

## THE USE OF MANGROVES IN MALAYSIA

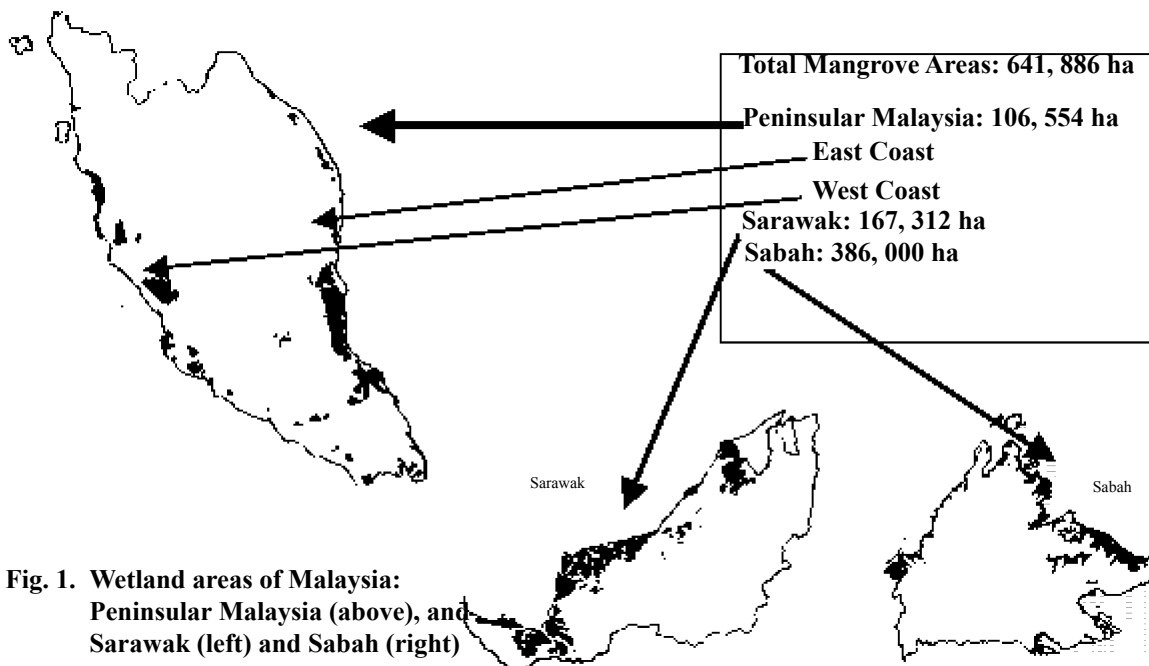
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### OVERVIEW

#### *Mangrove Areas*

Malaysia's coastline is estimated to be 4,810 km distributed along the West Coast Peninsular Malaysia (1110 km), East Coast of Peninsular Malaysia (860 km), Sabah (1800 km) and Sarawak (1040 km). Malaysia has a land area of about 329,758 km<sup>2</sup> and about 150,000 km<sup>2</sup> of territorial waters and an Exclusive Economic Zone of 450,000 km<sup>2</sup>. The mangrove forests in Malaysia, occur mainly along the west coast of Peninsular Malaysia, at the estuaries of Sarawak (1<sup>st</sup> Division), Rejang (6<sup>th</sup> Division) and Trusan-Lawas (5<sup>th</sup> Division) rivers of Sarawak and along the east coast of Sabah.

Mangroves comprise less than 2% of the total land area in Malaysia. There are 641,886 ha of mangrove forests in Malaysia, of which 57% are found in Sabah and 26% in Sarawak and the remaining 17% in Peninsular Malaysia. Figure 1 shows the wetland (mangrove and swamp forest) areas in Malaysia. Of the total, 441,092 ha or 69% have been gazetted as forest reserves. Currently, there are a total of 112 mangrove forest reserves in the country. These reserves form part of the country's Permanent Forest Reserve (PFR), which is managed sustainably for both production and protection by the Forestry Department.



**Fig. 1. Wetland areas of Malaysia:**  
Peninsular Malaysia (above), and  
Sarawak (left) and Sabah (right)

In Peninsular Malaysia, mangrove forests account for about 106,544 ha of land. Of this total, about 88,667 ha (83.2%) are gazetted as PFRs while the remaining 17,867 ha (16.85%) are Stateland Mangroves (Table 1). There are 74 mangrove forest reserves of which 54 reserves occur on the West Coast, 13 reserves occur on the East Coast and the remaining 7 reserves occur along the Straits of Johore.

In Sabah, mangrove forests cover 73% of its 1800 km coastline and are found mainly on the East Coast, West Coast as well as estuaries of the Klias and Padas Rivers. Mangroves in Sabah cover a greater area than in any other state in Malaysia. The extent is about 368,000 ha or 57% of the country's total. About 86% is designated as PFEs with only 14% remaining as Stateland Forests.

**Table 1: Extent of mangrove forest reserves and stateland mangroves in Malaysia (Area in hectares - ha)**

State	Forest Reserve	Stateland	Total
Johore	17,029	8,050	25,079
Kedah	7,949	-	7,949
Kelantan	-	-	-
Malacca	338	100	438
Negeri Sembilan	540	727	1,267
Pahang	2,483	8,990	11,473
Penang	451	-	451
Perak	43,502	-	43,502
Perlis	-	-	-
Selangor	15,090	-	15,090
Terengganu	1,295	-	1,295
Sabah	317,423	49,927	367,350
Sarawak	34,992	133,000	167,992
<b>TOTAL</b>	<b>441,092</b>	<b>200,794</b>	<b>641,886</b>

### ***Role and Potential of Mangroves in the National Economy***

The values of the mangrove resources are many and of great importance to the socio-economy of the country. However, some of these values are intangible and very little is appreciated by most people especially the urban dwellers. The importance of these resources is derived from the direct products taken from the mangrove forests as well as from the amenities provided by the resource from within and beyond their boundaries.

Products taken from the mangrove forests are mainly wood for charcoal, poles and firewood. In terms of economic value per hectare per annum of timber, the mangrove forests have been amongst the most valuable in the country. The leaves of the nipah palm, (*Nypa fruticans*), are used for making roof thatches and cigarette wrappers, while the inflorescences are tapped for nipa sugar for conversion into alcohol. In Sabah and Sarawak, mangrove timber is an important source of wood-chips for the manufacture of rayons.

### **ROLE OF MANGROVES AS FISHERY RESOURCE**

Mangrove ecosystems are important for the maintenance of the local coastal fishery industry in Malaysia. The fisheries products that are harvested from the mangrove ecosystem include many shrimp species, which are caught in the mangrove waterways or in adjacent coastal waters. Edible mud crab (*Scylla serrata*) and gastropods (*Cerithidea spp.*) are common in the mangroves while cockles (*Anadara granosa*) are abundant in mud flats. Together, they provide an important commercial food source. It is estimated that through the fishing industry alone, the mangroves of Peninsular Malaysia contribute RM650 million annually to the national economy. As a whole, Malaysia's wetlands directly or indirectly contribute more than RM5 billion to the economy every year.

Under natural conditions, mangrove forests act as seaward barriers against coastal erosion and help stabilize the coastline. The mangrove environment is also a spawning and nursery ground for many marine shrimps and fishes. Detritus and nutrients exported out of the ecosystem through tidal flushing form the food base for marine micro-organisms, which in turn support the valuable estuarine and near shore fisheries.

It is interesting to note that on the West Coast of Peninsular Malaysia, where most of the mangroves are found, shrimps are caught throughout the year. On the East Coast of Peninsular Malaysia, where little mangroves occur, shrimps are only caught during the months of November to March, when the current is moving south from the Gulf of Thailand.

In Malaysia, the total landing of shrimps (2001) was 77,465 mt. On the West Coast of Peninsular Malaysia where the bulk of the mangroves are found, the total landing of shrimps was 49,324 mt as compared to 5632 mt landed on the East Coast, 12,221 mt in Sarawak, 9779 mt in Sabah and 509 mt in Labuan. The total value of shrimp landing for the year was RM875 million.

In 2001, the total fish contribution from brackishwater aquaculture was 133,559 mt. The culture of cockles in mangrove mud flats in Peninsular Malaysia, is the most important brackishwater culture in terms of production, and contributes to over 90% of the mariculture production. Around 4700 ha of mud flats, are utilized for this culture and the production in 2001 was 70,815 mt valued RM 55,731,480 (53%). Cockles are mainly cultured in the West Coast mangrove shores off the states of Penang, Perak and Selangor.

In Malaysia, the area under brackishwater aquaculture (ponds) constitutes less than 1% of the total mangrove area; another 30% are utilized for various purposes - human settlements, ports, jetties, airports, tourist resorts, industries, and agriculture. Other brackishwater aquaculture related activities and its contribution to fish production in 2001 include oyster culture (264 mt), semi-intensive culture of tiger shrimps (29,147 mt), mussel culture (6880 mt), seaweed culture (18,862 mt) and fish cage culture (7591 mt).

## **PROTECTION AND DEVELOPMENT OF MANGROVE AREAS**

By virtue of their large landmass, Sabah and Sarawak account for 83.5% of all mangrove areas in Malaysia. Sabah, alone has 57% of the total mangroves in Malaysia. In 1990, it was estimated that there were about 650,000 ha of mangroves in Malaysia. It has been reported that between 1970-1990, an estimated 20% of mangroves (130,000 ha) have had their uses converted. By 1994, forest reserves under mangrove status comprise only 441,000 ha. Hence, about one third of the mangroves have been degazetted over a 25-year period, or about 8000 ha per year. Mangrove areas have been converted mainly for agricultural purposes through bonding of shoreline areas.

The Larut Matang Mangrove Forest Reserve in the West Coast of Peninsular Malaysia, widely regarded as the best managed mangrove forest in the world, has been sustainably utilized for timber since the 1920s. Its total annual revenue from timber has been estimated at US\$6.0 M with about US\$450,000 going to the State as royalty and other taxes. This area came under reservation as early as 1902 and it was not until 1906 that the whole of the Matang Mangroves were finally gazetted covering an area of approximately 40,000 ha. This forest is a State Government Reserve, created by a Gazette Notification under the Forest Laws, National Forestry Act 1984. The Matang Mangroves is managed by the State Forestry Department of Perak whereas the District Forest Office of Larut-Matang is directly responsible for the implementation and monitoring of the Work Plan.

The Forestry Department of Peninsular Malaysia provides the general supervision and policy guidelines in the management, conservation and preservation of the reserves. The Matang Mangroves has almost a century of management history so well documented through the numerous working plan and diligently prepared to ensure maximum benefit to the communities.

The Matang Mangroves Working Plans have also become a reference material in the management, silviculture and conservation of mangrove forests. The Management Plan involves felling cycles of about 30 years with planting (of selected species) where natural regeneration is poor or absent. Management is centered on the production of charcoal, poles and firewood.

National Parks or conservation areas of mangroves ensure posterity while the conservation of mangroves through sustainable yield management ensures prosperity. According to statistics of 1993, there are 5670 areas of gazetted mangrove conservation areas in Malaysia. Among them are:

- a. the Kuala Selangor Nature Park (about 320 ha), the largest protected mangrove area in Peninsular Malaysia. A Non-Governmental Body has put up a commendable and very successful effort to develop the necessary infrastructure for an educational site.
- b. Kuala Gula Mangroves in Perak – This is one of the bestknown bird nesting site in mangroves in the country. This is also part of the Matang Forest Reserve.

## **LAWS, RULES, REGULATIONS AND POLICIES ON MANGROVES**

### ***Existing Legal Framework***

Under the Federal Constitution of Malaysia, land matter falls under the jurisdiction of different State Governments. The National Land Code 1965 is an act, which introduced a uniform system for land administration in Peninsular Malaysia. Provisions under this Act include the vesting of unalienated land within a state in the state authority, including minerals and rock materials. However, for any land, which is being alienated, the power to approve or refuse an application rests with the State Authority with reference to the Town and Country Planning Department or local authority so that the land approved for the development will be in accordance with any plan proposed for a certain area.

The National Land Council was established to play a role in resolving land-use issues and facilitated the adoption of a comprehensive and co-ordinated approach in land use planning. Other related acts include the Town and Country Planning Act 1974 (Amended 1994), formulation of Structure and Local Plans and the Land Conservation Act 1960.

### **NATIONAL FORESTRY ACT 1984 AND ENVIRONMENTAL QUALITY ACT 1974 (AMENDED 1985)**

The National Forestry Act 1984 provides for the administration, management and conservation of forests and forest developments within the states in Peninsular Malaysia. The states of Sabah and Sarawak have their own state laws on forestry. Section 7(1) of the National Forestry Act 1960 provided the state to gazette any land as a permanent forest reserve. To enhance the effectiveness in forestry enforcement, the National Forestry Act 1984 was amended in 1993 and the Environment Quality (Prescribed Activities) Environmental Impact Assessment (EIA) Order 1987 is used with the National Forestry Act to protect the forest environment and biodiversity, in particular the logging of natural forests. Guidelines for the environment impact assessment (EIA) have also been drawn up to assist the proponents of major development projects to meet environmental standards. Some type of activities which are subjected to Environment Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987 are agriculture, airport, drainage and irrigation, land reclamation, fisheries, forestry, housing, industry, infrastructure, housing, industry, infrastructure, ports, mining, petroleum, power generation and transmission, quarries, railways transportation, resort and recreational development, waste treatment and disposal, water supply and development of hill-slopes and golf courses, etc.

## ***Fisheries Act 1985***

The Fisheries Act 1985 is the most recent Act implemented to manage, develop, conserve and control marine fishing and marine fisheries resources in Malaysian fisheries waters. The objective of this Act is to provide for better conservation, management and development of fisheries in Malaysia. Briefly, the Act covers:

- Administration of fisheries in Malaysia
- Licensing and management of local/estuarine fishing operations
- Control of fishing by foreign fishing vessels in Malaysian fisheries waters
- Offences, prohibitions and control of certain methods of fishing.
- Establishment of marine parks and marine reserves
- Offences and legal procedures relating to the implementation of the Act.

The fisheries regulations that have been made under the Fisheries Act include the following:

**a. Fisheries (Marine Culture System) Regulations 1990**

This regulation provides for procedures for the application of permit for the establishment of marine culture systems such as cage culture, pole culture, etc. and licensing of such systems with conditions attached. This regulation is for the control of aquaculture activities and to control pollution arising from such culture systems.

**b. Fisheries (Maritime) Regulations 1967**

This regulation provides for procedures for the application of licences for different types of fishing crafts with licence fees, deposits and conditions attached to such licences. This regulation is applicable in the maritime waters off the East Coast and West Coast of Peninsular Malaysia.

**c. Fisheries (Maritime) Regulations (Sarawak) 1976**

This regulation is applicable in the waters off the coast of Sarawak. This regulation provides for procedures for the application of fishing craft licences, licence fees, deposits and conditions attached to the licences for different types of fishing appliances.

**d. The Fisheries Regulations (1964)**

This regulation is applicable in the waters off the coast of Sabah. This regulation also provides for procedures for the application of fishing craft licences, licence fees, deposits and conditions attached to the different fishing appliances licences.

**e. Establishment of Marine Parks & Marine Reserves Order 1994**

The waters around 42 islands in the Malaysian fisheries waters have been gazetted as Marine Parks Malaysia. Fishing and collection of fish and other aquatic animals in these gazetted areas are prohibited.

**f. Fisheries (Conservation & Culture of Cockles) Regulations 2002**

This regulation is for the management, control and licensing for the collection of adult cockles and cockle spats from natural spatfall and culture areas. The size for the collection of adult cockles and cockle spats is also determined in this regulation and there is also a fee charged for the licence to collect cockles.

**g. Fisheries (Prohibition of Methods of Fishing) Regulations 1980**

This regulation prohibits unsustainable fishing practices such as use of dynamites and poison, and electric fishing, pair trawl, beam trawl and drift gill nets of more than 10 inches for catching rays, etc.

**h. Fisheries (Licensing of Local Fishing Vessels) Regulations 1985**

This regulation is for the licensing of local fishing vessels. It provides for the procedures to licence fishing vessels with conditions for marking of vessels, fees and deposits payable.

**i. Fisheries (Close Season for the Catching of Grouper Fry) Regulations 1996**

This regulation is applicable in the state of Kelantan and Trengganu only. Fishing of grouper fry during the month of November to December is prohibited unless permitted by the Director-General of Fisheries.

**j. Fisheries (Prohibited Fishing Methods for the Catching of Grouper Fry) Regulations 1996**

This regulation prohibits the collection of grouper fry in lagoons and estuary of rivers unless licensed to do so. Only fish traps can be used to catch grouper fry in the lagoons and estuary of rivers.

**k. Fisheries (Prohibited Areas) Rantau Abang Regulations 1991**

This regulation has gazetted the areas in Rantau Abang, Trengganu as a prohibited area for fishing unless permitted. The purpose of this regulation is for the protection of turtles that beaches in Rantau Abang to lay eggs and this area has been declared a turtle sanctuary.

**l. Fisheries (Prohibited Areas) Regulations 1994**

The waters around the islands in Sarawak have been gazetted as fisheries protected area. Collection of shells, mollusks and corals is prohibited. Fishing is prohibited unless licensed to do so.

**m. Fisheries (Prohibition of Import etc. of Fish) Regulations 1990**

This regulation lists out the species of piranha, which is prohibited from import, export, sale or kept in captivity unless permitted by the Director-General.

**n. Fisheries (Control of Endangered Species of Fish) Regulations 1999**

This regulation lists down all the species of fish and mammals, which are protected including the Dugong, whale, dolphin, whale shark and the giant clam, which are included in the list of endangered species in the Convention On International Trade of Endangered Species (CITES). It is an offense to fish for, harass, catch, kill, possess, sell, buy, export or transport any endangered fish as specified in this regulation. Any of the listed endangered fish species caught unintentionally shall be released immediately or disposed as directed by a Fisheries Officer.

***Policy***

Policies and plans that are relevant to the conservation and management of mangrove forests include the following:

**National Policy on the Environment**

This policy is based on seven principles that harmonize economic development goals with environmental imperatives. These principles are:

- Steward of the environment: exercise respect and care for the environment in accordance with the highest moral and ethical standards
- Conservation of nature's vitality and diversity: conserve natural ecosystem to ensure integrity of biodiversity and life support systems
- Continuous improvement in the quality of the environment: ensure continuous improvement in productivity and quality of the environment while pursuing economic growth and human development objectives

- Wise use of natural resources: manage natural resources utilization in order to protect the resource base and prevent degradation of the environment
- Integration of sustainability in all decision-making: ensure that the policies, objectives and mandates of all sectors take into consideration their impact on the environment
- Commitment and accountability: ensure the highest commitment to environmental protection and accountability by all decision makers, resource users, non-governmental organizations and the general public in formulating, planning and implementing their activities
- Active participation in the community of nations: participate actively and constructively as a responsible member of the world community; in the regional and global efforts towards environmental conservation and enhancement.

### **National Coastal Resource Management Policy**

This policy proposes to “provide the framework for related policies, strategies and management guidelines on coastal resources with a view of facilitating the attainment of Vision 2020 through the complementary macro and sectoral policies to achieve the national objective of balanced development.

Presently no specific legislation and regulations singularly address the ecological dimension of mangrove management, probably because the laws for forest management were established at the time when the environmental functions of mangroves were not well understood. In the context of management and conservation of mangroves, the National Forestry Policy (1978) applies. In Peninsular Malaysia, in order to streamline procedures and practices of forest management, the National Forestry Act (1984) has been instituted to bring about uniformity to the hitherto diverse and varied State Forest Enactment and Rules.

At present, the Department of Fisheries manages marine resources while the Forestry Department governs mangroves, which are gazetted as forest reserves. The Department of Environment monitors marine and river water quality. This shows that a cross-sectoral management arrangement may be needed. However, the importance of mangroves for a balanced ecosystem and to the nation’s economy has never been neglected.

To further support conservation, the Malaysian Government, in late 1996, announced a freeze on further development and agriculture activities in all mangrove swamps within 400 m of the coastline, which should be left untouched. In the same year, the Johor State Government decided to call for a halt on all aquaculture activities along river banks and in mangrove areas in the State. Several State Governments (Terengganu, Johor and Perak) have stopped approving development projects, including aquaculture activities, in or near mangrove forests to preserve ecological balance. Malacca became the first State to conduct a detailed Environmental Impact Assessment (EIA) study on coastal reclamation. The efforts by both the Federal and State Governments towards the conservation of mangroves of Malaysia should be lauded. The deterioration of coastal wetlands such as the mangrove forests will cause a great deal of ecological and economic loss.

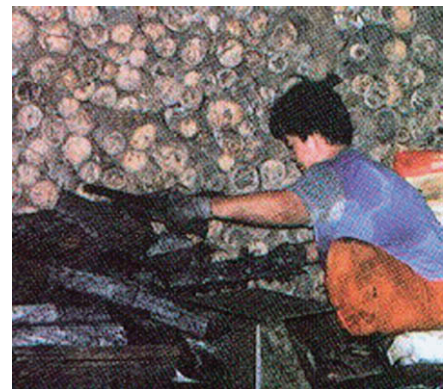
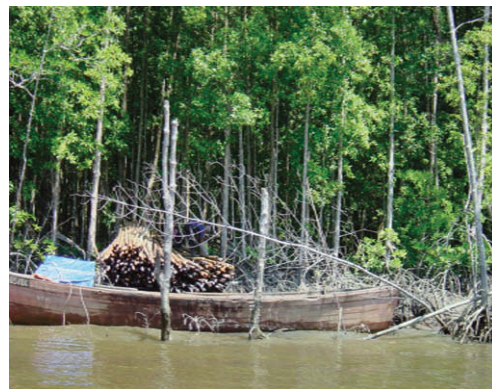
### **GENERAL POLICY RECOMMENDATIONS (USE OF MANGROVES FOR AQUACULTURE)**

In Malaysia, a guideline on the use of the mangrove ecosystem for brackish water aquaculture was formulated by the Working Group to the Malaysian National Mangrove (NATMANCOM) – a committee formed under the auspices of the National Council for Scientific Research and Development, Ministry of Science Technology and Environment. Some of the guidelines on the use of mangroves include the following:

- a. On choice of site, the priority should be:
  - i. mangrove areas already reclaimed for agricultural purposes, unused or abandoned due to poor soil conditions or production
  - ii. landward side of mangrove forest where forestry output is poor or where impact on coastal fisheries is the least
  - iii. State land forests which are outside the forest reserves and are mangrove reserves that are not managed on a sustained yield basis for environmental or economic objectives.
- b. On the size and location of site:
  - i. there should be a 100 m wide buffer zone along the coast between the pond site and the mean high water level of the sea
  - ii. not more than 20% of existing mangrove land in a given district can be cleared for pond construction
  - iii. the next project should be constructed at a distance more than 4 times the length of the coastline occupied by the first project.
- c. On pond design and culture techniques:
  - i. the pond should be constructed with minimum excavation to avoid problems associated with acid sulphate soil
  - ii. the water regimes be managed by pumping rather than be dependent on tidal fluctuations
  - iii. use of pellet feeds rather than raw trash fish.

## CONCLUSION

While it is recognized that the mangrove ecosystem plays an important role in sustaining aquatic resources, it may not be pragmatic to advocate a no-use policy to prevent the loss of this important habitat. It may not be realistic to put a total ban on aquaculture in the mangroves. It is more realistic to advocate sustainable practices that are not harmful to the environment.



Industry and utilization of mangrove resources in Matang





**Larut Matang Mangrove Forest Reserve (left) and Kuala Selangor Nature Park (right)-800 acres of mangroves and mud flats**



**Kuala Gula Bird Sanctuary (left) and the famous fireflies in Kampong Kuantan (right)**



**Eco tourism industry in Kampong Kuantan**



**Eco tourism in Kampong Kilim Langkawi: eagle feeding (left), boating (middle), and seaweed aquaculture (right)**