

new info

beche-de-mer

The taxonomy and exploitation of sea cucumbers in Malaysia

by Mark Baine¹ & Bobby Forbes¹

Introduction

In March 1996, Heriot-Watt University, Scotland and the Fisheries Research Institute, Malaysia were awarded funds from the UK Department of the Environment's Darwin Initiative to research the taxonomy, life history and conservation of sea cucumbers in Malaysia. Fishing is prohibited in designated Marine Parks, and these will provide ideal sites for the study of sea cucumber taxonomy and population dynamics.

Outside the Marine Parks there are no management measures in place for sea cucumber fisheries, and concern has been expressed at the possible overfishing of this resource, in particular the species *Stichopus variegatus* (curry fish) also known as 'Gamat'.

The project will also aim to identify fishing areas, collate information on catch and effort, provide population abundance estimates, determine the impact of existing fishing practices and recommend management measures as deemed appropriate.

Survey areas

The aim of the initial survey work was to cover geographically-distinct areas and establish species

lists for these areas. Three areas were chosen for the initial survey phase. They are shown in Figure 1.

Pulau Pangkor – Sembilan Islands

Situated at the mouth of the Dindings River on the west coast of Peninsular Malaysia, the east coast of Pangkor is subject to heavy sediment loading. Sediment loading on the west coast of the island is less marked.

The Sembilan Islands can be found approximately 20 km to the south of Pulau Pangkor, and are outside the zone of riverine influence. Sediment loading is considerably reduced, resulting in the presence of a greater variety of large corals.

Payar Group – Langkawi

The Payar Group consists of three small islands designated as a Marine Park: Pulau Payar, Pulau Kaca and Pulau Lembu. Situated in the only 'clear-water zone' on the west coast of Malaysia, they are a popular location for day visitors from the tourist centre of Langkawi.

The Langkawi archipelago is located just south of the Thai border on the west coast of Malaysia. A major tourist destination, in recent years the area

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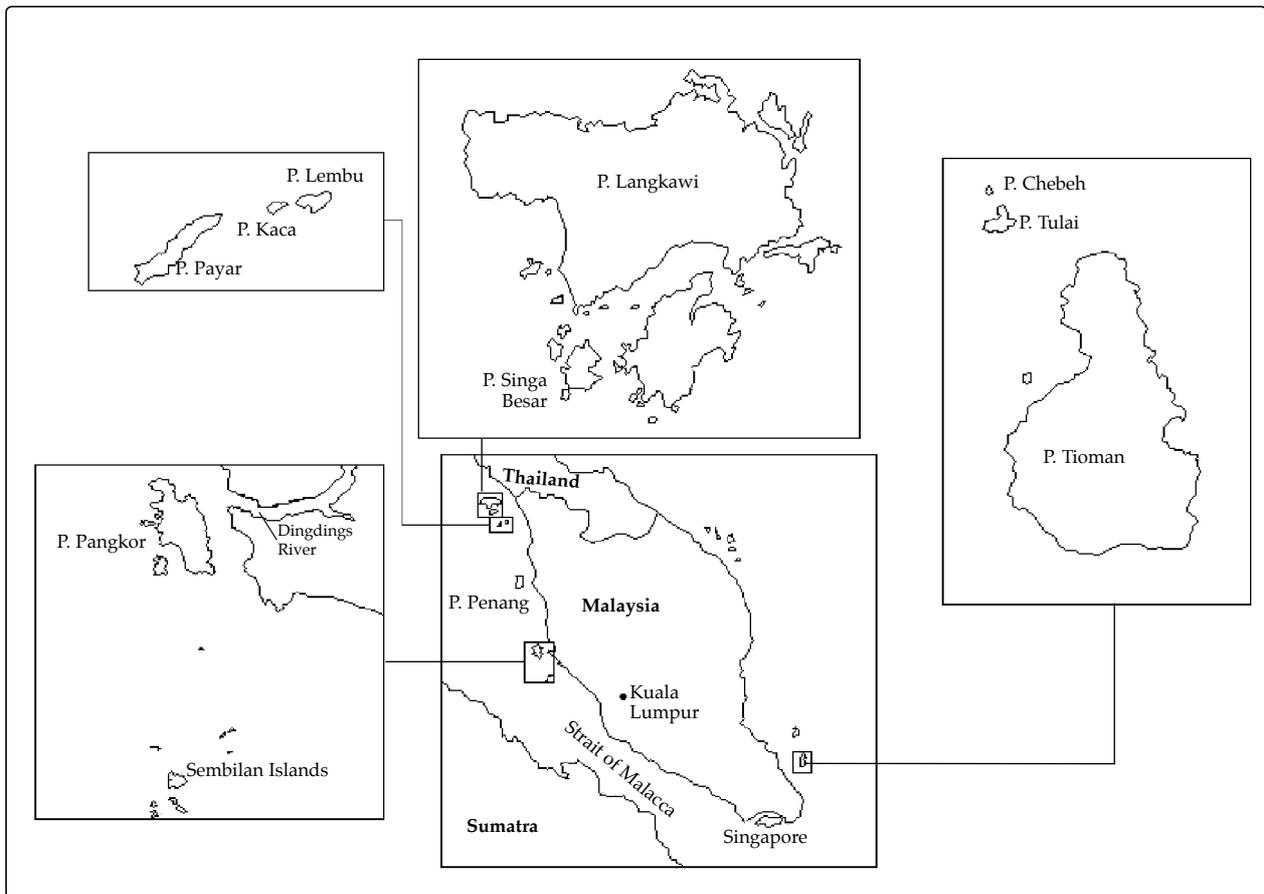


Figure 1

Maps showing the areas chosen for the initial survey phase

has undergone rapid development, with reclamation of coastal areas increasing. This in turn has resulted in increased sediment loading in the nearshore waters.

Pulau Tioman

Pulau Tioman, also designated a marine park, is situated on the east coast of Malaysia and is unaffected by runoff from rivers along that coast. It therefore exhibits much more diverse and developed coral communities. The east coast of the island is exposed to the annual monsoon season and is typical of a high energy environment, providing different habitats to those found on the west coast of the island.

Survey methodology

The major aim of the diving surveys in Phase I was to initiate the development of a taxonomic catalogue of the principal species found in Malaysian

waters. Data gathering is being approached in three phases:

- Phase I** : Establish a species list
- Phase II** : Training courses in taxonomy and survey techniques
- Phase III** : Monitor permanent transects to provide extensive data on species distribution and population dynamics

Survey results

Table 1 (see next page) shows the initial results of Phase I surveys. There were, however, different degrees of effort employed at each area, although local knowledge tends to indicate that the greater number of species found on the east coast is more likely to be the result of a greater diversity of habitat types. Further Phase I surveys should determine whether this is true. In all, 17 species were identified to species level, with a further six species still to be identified.

Table 1: Species list and location

Species	Location				
	Pangkor	Sembilan	Tioman	Payar	Langkawi
<i>Stichopus variegatus</i>	x	x	x	x	x
<i>Stichopus chloronotus</i>			x	x	
<i>Stichopus horrens</i>				x	
<i>Stichopus</i> sp. 1			x	x	
<i>Stichopus</i> sp. 2			x		
<i>Stichopus</i> sp. 3				x	
<i>Thelenota ananas</i>			x		
<i>Actinopyga echinites</i>			x		
<i>Actinopyga lecanora</i>			x		
<i>Actinopyga militaris</i>			x		
<i>Bohadschia argus</i>			x		
<i>Bohadschia graeffei</i>			x		
<i>Bohadschia marmorata</i>			x	x	
<i>Holothuria atra</i>	x	x	x	x	x
<i>Holothuria coluber</i>			x		
<i>Holothuria edulis</i>			x		
<i>Holothuria impatiens</i>			x		x
<i>Holothuria hilla</i>			x		
<i>Holothuria leucospilota</i>			x	x	x
<i>Holothuria</i> sp. 1		x			
<i>Holothuria</i> sp. 2			x		
<i>Synapta recta</i>			x	x	
<i>Synapta</i> sp. 1				x	

Fishery and trade statistics

In the early stages of this research, a limited number of sources have been identified for the collection of fishery statistics. These are presented below.

At this stage it is important to highlight inconsistencies in the definition of beche-de-mer. It appears from the Malaysian import and export statistics (Table 2) that beche-de-mer refers to sea cucumber and not merely dried sea cucumber. This unfortunately provides us with a confusing scenario, whereby the tonnage of dried sea cucumber has been presented in combination with salted sea cucumber and sea cucumber in brine. It also at present makes it very difficult to compare these statistics with other existing estimates.

If we take a closer look at the statistics for the third category, 'Beche-de-mer o/t fresh, chilled or frozen', one can immediately see the tremendous gulf between import and export figures. From the

available statistics for this category, the major country of origin for the imports to Malaysia is Indonesia at 30 per cent (1994), 51 per cent (1993), 84 per cent (1992), 92 per cent (1991) and 94 per cent (1990), although in 1994 China overtook Indonesia at 37 per cent.

The major destination for exports in this category is Singapore at 61 per cent (1994), 70 per cent (1993), 42 per cent (1991) and 81 per cent (1990), apart from 1992 when Taiwan received 60 per cent of the exports.

The value of imports and exports to Malaysia between 1989 and 1994 (in Malaysian Ringgit and approximate US\$ million equivalent [February 1997]) is presented in Table 3 (statistics supplied by FAO).

More detailed information exists for the state of Sabah, Malaysia. The local Fisheries Department have indicated that before the 1980s, the imports and exports of beche-de-mer were well over 100 t

Table 2: Import and export of fishery commodities, statistics supplied by FAO (in tonnes)

Year	Beche-de-mer live, fresh or chilled		Beche-de-mer frozen		Beche-de-mer o/t* fresh, chilled or frozen	
	Import	Export	Import	Export	Import	Export
1989	4.16	0.83	7.75	75.60	405.63	29.92
1990	11.68	0.36	5.75	45.31	413.72	79.55
1991	4.54	0.00	10.65	18.42	436.15	24.41
1992	4.65	0.00	6.68	23.48	388.61	49.15
1993	2.67	0.00	3.76	7.87	329.19	9.63
1994	10.39	0.00	24.15	16.45	643.32	13.06

* This category is also known as 'Dried, salted or in brine'.

Table 3: Value of imports and exports of beche-de-mer (o/t fresh, chilled or frozen) in Malaysia

Year	Beche-de-mer o/t fresh, chilled or frozen			
	Imports		Exports	
	<i>Malaysian Ringgit (RM)</i>	<i>US\$m equivalent*</i>	<i>Malaysian Ringgit (RM)</i>	<i>US\$m equivalent*</i>
1989	3 513 150	1.595	170 146	0.077
1990	2 631 940	1.195	575 002	0.261
1991	3 150 862	1.430	453 019	0.206
1992	2 660 313	1.208	284 050	0.129
1993	1 882 117	0.854	99 056	0.045
1994	2 442 040	1.109	156 849	0.071

* Feb. 1997 value

in certain years, most of the imports coming from the Philippines and Indonesia through barter trade. Local sea cucumber production at the time was erratic, and fluctuated according to overseas market demands. Good quality beche-de-mer was commanding around 17 RM per kilogram, with low grades fetching around 6 RM per kilogram. After the eighties (data is unavailable between 1982 and 1989) exports dropped to below 10 t per year with almost no records of imports between 1990 and 1995. The cost of the beche-de-mer, however, increased, with prices per kilo ranging from 17 RM to 160 RM.

The Fisheries Department has further indicated that there are six companies involved in the export of sea cucumbers from Sabah, the overseas market including Singapore, Taiwan, Hong Kong, China,

Korea, Japan, Thailand and others. In addition, Sabah also supplies Sarawak and Semenanjung Malaysia. Local traders explain the reduction in imports to Sabah as a result of neighbouring countries developing and improving transportation and communication networks, enabling them to directly export to other countries rather than through Sabah.

The FAO have also supplied figures for the catch of sea cucumbers in Malaysia, which are given in Table 4 (see next page). In addition, Conand and Byrne (1993) presented details of imports and exports from the Singapore market. The authors have extrapolated the data for Malaysia and presented them in Table 5 (see next page). As noted earlier it is difficult to compare data from these varied sources, which may also have different interpretations of the definition of beche-de-mer.

As stated by Conand and Byrne (1993) the situation with respect to statistics is not helped by the fact that Malaysia is simultaneously an importer, exporter, producer and consumer. The above data is a result of our first tentative steps into this complex maze of trade. For the remainder of the research, we will seek to confirm these figures and elaborate on them, including the gathering of statistics from individual traders. This will hopefully enable us to understand in more detail the complexity of trading routes, and more importantly the level of sea cucumber catch within Malaysia.

Holothurian fisheries in Malaysia

To date, two islands with a history of sea cucumber fisheries have been visited. These were Pulau Pangkor and Pulau Langkawi, both on the west coast of Malaysia, and neither designated as marine parks. At this initial stage of the research, it was decided to informally talk with local fishermen and traders. Some interesting results were yielded.

Only one sea cucumber fisherman exists in Pangkor. He collects sea cucumbers at low spring tides, normally with several helpers. The products are used for local consumption, and occasionally visitors from peninsular Malaysia purchase them. He processes them in three ways, producing beche-de-mer; 'Gamat water' (boiled coelomic fluid) taken orally for an ailment such as an upset stomach; and 'Gamat oil' (sea cucumbers boiled in coconut oil) used externally for aches and pains etc. Greater detail of the levels of catch, effort, areas, population size, etc. will be obtained for the fishing activities in Pangkor as the research proceeds. Fished areas will also be compared with unfished areas.

The number of sea cucumber fishermen in the islands of Langkawi is open to a high degree of conjecture. During our visits to local traders, we were informed that these varied between 0 and 10 local fishermen. At present it is not clear how many fishermen there are, and this will be further clarified. The major trader in Langkawi informed us that in the 1930s–1940s, farmers from Langkawi visited the island of Adang, Thailand and upon arriving remarked upon the healthy appearance of local villagers. They were subsequently informed about the properties of the sea cucumber, and upon returning home, a fishery developed in Langkawi. As with many fisheries, demand grew, and fishermen and suppliers increased in numbers.

The product eventually became so popular that around the mid-1940s, Langkawi traders began to import sea cucumbers from Thai fishermen (known as the 'sea people'). According to local suppliers, over intensive-fishing practices in Langkawi were also having a negative impact on the local sea cucumber populations.

Traders in Langkawi still obtain Gamat from Adang fishermen. The major retailer in Langkawi informed us that every season (October – February) about 30 boats arrive with approximately 300 kg of dried Gamat (beche-de-mer) on each boat. This equates to around 9 t of dried Gamat in total, and if we use a 10 per cent conversion rate, it equates to around 90 t of fresh sea cucumber. Each boat also carries 100 tins of Gamat water.

This retailer marketed the Gamat water and also processed the dried Gamat into such items as lotions, oils, tablets and toothpaste. He processed 10–20 packs of tablets per day (each with

Table 4: Sea cucumber catch data for Malaysia (t) (Source: FAO)

Year	1982	1983	1984	1985	1986	1987	1988	1989*	1990*	1991*	1992	1993	1994	1995
Catch	430	435	367	1169	687	800	616	800	800	780				

* Unconfirmed

Table 5: Imports and exports of sea cucumber from and to the Singapore Market (t) (calculated from Conand & Byrne, 1993)

Year	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Imports					426	294	394	253	154					
Exports					138	143	98	72	64					

1000 tablets) and around 10 tins of Gamat oil per day (rising to 20–30 in December in the local holiday season). He employs around 15 staff members and has indicated his wish to export to other countries including Britain. The amount of Gamat imported from Adang does, however, raise serious questions as to the health of similar sea cucumber populations in Thailand.

There are numerous other smaller market outlets in Langkawi for Gamat products such as beche-de-mer, soaps, oils, lotions, water, toothpaste, tablets and cosmetics. In these forms they are offered as cures for such ailments as upset stomachs, diarrhoea, aches and pains, cuts and inflammation, ulcers, chest pain, asthma, impotence, relief of soreness after giving birth and the general 'feel good factor'. It is not our intention to test the validity of these claims. However, the University of Malaya tested 23 species of sea cucumber in a recent study (Anon. 1995), and found that one species from the *Stichopus* genus possessed pain-killing properties (lending possible verification of the purported properties of *Stichopus variegatus*). Water-soluble extracts of an active compound, when tested on laboratory mice were found to be more effective than aspirin and morphine and 6–8 times safer. An oil-soluble extract, when taken orally, including human consumption, was also found to be very effective in the treatment and healing process of wounds. The medications have been manufactured into syrup, ointment, and cream and tablets, and are still on trial.

It is uncertain, at present, what part overfishing has played in the decline of local sea cucumber populations. In Langkawi, for example, the specu-

lation is that overfishing has played a strong part in the decline of *Stichopus variegatus*. Other areas with established sea cucumber fisheries, such as the coastal waters of Sabah, will be surveyed and local fishermen and traders interviewed. It is thought that these waters may represent the main source of sea cucumber catches in Malaysia, and that Sabah itself may be an important centre for beche-de-mer trade. Over the period of research it is hoped that a clearer picture of market trading routes for sea cucumbers to and from Malaysia will be developed, with particular emphasis being placed on the trade in sea cucumbers that have originated in Malaysian waters.

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Sustainable management of the sea cucumber fishery sector in Madagascar

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The history of sea cucumber exploitation in Madagascar and the problems of over-fishing were discussed in Bulletin No. 9 (Conand et al., 1997). Several programmes are under way, and the main results and prospects are addressed in this article.

In Madagascar, after reaching significant tonnages (nearly 600 metric tonnes (t), which represents more than 6000 t fresh weight) in 1991 and 1994, official trepang exports are showing a significant decline (Rafalimanana, 1997).

Other current indicators of over-exploitation are declining quality, a decrease in product size and value, and strong competition between collectors.

The sustainable development goal in national policy will require the whole sector, which is characterised by a multiple-level fishery, to be restructured, and the professionals, who are becoming a partner of government so as to introduce a system of industry control of exploitation, to organise themselves (Conand, 1997a, 1997b; Conand et al., 1997).

The sea cucumber sector in Madagascar and the various players involved in sustainable management

In Madagascar, this sector comprises five main levels as in other countries (Conand, 1997a):