PART 4
ECONOMIC VALUES

Summary

- This section provides a preliminary analysis of the main existing and potential direct, indirect and non-use economic values of the proposed Semporna Islands Park. It is based on a preliminary economic study carried out during the Semporna Islands Project (Spurgeon, 1999), and also draws on information in several other reports, as acknowledged in the text.

- The main current annual economic benefits (gross) accruing from the Semporna Islands are seaweed farming (around RM 100,000) and crop production (around RM 30,000). The value of reef fisheries is less easy to determine, but could be around RM one million per year. These values are very approximate, and costs incurred (capital and operational) would have to be deducted to give true economic values.

- There is potential for considerably increasing nearly all the different existing economic benefits in a sustainable way. In particular, there is scope for significantly increasing the economic benefits relating to tourism (perhaps RM millions) and mariculture (RM 100,000s).

- Although tourism could generate considerably greater financial rewards than reef fisheries, continuing reef fisheries to some degree is essential. It would provide significant economic benefits in terms of food production and well as benefits relating to social, cultural, political and tourism aspects.

- **Most importantly, the only way of obtaining maximum overall economic benefits, is to ensure that resources are effectively managed so that the attributes that give the area its value are retained.**

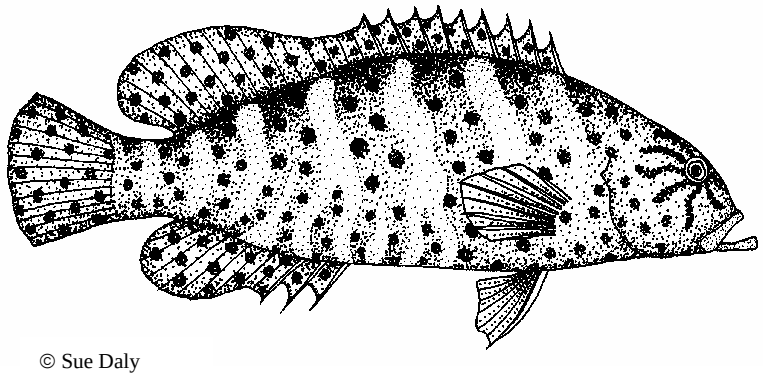

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Figure 56. The coral trout *Cephalopholis sexmaculata*, one of several species valuable both for fisheries and tourism.

4.1. INTRODUCTION

This section outlines the different assets (resources) and associated values within the proposed Park, and summarises how incomes and economic values could in theory be increased through sustainable use and management of the resources.

Total Economic Value is based on the theory that environmental assets or resources give rise to a range of economic values. These values are made up of direct use values, indirect use values and non-use values.

Direct use value is the contribution an environmental asset makes directly to current production or consumption (e.g. fisheries and tourism related)

Indirect use value includes the benefits derived from functional services that the environment provides to support current production and consumption (e.g. biological support to fisheries provided by coral reefs).

Non-use values include the premium that consumers are willing to pay to ensure that an asset will always be available in the future, even if it is currently unused, or there is no intention of using it in the future.

Organisms, habitats and ecosystems also have an '**intrinsic value'** or worth of their own regardless of human perceptions. This, by its very nature, cannot be given a monetary value.

This section deals separately with the main existing and potential direct use values (harvesting of fish and other marine life; culture of seaweed and other marine organisms; use of terrestrial resources and cultivation; tourism and recreation), and then goes on to deal briefly with indirect and non-use values.

Figure 57. Much of the fishing in the proposed park is done by hook and line from small boats.

4.2. HARVESTING OF FISH AND OTHER MARINE LIFE

Fishing around the Semporna Islands is undertaken by both permanent and temporary island inhabitants, as well as by fishermen from other islands and from the mainland. All areas are used, including mangroves, seagrass beds, back reef, emergent reef, shallow and deep reef and open water (Suliansa, 1999). Traditional methods of catching fish include hook-and-line (the most common technique), spears and various types of traps and nets. Commercial fishing techniques include trawl nets, purse seine nets and gill nets.

Other groups apart from fish are also of value. Collection and trade in shells used to be an important activity (Piper, 1981), but is less so now, although as many as 59 species of gastropod and 13 species of bivalve are still used (Suliansa, 1999). Sea cucumbers, sea urchins, octopus and squid are quite heavily utilised, but the amounts and total value of this catch is unknown.

The total value of the Semporna Islands fisheries relating to the coral reef resources is difficult to determine. In theory, the value is equal to the net benefit accruing to islanders and other fishermen resulting from capture of fish and invertebrates that are associated with the Semporna Island reefs. The value comprises 'net' commercial benefits (total gross market values less costs incurred) plus the value of subsistence catches (again using market prices less costs incurred).

Suliansa (1999) estimated the average incomes/month for different types of fishing activity as follows: live fish RM 400-800; fresh fish RM 200-700; dried fish RM 150-400; sea cucumbers RM 200-500. An average for all these types of fishing could be in the region of RM 400/month, giving an annual average income of RM 4,800. Komilus *et al* (1999) report there are 201 registered fishermen from the Semporna Islands, which would give a total annual value of RM 964,800 for marine resources.

It is important to note that this is only a very rough estimate, and also that costs incurred (capital and operational) would have to be deducted to give the true net economic value of the fishery. In addition, the value does not include catches for personal consumption, which are unknown but likely to be quite significant.

Assuming that the reefs are well maintained, the Semporna Islands could, with careful planning, become a site for research companies to sample biological products (e.g. genetic resources) to be used as the basis for producing various commercial products. As an example, the coral reefs in Montego Bay, Jamaica have been estimated to be worth a potential US$ 530,000/ha (Cartier and Ruitenbeek, 1999).

4.3. MARICULTURE

4.3.1. Seaweed

Cultivation of seaweed (*Eucheuma cottonii*) was promoted within the Semporna Islands area in 1980 by a demonstration farm supported by the Fisheries Department. It is now a major contributor to local incomes and employment on Selakan, Sebangkat and the reef top settlement, probably involving between 100 - 150 families. There are also additional areas of cultivation off Bodgaya and Boheydulang.

It is reported that an average income of RM 600 to RM 1,400 can be obtained from a good harvest, and that there are usually six harvests annually (Komilus *et al.* 1999). This gives an average income of RM 300 – 700 per month, which is slightly higher than the income from fishing (see above).

Annual production in the Selakan-Sebangkat area is between 90 and 110 tonnes (Komilus *et al.* 1999). With a market price of around RM 1.10 per kg of dry seaweed, this represents a total market value of about RM 110,000 per year. Net revenues are around 10% of total revenues. If carefully managed, the seaweed farming operation could also become a valuable resource for tourism, education and research.

4.3.2. Other possibilities

Currently, no other marine species are cultured within the Semporna Islands. However, there is scope for low impact mariculture such as the farming or 'ranching' of giant clams, pearl oysters, winged oysters, sea grapes, brown mussels, donkey's ear abalone, corals and sea cucumbers (Komilus *et al.* 1999).

Baker (1999) provides details of the costs of setting up a **giant clam** (*Tridacna)* farm on the islands. He suggests that with a capital outlay of around RM 400,000 and annual operating costs of RM 160,000 (i.e. around RM 700,000 over the first two years), possible annual revenues could easily be in the order of several hundred thousand RM, and possibly even millions of RM. This would be through sales of live shells and meat of various *Tridacna* species. It should be noted that the revenue stream would be lower in the first few years of production as the initial batches mature.

If carefully managed, this could provide significant employment and income to local people. If satellite farms are set up, several hundred local people could earn a living in this way. The clam farms could also become a valuable tourist, educational and research resource.

A Japanese **pearl farm** operated on Boheydulang from 1963 – 1993, but the economic value of the operation is unknown. There is a plan for a new venture to be started, which according to the press coverage would produce 40,000 quality pearls/yr for export. This could clearly bring significant economic benefits to local communities provided that they were involved in the operation of the farm.

4.4. TERRESTRIAL RESOURCES

4.4.1. Soil and minerals

Island soils have in the past been used by locals to make household and marketable products such as earthenware pots. Clay pots sell for about RM 6 – 15, whilst clay ovens sell for RM 15 – 20 (Mansor, 1999). Apparently there are women on Selakan with experience, but at present, there is little demand for the products (Guntavid and Galaip, 1998).

4.4.2. Freshwater

Water is an important and valuable resource on the islands, collected both from wells, streams and directly as rainwater. No information was obtained as to the average annual volumes available on the island. However, as the region develops more, and demand for water increases, it can be expected that the value of water (and cost of obtaining it) will increase.

4.4.3. Mangroves, forests and plants

Studies by Sugau *et al* (1998) and Guntavid and Galaip (1998) have identified a range of plants and trees with a multitude of different uses and values. In the latter ethnobiological study, 127 species of useful plants from 54 families were recorded by the study.

Many of the plants and trees yield edible fruits, shoots and leaves, for use not only as a main food source, but also for food flavouring and seasoning. The fruits, which include coconuts, mangos and bananas are generally used for home consumption, with excess sold at market. A well-harvested apple mango tree could bear fruit worth RM 350, whilst a wani mango tree could bear fruit worth RM 3,000 (Guntavid and Galaip, 1997). Fruits generally have a market value of around RM 0.5 to RM 10 for larger items such as jack fruit (Mansor, 1999).

Many of the plants and trees also provide a source of medicinal products with herbal healing properties. Certain plants and leaves are used to cure and alleviate fevers, skin diseases, dysentry, cuts and wounds, earache etc. Although modern medicines are slowly taking the place of traditional herbal medicine, elders are still keen to use traditional medicines. There are even strict rules and regulations about collecting plants, which is all part of a spiritual ritual. Prices on mainland Semporna for basic medicines and medical treatment range from around RM 1.50 to RM 40 (Mansor,1999).

The islands also harbour many plants of ritual and ceremonial importance for religious and traditional practices.

The forests provide wood, poles and leaves for construction of houses and other items such as boats and other items such as violins, although some wood comes from outside the islands. Large boats (e.g. 25 ft lepa-lepa boats) can sell for around RM 2,000 - 4,000, whilst smaller boats (e.g. bogoh bogoh dugout canoes) sell for around RM 500 – 900 (Guntavid and Galaip, 1997 & Mansor, 1999). The production rate and demand for large items made from wood is currently relatively low.

Forest and plant products can also be used for creating a range of handicrafts and general household items. However, this pastime is much reduced due to a lack of demand. Cooking utensils (e.g. spoons from coconuts) can be made, fetching RM 4 – 10 per item. The making of pandanus mats still goes on, but the materials are purchased in Semporna for RM 5, and the mats are sold on for RM40 – 80 per mat. The forests also provide various ornamental plants and natural dyes. Rattan is also used to make rope.

The forests also provide a naturally replenishing source of fuelwood used for cooking. The value of this is effectively equivalent to the cost of the next best alternative. Kerosene and gas stoves can cost around between RM 30 – 80, and the fuel can then cost RM 0.5 – 3 for a major cooking session (Mansor, 1999).

Extractive uses of the forest would need to be carefully assessed in order to ensure they were sustainable. However, there is considerable potential for forest and plant products to be used at a greater scale for tourism, and for education and research purposes.

4.4.4. Agriculture/cultivation, fruits and animals

There are around 60 ha of fully planted agricultural land on the islands, predominantly bearing coconuts, mangoes, bananas, tapioca, maize and citrus (Mansor, 1999). Annual yields vary from in the order of RM 100s to RM 1000s per acre per year. A ballpark estimate of gross annual crop value is thus in the order of RM 30,000 (60 ha x RM 500).

Nearly all the people who have settled on the central islands of Bodgaya, Boheydulang and Tetagan cultivate fruit trees, grow crops and use the natural forest products. The outlying islands are less productive and (with the exception of coconuts) offer fewer opportunities for cultivation. Some people from these islands and from outside the area visit Bodgaya and Boheydulang to collect plants, timber and water.

Livestock such as chickens and goats are also reared on some islands, but there is no detailed information on yields and values.

4.5. TOURISM AND RECREATION

Both national and international visitors come to the Semporna Islands, but currently, tourism and recreational activities within the proposed park are at an extremely low level. Statistics are somewhat limited, although there is a visitor's book for Sabah Parks on Boheydulang. Data from this book over the past five years reveal an average of around 30 foreign visitors per year, with numbers actually declining (14 in 1998). During the same period, numbers of Malaysian visitors average at 330, steadily increasing each year (596 in 1998) (Mansor, 1999).

Currently, very little, if any, income is generated from these visitors. There is, however, huge potential, especially for diving. Nearby diving sites such as Pulau Sipadan show the potential demand and economic value for quality dive sites. In 1994 there were 7,000 visitors, and the cost of 3 days and 2 nights was US$ 500 (Ministry of Tourism and Environmental Development, 1996).

There are several studies outlining the tourism value of coral reefs (see Spurgeon, in press). For example, a study in Indonesia (Cesar, 1996) estimates a 'high' value of US$ 5,000 per ha of reef per year. It is clear that significant economic benefit could accrue from tourism development of the Semporna islands and reefs. This could easily be in the order of RM 100,000s or millions. It is also important to note that uncontrolled use and congestion by divers and tourists in general can in theory reduce the overall net economic benefits compared to a sustainably managed site.

4.6. INDIRECT VALUES

4.6.1. Coast protection

The coral reefs and mangroves surrounding the Semporna Islands protect the islands and their land resources from storm and wave damage by absorbing part of the powerful energy forces. The actual value of this coast protection function depends predominantly on the probability and severity of flooding, wind and erosion events, the extent to which the reefs and mangroves absorb and protect the islands, and the value of the resources that would otherwise be damaged. Further investigation would be needed to assess these relationships more fully. There is no doubt though that various buildings, moorings, agricultural crops and beaches on some of the islands are afforded some protection. Houses on the islands vary in value from RM 100 – 5,000 (Mansor, 1999).

4.6.2. Sand supply

The natural bio-erosion of coral reefs, through organisms such as fish and other invertebrates feeding on the coral, leads to a constant supply of calcium carbonate sand in the area. This in turn helps nourish the sandy islands and beaches, thereby maintaining the various beach-related benefits. The actual bio-physical link between the coral reefs and the sand supply is complex to determine, although the relationship clearly does exist.

4.6.3. Biological support

The coral reefs and mangroves around the Semporna Islands provide important ecological functions in terms of biological support for offshore fisheries and for other nearby habitats. They act as shelter and nursery areas for economically valuable fish that live off the reefs. They also provide a source of nutrients (e.g. through production of plankton and zooplankton) for offshore fisheries and act as a supply of coral reef and mangrove organisms for other nearby reefs and mangrove areas.

Likewise, other animals and plants on the islands provide biological support for neighbouring islands and migratory animals.

It should be noted that the forests also have a range of other services and functions (e.g. surface water and groundwater control).

4.7. NON-USE VALUES

Non-use values include the premium that people are willing to pay to ensure that an asset will always be available in the future, even if there is no intention of actually using it.

Option value is the premium that consumers are willing to pay for an unutilised asset, simply to avoid the risk of it not being available in the future.

A well kept island system with the impressive environmental and cultural diversity that is found within the Semporna Island system will have a high option value for local, national and international people. If asked, many people are likely to be 'willing to pay' something to ensure that the island resources are maintained so that they can enjoy or use the resources at some time in the future.

Existence value arises from the satisfaction of merely knowing that the asset exists. In this case people gain enjoyment, again measured by 'willingness to pay', from simply knowing that the integrity of the environmental, cultural and aesthetic resources are maintained in the future, whether for their own 'non-use' benefit or for future generations.

The non-use value of the Semporna islands and reefs has not been calculated, but is likely to be substantial. For example, a questionnaire survey asking individuals about their 'willingness to pay' to ensure a specific environmental change, estimated a non-use value of improving coral reefs in Montego Bay, Jamaica, of US$ 20 million (Spash et al, 1998). A minimum non-use value for protecting the Great Barrier Reef, Australia, is estimated at US$ 80 million per year (1997 values based on Hundloe, 1990).

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