnancy.
- Seedlings are cooked and eaten as a vegetable.
- Seeds are a source of resin and is made into an ointment to treat wounds and skin diseases.

Ecology: A pioneer species of mangrove swamps on sheltered shores, also in more saline parts, along tidal river banks and along the seashore.

*Have complex **horizontal roots and pneumatophores**. Pneumatophores are thin, finger-like and covered with lenticels. Their root system aid in land-building process by accumulating mud.*

Tree.

***Light orange flowers.** About 10-30 per cluster.*

***Long, pointed leaves. Glossy green on the surface and very pale (near white) beneath.** The surface is covered with numerous sunken dots.*

***Fruits are light green, elongated and chili-shaped with fine hair.** It is occasionally viviparous.*

*The whitish undersides of the leaves give the tree species canopy a **silvery-white appearance** from a distance.*

Mangrove Vegetation

Family: Avicenniaceae
Scientific name: Avicennia officinalis
Local name: Api-Api hudat

Uses:

- Fruits are edible.
- Wood used as fuel.
- Seedlings are cooked and eaten as a vegetable.
- Resin in bark used as contraceptive.

Ecology: Occurs around the landward margins of mangrove swamps, especially along tidal river banks and river mouths. Flowering occurs all year round.

Tree.

*Large, **rounded leaves, dark green above,** yellowish-green or bluish-grey beneath with numerous, sunken, glandular dot. Leaves are obovate, oblong-obovate or elliptic-oblong in shape.*

Fruits are yellowish and covered with short hair.

*Often develop **stilt roots** and always have pencil-like **pneumatophores**.*

Salt excretion through glands located on the leaf surface

Dark yellow-orange flowers which are rancid smelling.

Mangrove Vegetation

Family: Combretaceae

Scientific name: Lumnitzera littorea

Local name: Teruntum (Merah)

Uses:

- Commonly used as furniture wood due to its attractive colouring and durability.

Ecology: Found in soft, muddy substrate along the landward margin of mangroves where tidal inundation is rare or areas with freshwater. Flowers all year round. Pollinated by birds and water. Fruit is corky and buoyant.

Tree.

Knee-shaped pneumatophores.

Red flowers. *Strongly scented.*

Fruits are ***succulent, vase-shaped with reddish base.*** *The* ***corky,*** *buoyant fruit is well suited to water.*

Dark brown, longitudinally fissured bark.

Red stems. *Slightly fleshly, leathery and obovate-elliptic shape leaves. Leaves are usually crowded toward the end of the twigs.*

Mangrove Vegetation

Family: Rhizophoraceae

Scientific name: Bruguiera gymnorrhiza

Local name: Tumu merah, Tumu

Uses:

- The hard, red timber is used for foundation piling, mine timbers, house posts, furniture and cabinet works.
- Charcoal production.

Ecology: Dominates tall mangrove forest. Occurs in areas of low salinity and on somewhat dry, well-aerated soil; can tolerate both shaded and sunny sites. Found directly along the coastline. Flowers and fruit are present throughout the year.

Large flowers with hairy, orange-brown coloured petals.

*Column-shaped, evergreen **tree.***

Buttressed and knee roots.

Reddish interpetiolary stipules. *Leaves are leathery.* ***Dark green on top, light green at bottom.*** *Black dotted beneath and with a pointed tip, often reddish beneath.*

Bark is dark grey to brown in colour, usually smooth with lenticels.

Fruits are spirally rolled and round in cross section.

Mangrove Vegetation

Family: Rhizophoraceae

Scientific name: Ceriops tagal

Local name: Tengar, Tengah

Uses:

- Bark is used in obstetrical and haemorrhage cases.
- Tannin is obtained from the bark.
- Dye obtained from the bark is used in the "batik" industry.
- Timber useful for construction purposes as it has long lifespan when immersed in salt water.
- Firewood.

Ecology: Forms dense scrublands on the landward edge of tidal forests, in areas inundated by spring tides with well-drained soils. Species degenerates into a bushy shrub during unfavorable growth condition.

Grey, occasionally brown, smooth bark and with a flanged stem base.

Small tree or shrub.

Yellow cotyledonary collar.

Stilt roots.

Rounded, *glossy-green leaves.*

Dark green to brown propagules.

White flowers which soon turn brown, 5-10 per cluster.

Mangrove Vegetation

Family: Rhizophoraceae
Scientific name: Rhizophora apiculata
Local name: Bakau minyak

Uses:

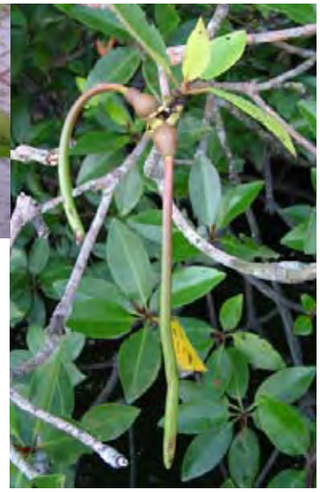
- Foundation piles, beams and outriggers of dugout canoes.
- Interior timber and furniture.
- Firewood.
- Branched stilt roots are made into anchors.
- Used in mangrove rehabilitation and plantation forestry.
- Charcoal production.

Ecology: Flooded by normal high tides. Tidal waterways with strong freshwater input on permanent basis also preferred. Found on deep, soft, muddy soils that are flooded by normal high tides. It avoids firmer substrates mixed with sand. Crabs may hamper regrowth by devouring or removing the bark of seedlings.
Flowers all year round.

Oblong to pear shaped, brown fruits. Rough exterior.

Tree.

Four brownish-yellow to reddish sepals. Petals with yellow to white.



The cylindrical hypocotyl is green with purple, club shaped. 18-38cm long. ***Red cotyledonary collar.***

Leaves are leathery, narrowly elliptic in shape. Dark green leaves with distinct light green zone along the midrib which is tinged reddish underneath.

Arching stilt roots and sometimes aerial roots from branches.

Mangrove Vegetation

Family: Rhizophoraceae

Scientific name: Rhizophora mucronata

Local name: Bakau kurap

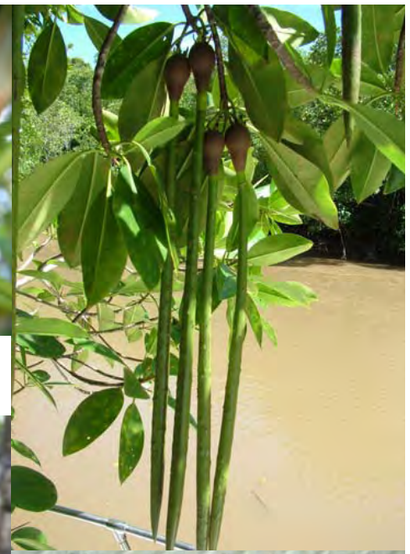
Uses:

- Used for timber as it is very heavy, hard and strong wood.
- Used for fuel and charcoal.
- Tannin in the bark used for tanning and dyeing, especially fishing lines and ropes.
- Occasionally used for treating hematuria (blood in urine) cases.

Ecology: Maybe planted along coastal fish ponds to protect dikes and bunds and used for making fish traps. In similar localities to *Rhizophora apiculata*, but more tolerant of sandy and firmer substrates. Generally grows in groups, seldom far from tidal water. Flowers all year round. Seedlings are often predated on by crabs. One of the important and widespread mangrove species.

Dark, almost black bark that is horizontally fissured.

Yellow calyx and white petals.



Fruit is brownish-green, elongated to egg-shaped. Cylindrical hypocotyl is rough and warty about 36-64cm long. ***Green cotyledonary collar.***

Broadly elliptic to oblong leaves. Leaves are leathery.

Stilt roots *and* ***aerial roots*** *growing from lower branches.*

Mangrove Vegetation

Family: Rubiaceae
Scientific name: Scyphiphora hydrophyllacea
Local name: Chengam

Uses:

- Wood may be used to make utensils.
- Larger specimens used for fence posts and firewood.
- Contain high amounts of tannin and dye.
- Leaves can be used to treat stomach problems.

Ecology: It appears to be intolerant of lengthy periods of freshwater inundation and usually occupies sites that are frequently inundated by the tide. Reported to occur at sites which are unsuited for colonization by other mangrove species, usually around banks of tidal waterways. Flowers throughout the year. Produces a lot of fruits but seed germination levels are relatively low.

Shrub or small tree.

Almost stemless white flower.

Fruit is cylindrical, green and ribbed.

Leaves are obovate-shape with red stems.

Prop-roots.

Mangrove Vegetation

Family: Sonneratiaceae
Scientific name: Sonneratia alba
Local name: Perepat

Uses:

- The fruit is sour and somewhat edible.
- Timber is used in various ways. From construction of houses and bridges to furniture and musical instruments.
- Fuel in periods of shortage.

Ecology: A pioneering species in mangroves. Intolerant of long periods of exposure to freshwater. Frequently found in coastal areas that are sheltered from strong wave action. Flowers are ephemeral and nocturnal, pollinated by hawk-moth, birds and fruit eating bats. Fireflies congregate on the trees at night. Fruit is buoyant due to the air-bearing tissue in the seed. Exhibits a great deal of morphological variation in the fruit. Hyrids are also known.

Cable roots, pneumatophores.

Tree: *Cream-coloured to brown bark, with smooth, fine, longitudinal fissures.*

Fruit is buoyant.

Petals are reddish with numerous long, white stamen. Flattened round berry. Bears persistent sepals at its base. Lots of morphological variation.

Leathery leaves. Leaves are obovate-ovate and opposite in arrangement.

Mangrove Vegetation

Family: Meliaceae
Scientific name: Xylocarpus granatum
Local name: Nyireh Bunga

Uses:

- Used to produce high grade furniture.
- Bark is collected for its high tannin content and red dye.
- Oil obtained from the seed is used as lamp oil and in hair grooming.
- Bark is used to treat cholera.
- Fruit is used to treat diarrhea.

Ecology: Occurs along banks of tidal creeks, landward margins of mangrove, and other brackish-water environments that are not too saline.

Cannon ball-like fruits.

Bark is yellowish and light brown in colour and flaky.

Low buttresses, plank or ribbon.

Obovate-shaped leaves.

10 -12 irregularly-shaped seeds.

Calyx is tinged with red. Petals are white and oval-shaped.

Mangrove Vegetation

Family: Arecaceae
Scientific name: Nypha fruticans
Local name: Nypa, Nipah

Uses:

- Syrup is extracted from flowers
- Production of alcohol, sugar and vinegar.
- Fronds are used for making thatch, umbrellas, hats, mats, baskets and cigarette papers .
- Seed is edible.
- Leaf stem fiber are used to produce rope, brooms and brushes.

Ecology: Grows on soft, fine-grained substrates fringing the upper limits of tidal waterways. Rarely occurring beyond the littoral zone. Requires high input of freshwater. Root system is dense and well adapted to resist running water. Pollination occurs through *Drosophila* flies. Fruits are fibrous. Air cavities in the seed coat and fruit coat aids water dispersal.

Female flower *Male flower*

Close up of Nypa.

Nypa is a riverine species which grows in brackish waters.

Fruiting body is spherical. The seeds are white and egg shaped.

Germinating fruit. Can be viviparous depending on environmental conditions.

Animal Life of Linting Wetlands

Birds

Mangroves and mudflats provide important breeding and feeding grounds for resident and migratory birds. Kingfishers, egrets, storks, eagles are some of the common birds sighted in this habitat. Birds occurring in mangroves may be quite similar to those of adjacent dryland forest.

Copper - throated Sunbird
(Nectarinia calcostetha)

Sunbirds are active diurnal birds. They are generally found in pairs but occasionally in small family groups. A few species may gather in larger groups, and they will join with other birds to mob potential predators. Sunbirds will also aggressively target other species, even if they are not predators, when defending their territories. They feed mainly on nectar but are known to eat insects too. The Copper-throated Sunbird is found mainly in mangroves, but also in coconut groves and coastal scrub.
Photo by: Lim Kim Chye

Ashy Tailorbird
(Orthotomus sepium)

Ashy tailorbirds are commonly found in mangroves, energetically foraging in the lower understorey; moving and calling constantly. Their diet consists of eating insects. Ashy Tailorbirds "sew" their nests out of large leaves.
Photo by: Lim Kim Chye

Collared Kingfisher
(Todiramphus chloris)

The White-collared Kingfisher is easily distinguished by its aquamarine-blue upper parts and head, black bill, thick white collar and entirely white underparts. Its diet varies according to the habitat it resides in. It is most commonly found in coastal areas, farmland, open woodland, grassland and gardens.
Photo by: Lim Kim Chye

Asian Glossy Starling
(Aplonis panayensis)

The Asian glossy starling is found in South-east Asia. Its natural habitats are subtropical or tropical moist lowland forests and subtropical or tropical mangrove forests though a huge number of this species are also found inhabiting towns and cities. They often move in large groups and are considered one of the noisiest species of birds.
Photo by: Lim Kim Chye

Mangrove Whistler
(Pachycephala grisola)

Mangrove whistlers are found along mangroves and adjacent coastal vegetation, including casuarina forests. They feed on insects and are often spotted in mixed-species flocks. They breed from March to June in Southeast Asia.
Photo by: Choy Wai Mun

Oriental Magpie Robin
(Copsychus saularis)

Magpie Robins are distinctive black and white birds. Their long tail is held upright as they forage on the ground or perch conspicuously. Commonly found in India and parts of Southeast Asia in urban gardens as well as forests. They are particularly well known for their songs and were once popular as cagebirds. Their diet consists of fruit, worms and insects.
Photo by: Lim Kim Chye

Little Heron
(Butorides striatus)

The striated heron is also known as mangrove heron, little heron or green-backed heron. They mainly eat small fish, frogs and aquatic insects. They sometimes lure their prey by dropping a feather or leaf on the water surface and picking at fish that come to investigate.
Photo by: Lim Kim Chye

Oriental Pied Hornbill
(Anthracoceros albirostris)

Often found outside primary forests, these birds still depend on large living trees for nesting sites. Diet consist mainly fruit, but they also take insects and small animals including reptiles, birds and mammals. Oriental pied-hornbills often forage in pairs or small groups.

Common Iora
(Aegithina tiphia)

The Common Iora is easily detected from its loud whistles and bright colours. During the breeding season, males display by fluffing up their feathers and spiral in the air appearing like a green, black, yellow and white ball. They are commonly found in forests, gardens, orchards, mangroves, and beach forests. Common Ioras are omnivores; their diet includes spiders, moths, caterpillars, and other similar insects that can be found on leaves. They also eat some fruit.
Photo by: Lim Kim Chye

Striped Tit-babbler
(Macronous gularis)

Striped Tit-babblers tend to forage in small flocks and can be observed creeping and clambering amongst low vegetation. They breed in the pre-monsoon season from February to July and build a loose ball shaped nest made from grasses and leaves.
Photo by: Lim Kim Chye

Brown-throated Sunbird
(Anthreptes malaccensis)

The brown-throated sunbird primarily feeds on nectar, but it will also take small fruits and berries. Juveniles are fed with insects. It is found in a wide range of semi-open habitats in south-east Asia, ranging from Myanmar to the Lesser Sundas and west Philippines.
Photo by: Lim Kim Chye

Common Sandpiper
(Actitis hypoleucos)

A gregarious bird and is seen in large flocks. The Common Sandpiper breeds across most of temperate and subtropical Europe and Asia, and migrates to Africa, southern Asia and Australia in winter. The Common Sandpiper forages by sight on the ground or in shallow water, picking up small food items such as insects, crustaceans and other invertebrates; it may even catch insects in flight.
Photo by: Lim Kim Chye

Hill Myna
(Gracula religiosa)

The common hill myna is often detected by its loud, shrill, descending whistles followed by other calls. It is most vocal at dawn and dusk, when it is found in small groups in forest clearings high in the canopy. Both sexes can produce an extraordinarily wide range of loud calls – whistles, wails, screeches, and gurgles, sometimes melodious and often very human-like in quality. Like most starlings, the hill myna is fairly omnivorous, eating fruit, nectar and insects.
Photo by: Lim Kim Chye

Whimbrel
(Numenius phaeopus)

This is a migratory species wintering on coasts in Africa, South America, south Asia into Australasia and southern North America. It is also a coastal bird during migration. It is fairly gregarious outside the breeding season.
Photo by: Lim Kim Chye

Crested serpent eagle
(Spilomis cheela)

The crested serpent eagle is a specialist reptile eater which hunts over forests, often close to wet grassland, for snakes and lizards.
Photo by: Lim Kim Chye

Lesser Sand Plover/Mongolian Plover
(Charadrius mongolus)

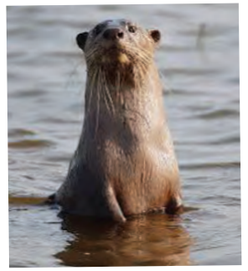
This chunky plover is long-legged and long-billed. The lesser sand plover's food is insects, crustaceans and annelid worms, which are obtained by a run-and-pause technique, rather than the steady probing of some other wader groups. This species takes fewer steps and shorter pauses than the greater sand plover when feeding.
Photo by: Lim Kim Chye

Mangrove Blue Flycatcher
(Cyornis rufigastra)

It is found in Brunei, Indonesia, Malaysia, the Philippines, Singapore, and Thailand. Its natural habitat is subtropical or tropical mangrove forests. It feeds on insects.
Photo by: Lim Kim Chye

Animal Life of Linting Wetlands

Mammals



Smooth-coated otters
(Lutrogale perspicillata)

Smooth-coated otters *(Lutrogale perspicillata)* are identified by their short and sleek fur which is dark to reddish brown along the back while the underside is light brown to almost grey in colour. Although they are often found in saltwater near the coast, they require a nearby source of fresh water. Their diet consists of fish, reptiles, frogs, insects, crustaceans, and small mammals. *Photo source: http://en.wikipedia.org/wiki/Smooth-coated_otter*

Wild boar
(Sus scrofa)

Wild boars are nocturnal creatures. Their activities commence shortly before sunset and continue throughout the night. They are omnivores that feed mainly on fruits, seeds, tapioca, earthworms, molluscs, crabs and even fishes. Feeding is generally a social activity where they spend around 4-8 hours each day for foraging or travelling to feeding areas. It is found in a wide range of habitats from forests to farmlands or plantations and can even be found at high elevations too.

Long tailed macaque/ crab-eating macaque (Macaca fascicularis)

The most common species of monkey found in Malaysia. Has a distinctive head shape, pinkish faces and muscular bodies. Common in coastal areas and along large rivers but adapts well to a range of habitat including peat swamp and mangrove forest, also can be found in agricultutal areas that near to primary and secondary forest.

Plantain squirrel
(Callosciurus notatus)

This is a diurnal and arboreal species which occasionally descend to ground for forage. It is able to tolerate living in disturbed forests and often enter fruit orchards. Mostly feed on fruits but also some arthropods like prawns and crabs.
Photo source: Lim Kim Chye

Animal Life of Linting Wetlands

Reptiles & Amphibians

Few amphibians can survive the saline mangrove environment, but certain species of frogs are nevertheless fairly common.

Reptiles commonly occurring among mangroves are the estuarine crocodile, water monitor, mangrove snake and Wagler's pit viper.

Mangrove Cat-Snake
(Boiga dendrophila)

This species is often found on branches near or overhanging water. The head is black while the body and tail are glossy black with narrow yellow bars. It feeds on small mammals such as squirrel and tree shrews, also feeds on frogs and unguarded eggs.
Photo source: J. Howes

Water Monitor Lizard
(Varanus salvator)

The Water Monitor Lizard is one of the largest lizards in the world and can be identified by the long, flattened snout which bears oval nostrils close to the tip. It feeds mainly on crabs and frogs but also includes eggs, nestling birds, small mammals, lizards, large invertebrates and carrion. This species is commonly spotted on mangrove vegetation, peat swamp and cultivated lands.

Mudskipper

Animal Life of Sungai Belungkor

Fish

Mangroves are highly important breeding and bursary habitats for many fish species, including commercial fish species. Almost 50% of fish landings are associated with mangroves.

Archer fish
(Toxotes jaculator)

The archer fish is probably the most famous fish species found in mangroves due to its ability to 'shoot' their land-based prey with water droplets using their mouth. Also commonly found in estuaries and open oceans.
Photo by: Erwin Luesink

Mudskippers are amphibious fish meaning that they can use their pectoral fins to walk on land. This unique characteristic of mudskippers allows them to adapt to intertidal habitats.

Mudskippers are quite active when out of water, feeding and interacting with one another, for example to defend their territories.

Animal Life of Linting Wetlands

Crustaceans

Crustaceans form a large group of arthropods which include crabs, prawns, barnacles and lobsters.

Crabs

Crabs are found in abundance in mangroves. The mangrove tree-climbing is a dark blue-brown crab often found on tree trunks during high tides. They are mainly herbivores that feed on algae, leaves and animal matter.

Hermit crabs

Hermit crabs use an empty sea shell as a portable house to protect themselves. As the hermit crab grows in size, it has to find a larger shell. They are scavengers that feed on rotting flesh or plants. When threatened, they retreat into their shell and block the entrance with their pincers to protect themselves.

Prawns

Juvenile prawns are often found in the estuarine mangrove swamps in large numbers in search of food, especially plankton. The conversions of mangroves into shrimp farms are detrimental to the environment.

Molluscs

Molluscs are soft-bodied creatures, often covered with hard shell. They are divided into several groups but commonly found in mangroves are the bivalves (cockles, mussels and oysters) and gastropods (horn shells and snails).

Animal Life of Sungai Belungkor

Chelicates

Horseshoe crabs

Horseshoe crabs are also known as king crabs. Though they belong to the arthropoda family along with crabs, insects and other invertebrates, their closest living relatives are actually spiders and scorpions. Interesting fact: It is assumed that the tail is used to ward off enemies but it is actually used to right themselves when they are turned upside down.

Activities to Pursue

Linting Wetlands is a great place to visit. There is something for everyone. Activities are carried out by members of the local community as a source of secondary income and to promote greater awareness on the importance of mangrove conservation.

River Safari

Take a cruise along the Belungkor River to learn more about the mangrove ecosystem and its importance.

Mangrove Replanting

Contribute to the rehabilitation and conservation of degraded mangrove forests. Purchase one or a few mangrove saplings from the mangrove nursery to participate in a mangrove replanting activity.

Bird Watching/ Wildlife Spotting

The Belungkor mangroves are home to a high number of bird and animal species. It is a great place to spend time bird watching or wildlife spotting.

Photography

Photography enthusiast will not be disappointed with the beautiful landscapes surrounding the area as you travel through hidden creeks along the mangroves.

Jong Racing

Come experience crafting a Jong with the locals and learn how to operate it. Even better, participate in Jong racing competitions with the locals if the time is right (usually from December to February).

Local Cuisine

Foodies will not be disappointed by what the vilage has to offer. Ranging from seafood to local cakes, there's always something that will appeal to your tastebuds.

Trekking

Explore the mangrove forest through foot and spot some wildlife along the way such as otters and birds. If traipsing through mud is not your cup of tea, try hiking up Bukit Belungkor.

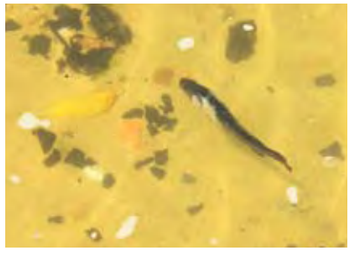
Activities to Pursue

Fishing

Learn of the various traditional fishing techniques – known as "Kelong" and "Empang" and maybe go fishing with the local fisherfolk.

Beach Exploration

A stroll along the coast will yield many pleasant surprises – waders that feed on the mudflats during migratory season, hermit crabs scurrying across the sand.



Fireflies Watching

Get up close and personal with the "stars" of the forest and enjoy the night breeze as you cruise along the river.

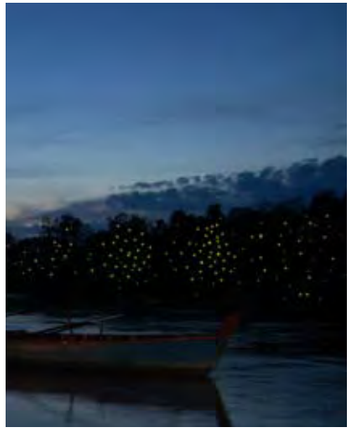


Photo source: http://mdks.gov.my/

Language Guide

Do not be intimidated by the language barrier? Below are some basic words to help you communicate with the community.

English	*Malay*
Hello	*Helo*
How are you?	*Apa khabar?*
I'm fine	*Khabar baik*
Thank you	*Terima kasih*
Yes	*Ya*
No	*Tidak*
I don't understand	*Saya tidak faham*
What is this?	*Apakah ini?*
Help	*Tolong*
Stop	*Henti*
I	*Saya/Aku*
You	*Kamu/Anda*
Eat	*Makan*
Drink	*Minum*
Where is the...	*Di manakah...*

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Appendix

Table 1: List of mangrove vegetation recorded at Linting Wetlands and its tributaries

No.	Family	Scientific Name	Local Name
1.	Acanthaceae	*Acanthus ilicifolius*	Jeruju putih
2.	Avicenniaceae	*Avicennia alba*	Api-api putih
3.	Avicenniaceae	*Avicennia officinalis*	Api-api ludat
4.	Combretaceae	*Lumnitzera littorea*	Teruntum merah
5.	Combretaceae	*Lumnitzera racemosa*	Teruntum putih
6.	Meliaceae	*Xylocarpus granatum*	Nyireh bunga
7.	Meliaceae	*Xylocarpus moluccensis*	Nyireh batu
8.	Myrsinaceae	*Aegiceras corniculatum*	Kacang-kacang
9.	Rhizophoraceae	*Bruguiera cylindrica*	Berus
10.	Rhizophoraceae	*Bruguiera gymnorrhiza*	Tumu merah
11.	Rhizophoraceae	*Bruguiera hainesii*	Bakau mata buaya
12.	Rhizophoraceae	*Bruguiera parviflora*	Lenggadai
13.	Rhizophoraceae	*Ceriops tagal*	Tengar
14.	Rhizophoraceae	*Rhizophora apiculata*	Bakau minyak
15.	Rhizophoraceae	*Rhizophora mucronata*	Bakau kurap
16.	Rubiaceae	*Scyphiphora hydrophyllacea*	Chingam
17.	Sapindaceae	*Allophyllus cobbe. Var. limosus*	-
18.	Sonneratiaceae	*Sonneratia alba*	Perepat
19.	Sonneratiaceae	*Sonneratia ovata*	Gedabu
20.	Sterculiaceae	*Heritiera littoralis*	Dungun

Table 2: Checklist of fish and invertebrates species found in Linting Wetlands and its tributaries

No.	Family	Species	Local Name
1.	Ariidae	*Nemapteryx caelata*	duri, duri lorek
2.	Ariidae	*Arius venosus*	bedukang, duri
3.	Ariidae	*Arius maculatus*	duri, otel
4.	Carangidae	*Carangidae sp*	talang
5.	Clupeidae	*Anodontostoma chacunda*	selangat
6.	Clupeidae	*Hilsa kelee*	bengkalis, tamban
7.	Dasyatidae	*Himantura walga*	pari tanjung, ketuka
8.	Engraulidae	*Setipinna taty*	bilis, kasai janggut
9.	Engraulidae	*Thryssa hamiltonii*	kasai
10.	Engraulidae	*Thryssa mystax*	bakok, kasai
11.	Engraulidae	*Coilia dussumieri*	bulu ayam
12.	Ephippidae	*Platax orbicularis*	telinga gajah
13.	Hemiscylliidae	*Chiloscyllium indicum*	yu bodoh
14.	Latidae	*Lates calcarifer*	siakap
15.	Leiognathidae	*Leiognathus brevirostris*	kekek
16.	Leiognathidae	*Gazza minuta*	kekek
17.	Leiognathidae	*Karalla daura*	kekek
18.	Leiognathidae	*Photopectoralis bindus*	kekek
19.	Lutjanidae	*Lutjanus johnii*	tanda, jenahak
20.	Mugilidae	*Ellochelon vaigiensis*	loban, belanak

Table 2: Checklist of fish and invertebrates species found in Linting Wetlands and its tributaries

No.	Family	Species	Local Name
21.	Mugilidae	*Chelon subviridis*	belanak
22.	Paralichthyidae	*Pseudorhombus arsius*	lidah, sebelah
23.	Platycephalidae	*Platycephalus indicus*	baji, bebaji
24.	Plotosidae	*Plotosus canius*	semilang
25.	Pristigasteridae	*Ilisha melastoma*	beliak mata,puput
26.	Pristigasteridae	*Ilisha elongata*	beliak mata, puput
27.	Scatophagidae	*Scatophagus argus*	kitang
28.	Sciaenidae	*Johnius carouna*	gelama
29.	Sciaenidae	*Pennahia anea*	gelama, gelama pisang
30.	Sciaenidae	*Johnius borneensis*	gelama, gelama tukul
31.	Sciaenidae	*Johnius belangerii*	gelama, gelama panjang
32.	Sciaenidae	*Dendrophysa russelii*	gelama, gelama tikus
33.	Siganidae	*Siganus guttatus*	debam, dengkis, ketang
34.	Sillaginidae	*Sillago sihama*	bulus, bulus-bulus
35.	Tetraodontidae	*Lagocephalus lunaris*	buntal, buntal pisang
36.	Tetraodontidae	*Chelonodon patoca*	buntal, buntal pisang
37.	Triacanthidae	*Triacanthus biaculeatus*	ikan lembu
38.	Trichiuridae	*Trichiurus lepturus*	timah

Table 2: Checklist of fish and invertebrates species found in Linting Wetlands and its tributaries

No.	Family	Species	Local Name
39.	Harpiosquillidae	*Harpiosquilla raphidea*	udang lipan
40.	Limulidae	*Carcinoscorpius rotundicauda*	belangkas
41.	Limulidae	*Tachlypeus gigas*	DD
42.	Muricidae	*Murex strapa*	-
43.	Peneaidae	*Peneaus indicus*	udang kertas
44.	Peneaidae	*Alcockpenaeopsis hungerfordii*	-
45.	Peneaidae	*Metapeneaus brevicornis*	-
46.	Peneaidae	*Metapeneaus ensis*	udang pasir, udang minyak
47.	Peneaidae	*Peneaus monodon*	udang harimau
48.	Peneaidae	*Peneaus penicillatus*	-
49.	Portunaidae	*Portunus pelagicus*	ketam bunga
50.	Portunaidae	*Thalamita crenata*	-
51.	Sepiidae	*Sepia sp*	sotong katak
52.	Squillidae	*Chloridopsis scorpio*	udang lipan

Table 3: List of Birds Found at Sungai Belungkor and Its Tributaries

No.	Common Name	Scientific Name	Resident/ Migrant Status	National Protection Status
1	Grey Heron	*Ardea cinerea*	R,M	TP
2	Little Heron	*Butorides striatus*	R,M	TP
3	Pond Heron sp.	*Ardeola sp.*	N/A	N/A
4	Little Egret	*Egretta garzetta*	R,M	TP
5	Great Egret	*Casmerodius albus*	R,M	TP
6	Osprey	*Pandion haliaetus*	M	TP
7	White-bellied Sea-Eagle	*Haliaeetus leucogaster*	R	TP
8	Crested Serpent Eagle	*Spilornis cheela*	R	TP
9	Changeable Hawk-Eagle	*Spizaetus cirrhatus*	R	TP
10	Black-shouldered Kite	*Elanus caeruleus*	R	TP
11	Red Junglefowl	*Gallus gallus*	R	P(1)
12	White-breasted Waterhen	*Amaurornis phoenicurus*	R,M	P(1)
13	Mongolian Plover	*Charadrius mongolus*	M	P(1)
14	Greater Sandplover	*Charadrius leschenaultii*	M	P(1)
15	Eurasian Curlew	*Numenius arquata*	M	P(1)
16	Whimbrel	*Numenius phaeopus*	M	P(1)
17	Common Sandpiper	*Actitis hypoleucos*	M	P(1)
18	Curlew Sandpiper	*Calidris ferruginea*	M	P(1)
19	Sanderling	*Calidris alba*	M	P(1)

Table 3: List of Birds Found at Sungai Belungkor and Its Tributaries

No.	Common Name	Scientific Name	Resident/ Migrant Status	National Protection Status
20	Red-necked Stint	*Calidris ruficolis*	M	P(1)
21	Ruddy Turnstone	*Arenaria interpres*	M	P(1)
22	Great Crested Tern	*Sterna bergii*	R,M	TP
23	Lesser Crested Tern	*Sterna bengalensis*	R,M	TP
24	Pink-necked Green Pigeon	*Treron vernans*	R	P(1)
25	Green Pigeon sp.	*Treron sp.*	N/A	N/A
26	Green Imperial Pigeon	*Ducula aenea*	R	TP
27	Spotted Dove	*Streptopelia chinensis*	R	NP
28	Zebra Dove	*Geopelia striata*	R	NP
29	Green-winged Pigeon	*Chalcophaps indica*	R	P(1)
30	Asian Koel	*Eudynamys scolopacea*	R,M	TP
31	Chestnut-bellied Malkoha	*Phaenicophaeus sumatranus*	R	TP
32	Large-tailed Nightjar	*Caprimulgus macrurus*	R	TP
33	Savanna Nightjar	*Caprimulgus affinis*	R	NP
34	Swiftlet sp.	*Aerodramus sp.*	R	TP?
35	Common Kingfisher	*Alcedo atthis*	R,M	TP
36	Stork-billed Kingfisher	*Halcyon capensis*	R	TP
37	White-throated Kingfisher	*Halcyon smyrnensis*	R	TP
38	Collared Kingfisher	*Todiramphus chloris*	R,M	TP

Table 3: List of Birds Found at Sungai Belungkor and Its Tributaries

No.	Common Name	Scientific Name	Resident/ Migrant Status	National Protection Status
39	Blue-tailed Bee-eater	*Merops philippinus*	R,M	NP
40	Oriental Pied Hornbill	*Anthracoceros albirostris*	R	TP
41	Banded Yellownape	*Picus miniaceus*	R	TP
42	Mangrove Pitta	*Pitta megarhyncha*	R	NP
43	Barn Swallow	*Hirundo rustica*	M	TP
44	Pacific Swallow	*Hirundo tahitica*	R	TP
45	Common Iora	*Aegithina tiphia*	R	TP
46	Yellow-vented Bulbul	*Pycnonotus goaivier*	R	NP
47	Greater Racquet-tailed Drongo	*Dicrurus paradiseus*	R	TP
48	Black-naped Oriole	*Oriolus chinensis*	R,M	TP
49	House Crow	*Corvus splendens*	R	NP
50	Large-billed Crow	*Corvus macrorhynchos*	R	NP
51	Striped Tit Babbler	*Macronous gularis*	R	TP
52	Oriental Magpie Robin	*Copsychus saularis*	R	NP
53	White-rumped Shama	*Copsychus malabaricus*	R	TP
54	Golden-bellied Gerygone	*Gerygone sulphurea*	R	TP
55	Arctic Warbler	*Phylloscopus borealis*	M	TP
56	Ashy Tailorbird	*Orthotomus sepium*	R	TP
57	Common Tailorbird	*Orthotomus sutorius*	R	TP

Table 3: List of Birds Found at Sungai Belungkor and Its Tributaries

No.	Common Name	Scientific Name	Resident/ Migrant Status	National Protection Status
58	Rufous-tailed Tailorbird	*Orthotomus sericeus*	R	TP
59	Yellow-bellied Prinia	*Prinia flaviventris*	R	TP
60	Mangrove Blue Flycatcher	*Cyornis rufigastra*	R	NP
61	Pied Fantail	*Rhipidura javanica*	R	TP
62	Mangrove Whistler	*Pachycephala grisola*	R	TP
63	Asian Glossy Starling	*Aplonis panayensis*	R	NP
64	Common Myna	*Acridotheres tristis*	R	NP
65	Javan Myna	*Acridotheres javanicus*	R	NP
66	Hill Myna	*Gracula religiosa*	R	P(2)
67	Brown-throated Sunbird	*Anthreptes malaccensis*	R	TP
68	Copper-throated Sunbird	*Nectarinia calcostetha*	R	TP
69	Olive-backed Sunbird	*Nectarinia jugularis*	R	TP
70	Scarlet-backed Flowerpecker	*Dicaeum cruentatum*	R	TP
71	Eurasian Tree-Sparrow	*Passer montanus*	R	NP
72	Scaly-breasted Munia	*Lonchura punctulata*	R	NP

Notes:
Adapted from MNS-Bird Conservation Council (2005), Checklist of the Birds of West Malaysia.

Resident/Migrant Status refers to:
R = Resident in West Malaysia
M = Migratory, includes species subject to local movements
N/A = Not available

National Protection Status (subject to review in August 2005) refers to:
TP = Totally Protected
P(1) = Permit required to hunt species
P(2) = Permit required to keep species
NP = Not Protected
N/A = Not available

Notes