

OVERVIEW ON COUNTRY POLICIES, PROGRAMS EXPERIENCES WITH ARTIFICIAL REEFS, STATIONARY FISHING GEAR ESTABLISHMENT OF MARINE PROTECTED AREAS IN MALAYSIA

Sukarno bin Wagiman, Abdul Khalil bin Abdul Karim
Abd. Razak bin Latun
Department of Fisheries, Malaysia

Abstract

Marine environments are typically strongly linked to the mixing of water masses and, in coastal areas they are greatly influenced by rivers and land runoff. A marine area can also be strongly influenced by activities in distant areas including those on land and at sea. Artificial reef developments is part of the government programme in Malaysia for habitat enhancement and rehabilitation, and artisanal fishing ground. A total of 99 artificial reefs have been constructed from various materials such as tires, fabricated concrete blocks and cylinders, sunken boats and PVC pipes. Another 221 artificial reefs have also been deployed in coastal waters to provide fishing ground specifically for traditional fishermen. In 1983, the Government of Malaysia initiated the establishment of Marine Parks in Peninsular Malaysia for the conservation of living marine resources. To date, waters of 2 nautical miles off the shores of 40 islands in Peninsular Malaysia have been gazetted as marine parks of Malaysia under the Fisheries Act 1985. These 40 islands are grouped into 5 marine parks and a comprehensive management plan was developed to cater for them. These plans were adopted for the day-to-day management of particular marine parks. Current management issues in these marine parks are the impacts of fisheries and tourism. All fishery activities within the marine park waters are prohibited.

■ INTRODUCTION

As a sovereign nation, Malaysia has proclaimed its 47,000 square miles Territorial waters and 113,000 square miles EEZ in April 1980; and thus, by the provision given under the United Nation Convention On The Law Of The Sea (UNCLOS), Malaysia has exercised its right as a coastal state and as a 'Straits State' depending on one's orientation. The coastal waters is a very important fishing ground for about 84,500 fishermen working on 31,800 fishing vessels (Anon, 2002). This fishing activity was producing 1.2 millions tones of fish with about 80% of the fish landed coming from coastal waters. Edible marine organisms have been and are still the main protein source in the diet of the people in Malaysia. With a per capita consumption of fish of about 39.5 kg. And an increasing population, the demand for fish is expected to increase in the future.

One of the most important goods derived from the marine ecosystem functions is food for human consumption. The diverse marine habitats support fishing and its related industries as one of the major food production industry in Malaysia. Fishing industries in Malaysia during the last decade have undergone changes through several eras of management regime to regulate its open access and common property nature. The fishing industries in Malaysia started with the management regime of the Colonial Fisheries Unit in 1894 under the British Government (Department of Fisheries 1994). During the early colonial period and the pre independence (1894-1950), there were no clear fisheries management objectives and plans other than: 1) regulating the fisheries activities; 2) economic performance and 3) equity or social needs. During the Post-Independence (1951-1970) and early years of the New Economic Policy (1971-1990), the Colonial Fisheries laws were replaced with the Fisheries Act of

1963, which provided a more comprehensive legal framework to manage the fisheries in Malaysian waters. Marine fish resources have declined considerably over the past decade, particularly in inshore waters, due to the increased intensity of fishery activity. Then, fish aggregating devices and artificial reefs have been found to be popular forms of fisheries resource enhancement and management tool in this country. Some traditional fishermen in the East Coast of Peninsular Malaysia practiced this activity since the early 1900's (Hung, 1990). This was practiced by sinking derelict wooden boats, bundle of trees branches, twigs and rocks.

Malaysian marine protected areas were first established in 1983 and they are new compared to other marine parks in the other parts of the world for examples in Caribbean and Australia. This paper overviews the states of development of artificial reefs and marine protected areas and the experience gained by Malaysia on the use and management of artificial reefs and marine protected areas.

■ ARTIFICIAL REEFS

Artificial reef developments from part of the government's programmes in Malaysia for habitat enhancements and rehabilitation's, and artisanal fishing ground. The decline in fisheries resources is reflected in the annual catch data on the demersal resources off the east coast of Peninsular Malaysia. The catch rates of demersal fish monitored from commercial fishing boats, in 1988 were 280 kg. Hr⁻¹ have gradually decreased in 1994, to 180 kg. Hr⁻¹ (Anon, 1994). The high composition of trash fish in the catch of trawl nets also serves as an indication of marine living resources depletion. In 1994, the trash fish composition was 55% compared to only 32.9% in 1987 (Ibrahim *per. Comm*)

Accordingly, in 1975, as a step towards alleviating the problem of declining fisheries resources and helping in the rehabilitation of marine habitat, the Department of Fisheries initiated artificial reef construction. The principle objective in the construction of artificial reef are to generate

the recovery of fishery stocks, or to mitigate some of the impacts or losses related to coastal development projects or to increase the fisheries resources and diversity of colonizing organisms thereby improving the catches. As such, fishing in the artificial sites is prohibited.

At present in Peninsular Malaysia, a total of 99 artificial reefs have been constructed from various materials such as tires, fabricated concrete blocks and cylinders, sunken boats and PVC pipes. The government had spent a total budget of RM 23.16 millions, since 1986. Clearly, an artificial reef provides better fishing ground for artisanal fishermen and protection of habitats from destruction by trawlers. It was indicated that the fish catcher-unit-effort (kg. Per personhour) in Malaysian artificial reef was 8.7 to 20.72, and 0.78 in areas without artificial reef (Omar, *et al.*, 1994; Sukarno *et al.*, 1994)

Additionally, there are another 221 artificial reefs that have been deployed in coastal waters to provide fishing ground specifically for traditional fishermen. This initiative was started only in 1983 under the Fisheries Development Authority Malaysia with the total cost of RM24 millions.

■ STATIONARY FISHING GEAR (SET NET)

The fisheries sector still plays an important role in providing fish as a source of food and protein. Contributed about 1.54% to GDP and provide direct employment both in the capture fishery and aquaculture. An increase in the number of vessel, fishing gears together with sustainable management of the resource, it would give a positive contribution to fisheries sector in the future. There was an increase in the number of licensed fishing gears in 2001 by 28.1% as compared to the previous year (Anon, 2002). However, the use of stationary fishing gear (set net) in Malaysia is no longer practiced. Stationary fishing gear was popular during the pre 70's but with the introduction of more efficient gears, set net have taken a back seat among the fishing communities. Though the subsidiary scheme that was introduced in the 70's, fishermen were

given aids in improving their methods of catching fish. The drift nets replaced the set nets quickly but since the active gears such as trawl net and purse seine more preferable.

■ MARINE PROTECTED AREA

However, in the early stage of the fisheries development under the Fisheries Act of 1963, the fisheries management objectives linger around maximizing sustainable yields (MSY), maximizing economic return, maintaining employment, ensuring the equitable distribution of wealth and maintaining the living standard of those involved in the fishery. The importance of the dynamics of the effective fishing effort, 'other resource users', the marine habitats, the ecology and the terrestrial environment especially the offshore islands and the coastal areas were given less emphasis. As a result, we see that the coastal waters (of islands and the mainland) in the Peninsular Malaysia have been subjected to prolong and tremendous pressure due to the social and economic reasons as predefined in the fisheries management objectives.

Nevertheless, the Fisheries Act of 1963 provided regulations to regulate fisheries exploitation through a very strict 'limited entry' or 'input' management regime. Among others, the regulations provided for restriction of some fishing areas which is the initial stage towards the marine protected area (MPA) management approaches, the impetus for MPA's came much later.

Though not defined as MPA's per se, the water areas of less than three miles of any state of West Malaysia and of Pulau Langkawi and Pulau Bidan in Kedah; Pulau Pinang; Pulau Pangkor in Perak; Pulau Ketam in Selangor; Pulau Tioman in Pahang; and Pulau Redang and Pulau Perhentian in Terengganu were restricted to trawl fishing and fishing with purse seine nets but not to fishing using traditional appliances (Fisheries (Maritime) Regulations 1967). The numbers of islands were later increased to include Pulau Perak, Pulau Jarak, Pulau Pisang, Pulau Aur, Pulau Berhala, Pulau Tenggol and Pulau Yu Besar

in 1980 while the restricted water areas increased from three to five nautical miles from the shoreline of all State of West Malaysia and the above-mentioned islands. Some of the island mentioned above were later gazetted as Marine Parks of Malaysia. Under the New Fisheries Policy 1982-1983, 'restricted fishing area' were expanded and clearly defined to four fishing zones as follows (Anon, 1983);

Zone A - within five nautical miles from shoreline, reserved for traditional owner operator vessels;

Zone B - Five nautical miles and above from the shoreline for commercial gear of owner operator vessels below 39.9 GRT (Gross Registered Tonnage);

Zone C1- 12 nautical miles and above from the shoreline for commercial gears operating with vessel 40.0 GRT and above;

Zone C2- 30 nautical miles and above from the shoreline for commercial gears operating with vessel 70.0 GRT and above;

The essence of these water areas restriction aim mainly for resource distribution (equity sharing) and minimizing conflict among fishers using various fishing appliances and at the same time met the requirement of MPA's as adopted by IUCN at its 17th General Assembly in 1988 (Gubbay, 1995). These requirements include among others, area protection, conservation and sustainable use of the ecosystems and its resources especially in zone A where the areas are protected from the commercial gears – the trawler and the purse seiner (Figure 1).

The use of marine protected areas management has been widely promoted by the Department of Fisheries as a sole 'steward' since the early 80s. Realizing the need to enhance fisheries resources, steps to establish MPA were taken seriously as one of the management tool.

Through the Department of Fisheries Malaysia has been established for more than 100 years, the development of marine parks took place only at the beginning of early 1980's. Due to the inadequacy of the Fisheries Act of 1963, the potential identified water

bodies were first gazetted as the Fisheries Protected Area (1983-1985) before they were regazetted as the Marine Parks of Malaysia in 1994 under the Fisheries Act of 1985.

Establishment of Marine Parks

The first national park in Malaysia was established in 1925 but parks have been limited to mainland terrestrial areas and not include the sea areas. The islands within Peninsular Malaysia have received minimum attention under the National Park Act 1980. The initiative for the conservation of the marine assets in the form to marine park was largely due to the direction of the Prime Minister of Malaysia in 1983. However, the marine park proposal, requirement and management were much earlier as 1975 (Langham, 1976 and Lulofs, 1977). Like many other developing countries, legal and conservation measures have been slow in implementing in Malaysia, resulting in the destruction of potential good sites for marine parks.

In addition to the mentioned marine parks, three state parks (12 islands) in Sabah, one national park in Sarawak (4 islands), and three marine protected areas in Sarawak were gazetted to protect coastal and marine ecosystem.

Objectives of the Marine Park Establishment

The Objectives of the establishment of marine parks in Malaysia are:

1. To afford special protection to the aquatic flora and fauna and to protect, preserve and manage the natural breeding grounds and habitat of aquatic life with particular regards to species of rare or endangered flora and fauna;
2. To allow for the natural regeneration of aquatic life where such life has been depleted;
3. To promote scientific study and research;
4. To preserve and enhance and other undamaged state and productivity of the environment; and

5. To regulate sectional and other to avoid irresistible damage to the environment.

The objectives of the marine research programme is to direct activities to provide baseline information for the development of a management plan, promote education of marine parks and to apply the research knowledge to achieve management plan.

Legislation and Management

In Peninsular Malaysia, marine parks have been administered by the Department of Fisheries, Ministry of Agriculture since 1983, and all the responsibilities for marine parks establishment and management have now been incorporated into the Fisheries Act 1985. The coral reef management in Malaysia is discussed in De Silva (1984), and De Silva and Ridzwan (1983). The state government has jurisdiction over land (including islands) and its resources and foreshore including the waters up to 3 miles from the low water mark. The federal government has jurisdiction over all estuaries and marine living resources. Such jurisdictional division will hamper the concept of integrated marine parks management unless machinery is established in order to allow consultation or joint management on the same interest. The Fisheries Act 1985 covers all aspects of fishing and prohibits the use of dynamite and other destructive fishing methods.

The marine parks are administered by the Department of Fisheries under the Fisheries Act 1985 Part IX-Marine Parks and Marine Reserve (Sections 41-45). (Anon, 1985). As marine parks, the concerned water body is given the statute of no take zone after many years of conflicting uses. The administration of navigation and shipping remains with the Department of Transport, within the framework of regulations established for management of each particular marine park. Accordingly, A Notional Advisory Council on Marine Parks (NACMP) has been established. The council consists of representatives from federal and state governments, non-government organizations (NGO) such as World Wildlife Fund (WWF),

Malayan Nature Society and Malaysian Marine Science Society (Anon, 1993). The NACMP advises the Minister of Agriculture on any matters relating the marine park areas.

To date 40 offshore islands and the surrounding marine waters have been identified and established as marine parks and state parks under the Fisheries Act 1985. These islands are grouped into five marine parks, which located off the coast of Kedah, Terengganu, Pahang, Johor and Labuan (Figure 2).

The establishment of MPAs in Malaysia meets the need to manage and to conserve marine biodiversity as spelled out in the National Policy on the Biological Diversity (NPB). The NPB, which was officiated in 1998 act as a primary document to guide biodiversity conservation effort in the country. Nevertheless, the existence of several policies, legislations and protection of marine resources directly or indirectly, reflect the concern and priority given to sustain the marine resources.

The conservation efforts are made possible through legislations and guidelines that include the Fisheries Act, 1985; Control of Development in the Coastal Zone, 1987; Guidelines on Erosion Control for Development Projects in the Coastal Zone, 1997; National Ecotourism Plan, 1997; and guidelines for development planning in the Coastal Zone; 1997 to mention a few. Furthermore, the Department of Fisheries Malaysia is in the process of formulating a new marine parks regulation. This regulation will encompass a wide range of provision from day to day activities to the regulation of uses and user.

■ ACTIONS TAKEN TO PROTECT THE MARINE RESOURCES

Malaysia's coastline of 4675 km. comprises primarily of mud flat and sandy beaches. Most of the islands support coral reefs. Most of the populations live in the coastal zone, which is also the center of economic activities. The effective implementation of marine resources and environments at the state and federal levels

requires a system of laws and an effective institutional mechanism for planning, regulation and enforcement of existing and new developments. Three of these laws that have profoundly influenced marine resources/environment are the Fisheries Act (1985), the Environmental Quality Act (1985) and the Environmental Impact Assessment Order (1987). Ultimate jurisdiction over marine living resources is with the Department of Fisheries. The Fisheries Act, 1985 covers all aspects of fishing, marine park management, sea turtle conservation, artificial reefs construction and explosive and toxicant fishing methods prohibitions. The Environmental Impacts Assessment (EIA) order, lists development activities such as resort and recreational facilities or clearing of mangrove swamps that require mandatory EIA reports to be submitted for prior approval by the Department of Environment. The government to streamline planning practices has also introduced administrative guidelines.

An integrated management plan for marine parks has been formulated in order to strengthen the management and enforcement within the park. The concept of marine park management in Malaysia is to incorporate zoned areas so that sensitive habitats are protected from destructive activities (Looi, 1993). Zoning in marine park is implemented to keep people out of sensitive, valuable or recuperating and habitats where necessary to limit the impacts of visitors on the resources. The marine park management plan incorporates the following zones;

- Core zone – covers all the coral reef areas. Activities within this zone will be controlled. Collecting and fishing will be prohibited.
- Buffer zone – safeguard areas around the core zones to the core.
- Reserve zone – maintains undamaged wilderness area for retention of a gene pool in this zone.
- Scientific zone – researches pristine areas by ecologically sound techniques
- Preservation zone – closes damaged reef areas for rehabilitation or regeneration of resources.

- Recreational zone – allows controlled recreational activities.

The Department of Fisheries Malaysia is responsible for law enforcement and public safety within the boundaries. Under the Fisheries Act (1985), the rules and regulations had total prohibition against the collection of marine organisms and also prohibition against fishing within the designated areas. Four management and visitor centers have been built which are responsible for management and control of the parks.

■ WHAT NEED TO BE DONE?

The fishery industry in Malaysia situation is by no means typical. Throughout the tropics, human populations are growing and growing at a high rate. However, coral reef and reef fishes are probably reaching critically low levels. A better integrated management plans with better enforcement and interpretation programmes has to be designed. For artificial reefs and marine protected areas to be successful as a tool for coping with the marine resources and environment degradation and depletion, public interpretation, education and awareness about the function and importance of marine environment are needed. Furthermore, more scientific research and study should be encouraged in order to gain knowledge for the development of a better management plan and to resolve management issues. Ehrlich and Dailey, (1993) described and supported the use of science in perceiving the natural resources problem, understanding their mechanism and strategically assessing options for their solution. The following research needs can be identified; scientific evaluation of alternative option for mitigating anthropogenic influences and restoration of habitats, and scientific evaluation of success or failure of management plan and strategies such as marine protected areas, marine parks, fishing zoning, artificial reefs and other marine ecosystems.

ACKNOWLEDGEMENT

The authors wish to convey their gratitude to the Director General, Department of Fisheries Malaysia for his support in preparing this paper. A paper like this, compiled from diverse sources, would not have been possible without the assistance and support from numerous people. To list them by name, the authors would like to thank Mr. Abd. Hamid bin Shukor, Mr. Hamidon bin Ahmad, Mr. Mohd. Zabawi bin Saad and Mr. Zam Zam bin Sariipan for their cooperation and willingness in providing information.

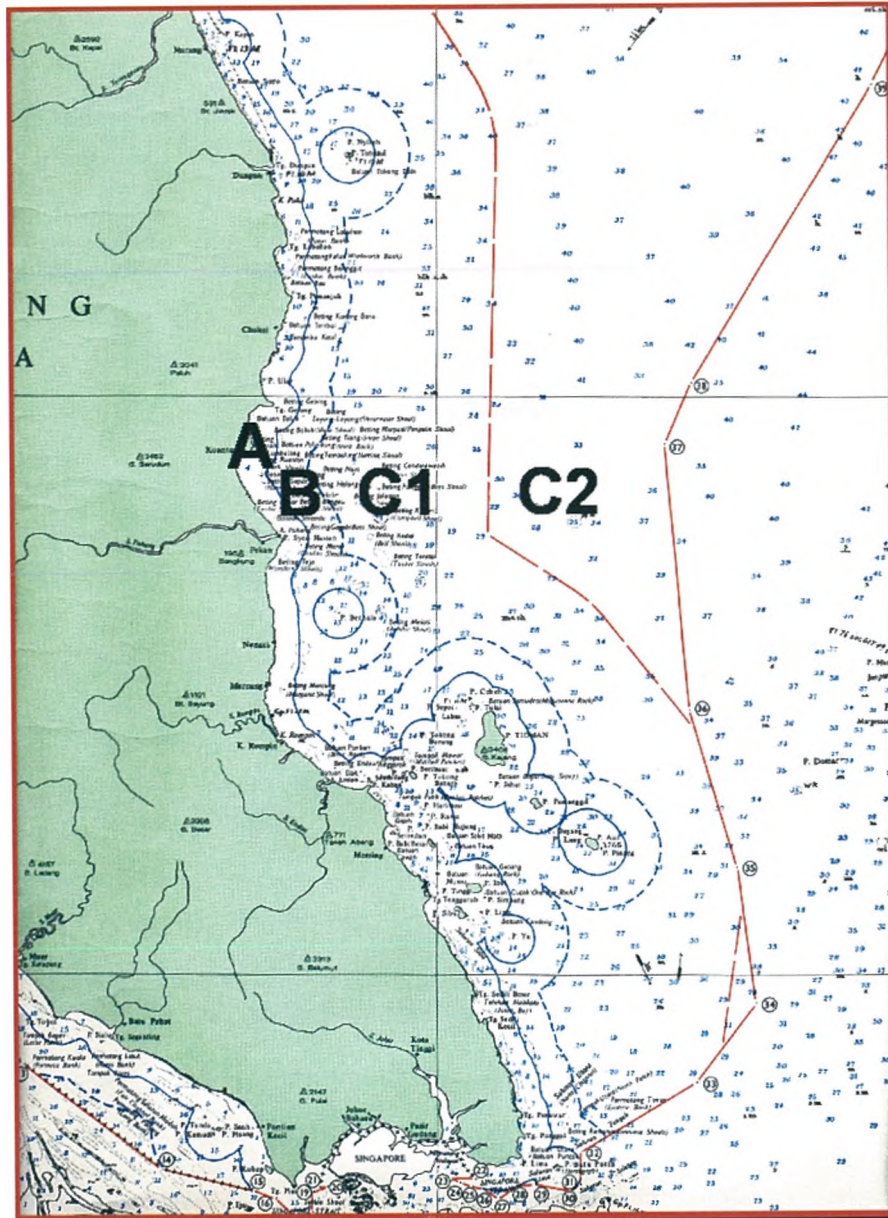


Figure 1. Restricted fishing areas which were defined into four zones (Source; Department of Fisheries Malaysia)

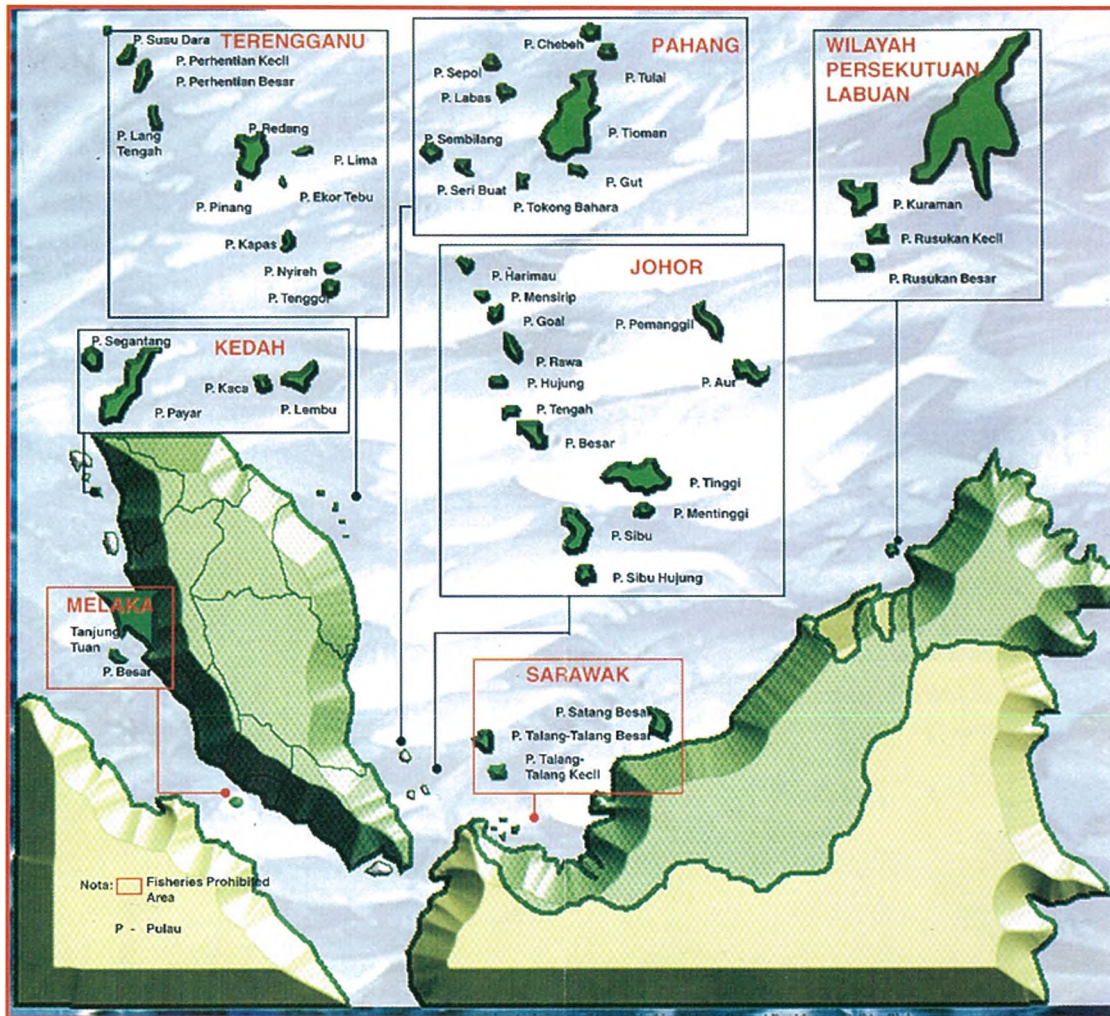


Figure 2. Location of the Marine Parks in Malaysia (Source; Department of Fisheries Malaysia)

REFERENCES

- 1) Anon (1983) *Fisheries Act 1963, Fisheries (Prohibited Areas) Regulation 1983*, Fisheries Department, Malaysia. P.U. (A) 424
- 2) Anon (1994). *Annual Fisheries Statistics Vol. 1 & 2*. Department of Fisheries, Ministry of Agriculture Malaysia, Kuala Lumpur
- 3) Anon (2002). *Annual Fisheries Statistics Vol. 1 & 2*. Department of Fisheries Ministry of Agriculture Malaysia, Kuala Lumpur
- 4) De Silva, M.W.R.N. (1984). Coral reef assessment and management methodologies currently used in Malaysia. In: *Comparing Coral Reef Survey Method.*, UNESCO Report in Marine Science 21:47-56.
- 5) De Silva, M.W.R.N. and Ridzwan, A.R. (1983). Zoned marine part for recreation. In: *Proc. National Seminar on Forests, National Parks and City Parks for Recreation*. Univ. Pertanian Malaysia, Serdang. Pp. 26-28.
- 6) Ehrlich, P. and Dailey, G.C. (1993). Science and management of natural resources. *Ecological Application* 3:558-560.
- 7) Gubbay, S. (1995). *Marine Protected Areas*. Chapman Hall, London
- 8) Langham, N.P.E. (1974). The need for marine park and reserves in Malaysia. *Malaysia Nat. Journal*, 4: 269-276.
- 9) Looi, C.K. (1993). *National Marine Park: Policy and Concept*. Fisheries Article No. 40. Dept. of Fisheries, Malaysia, Kuala Lumpur. 23 pp.
- 10) Lulofs, R.B. (1977). Marine National Park. *Malaysia Naturalist*, 3(4): 4-12.
- 11) Omar, R.M.N.R., (Cheah, E.K., Sukarno. W., Mutalib, A.M.H., Mobarak, H. Bidin, R.R.H. and Omar, C.M.H. (1994). Design and construction of artificial reefs in Malaysia. *Bulletin of Marine Science*, 55(2-3): 1050-1161
- 12) Sukarno, B. W., Noordin, R.M.R.O., Omar, M.H. and Rosdi, M.N. (1994). *Tukun Tiruan Malaysia*. Department of Fisheries Malaysia, Kuala Lumpur. 132 pp.