

STATUS OF SPINY LOBSTER RESOURCES IN SABAH, MALAYSIA¹

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Introduction

Spiny lobsters (*Panulirus* species) make up an important component of the niche live reef fish trade (LRFT) markets based in Hong Kong, Taiwan and Singapore. In 2001, exports of spiny lobsters in various forms (live, fresh, chilled and frozen) in 2001 amounted around 97 MT (USD1.37 million) (Table 1), representing some 0.1% by volume and 0.6% by value of Malaysia's total fish exports. Sabah accounts for most of the annual live spiny lobster exports. The purpose of this paper is to give an overview of the present status of spiny lobster resource exploitation in the country with a special reference to the State of Sabah – on the northern tip of Borneo Island (Figure 1).



Figure 1: Location map of Sabah State, Malaysia

Fishing Grounds

The main spiny lobster fishery is based in Sabah which account for 75% of the coral reefs in the country. These rich fishing grounds account for the bulk of the spiny lobster landings in the country. In the neighbouring State of Sarawak, there are only a few coral reefs limited to the Tanjung Datu and Talang-Satang Group of Islands, and areas off the shores of Bintulu and Miri. According to some local fish traders, the reef shoals off Miri account for some of the spiny lobsters exported via the Federal Territory of Labuan. However, no statistics are available on the volume of spiny lobsters exploited from these waters. Peninsular Malaysia accounted for less than 20% of the coral reefs in the country. However, most of the coral reef areas including small offshore islands had been gazetted either as marine parks under the Fisheries Act 1985 or zoned for ecotourism activities and hotel resorts, where fishing of any kind is totally banned or strictly controlled. Some minor spiny lobster fishery existed in the states of Johore and northern Peninsular but the authors were not able to obtain the landing statistics at source for the purpose of this paper².

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² Under the DOF Malaysia annual fisheries statistics, spiny lobsters and shovel-nose lobsters (*Thenus orientalis*) are grouped under lobster landings

Excluding Sabah, a total of 40 areas had been gazetted under the Malaysian Fisheries Act 1985 as marine parks in the country. In Sabah, the management of marine parks falls under the State Government jurisdiction where marine parks are gazetted under the state ordinances or enactments.

Sabah has six gazetted marine protected areas/sanctuaries, with three being managed by Sabah Parks - Tunku Abdul Rahman Park and Pulau Tiga Park on the west coast and the Selingan Turtle Islands on the northeast. On the other hand, the Sugud Islands Marine Conservation Area near the Selingan Turtle Islands, Sipadan Island and Mantanani Island are managed by Sabah Wildlife Department. Another two MPAs are now in the pipeline of being gazetted - Tun Sakaran Marine Park in Semporna and Tun Mustapha Marine Park in Kudat.

MAIN SPINY LOBSTER FISHING GROUNDS IN SABAH, MALAYSIA

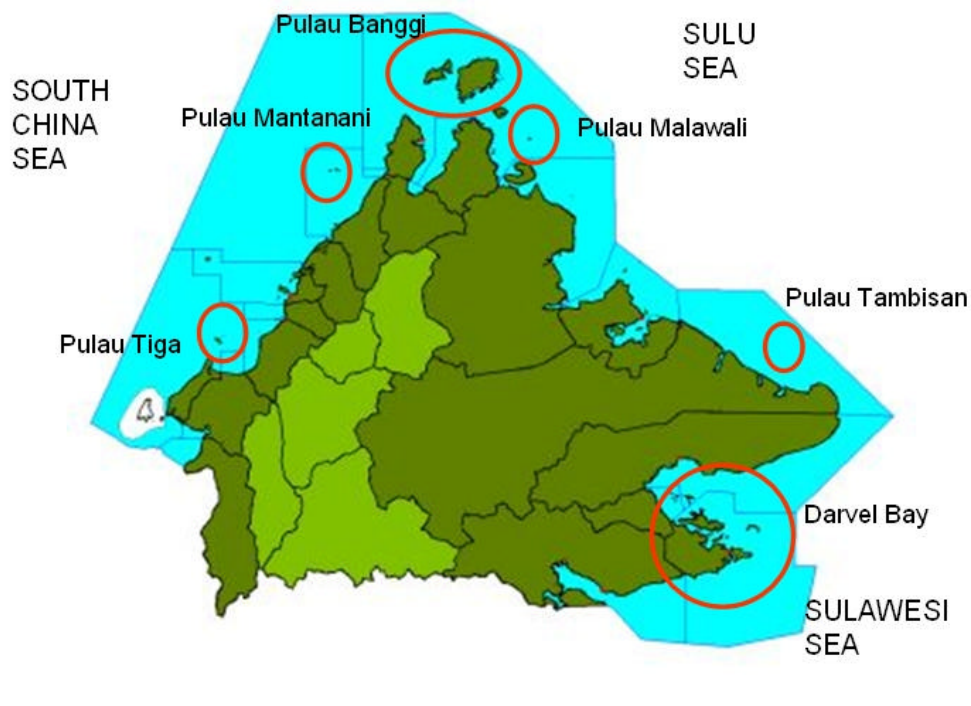


Figure 2. Main spiny lobster fishing grounds in Sabah, Malaysia

The major spiny lobster fishing grounds in Sabah are concentrated around small islets to large islands and offshore shoals which have extensive fringing coral reefs. These waters are relatively shallow with average depths ranging between 5-10 fathoms. Among the major spiny lobster fishing grounds include in the Darvel Bay (Tawau - Semporna) and Tambisan Island on the east, Banggi Islands and Malawali Island in the north, and Mantanani Group of Islands and Pulau Tiga Group of Islands on the west coast (**Figure 2**). Besides spiny lobsters, these reef areas also support the LFRT fishery of high value fishes including groupers for the Hong Kong, Taiwan and Singapore markets. However, fish landings from these areas had gradually declined throughout the years due to the degradation or destruction of reef habitats aggravated by destructive fishing practices (cyanide and blast fishing), pollution as well as impacts from uncontrolled coastal development.

Assessment of Spiny Lobster Resources

There is a paucity of information on the distribution, biology, ecology and capture fisheries of spiny lobster resources in Sabah. In the 1970s, DOF Sabah had conducted some preliminary surveys on spiny lobsters in the state but since then, no further work had been carried out. Biological data for *P. ornatus* cultured in marine cages (Azhar, 1999) is shown in **Table 3**.

Spiny Lobster Fishery

The potential of spiny lobsters in Sabah as a commercial species was first realized in the late 60s but it was not until the late 80s that spiny lobsters became a commercially targeted species. The first significant commercial attempt was carried out using a 300 GRT vessel by a local fishing company with Korean interests. The company planned to export the catches to Korea and other countries in cooked headless form. Persistent poor catches using baited pots had forced it to resort to other methods including trammel nets and hand collection at night using hookahs. However, the company ceased operation after two years. The export of live spiny lobsters by air to Hong Kong first started in 1989, and because of the attractive prices offered in Hong Kong, the number of fishing operators involved in spiny lobsters had rapidly proliferated throughout the years. However, no data available is on the number of individuals or fishing vessels involved in the spiny lobster fishery.

Generally, fishing vessels employed in the fishery are relatively small (<10 GRT) powered by 30-75 HP inboard engines manned by 5-6 crew members including 3-4 divers. Collection of spiny lobsters is carried out at night where divers would dive in tandem over the reef area with air supplied direct from the boat through a compressor via flexible hoses (hookah). The catches were brought up and kept in specially constructed live wells inside the boat. The catches were either kept in cement tanks or marine cages prior to export. Reliable sources informed that cyanide is now used to catch spiny lobster during the day. Since 1996 cyanide is being widely used to meet the increasing demand for spiny lobsters and other high value reef fishes for the Hong Kong and Taiwan markets. Some traders believed that more than 50% of the spiny lobsters and high value reef fishes landed are caught by cyanide.

There are five *Panulirus* species being exploited in Sabah waters – with *P. longipes* being the most common species, followed by *P. versicolor*, *P. ornatus* and another two unidentified species. *P. ornatus* is the most sought after species among fish traders fetching an average of RM70/kg wholesale on the local market and export price of RM115/kg wholesale in Hong Kong, followed by *P. versicolor* (RM50/kg wholesale; RM80/kg export) and *P. longipes* (RM45/kg wholesale; RM75/kg export). The prices of the other two unidentified species are reported to be much lower compared to the other three species. Spiny lobsters represent an important component of the marine cage culture production in Sabah. Exporters or farmers normally reared them in cement tanks or sea marine prior to export or harvesting. The culture period depends on the timing of the next export shipment or when fish traders (middlemen or exporters) come to the farms to buy their products.

According to statistics under from the National Fisheries Management Information System (NFMIS), landings of spiny lobster in Sabah had gradually increased through the years and in recent years had stabilized around 50-80 MT in 2002 (**Table 2**). With production being export-oriented, the fishing effort for spiny lobsters had stabilized throughout the years, with annual export quota fixed at the 70 MT level (including re-exported “imports” from Indonesia and the Philippines).

In 2002, Tawau and Semporna account for 53% of the total landings, with most supplies coming from the Darvel Bay as well as substantial imports from Indonesia (Manado) via Tarakan and from the Philippines (Sitangkai) via Semporna. Kudat accounted for 45% of the 2002 landings, with supplies sourced from the Banggi Group of Islands and Sandakan waters as well as from the Philippines (Palawan). The spiny lobster landings in Kudat had fluctuated throughout the years due to the inconsistent supplies from the Philippines. On the other hand, Kota Kinabalu only account for 2% of the 2002 landings, where most catches from the west coast being landed and exported out of the Federal Territory of Labuan as well as declining spiny lobster catches due to the gradual degradation of reef habitats aggravated by destructive fishing practices throughout the years.

Spiny Lobster Trade

Spiny lobsters from Sabah are mainly exported live, with most of the annual export volume destined for the LRFT markets in Hong Kong and Taiwan (**Figure 3-5**). According to statistics from the Royal Customs and Excise Department, exports of spiny lobsters increased to 133 MT in 1992 from 43 MT in 1990, and then declined gradually to only 47 MT in 2002. The export data of spiny lobsters by destination for the 1990-2002 period is given in **Table 3**. The decline in export volume was due to the annual export quota of 70 MT enforced by DOF Sabah since 1994. However, more studies are needed to assess the actual exploitation rates in different fishing grounds.

The export data include spiny lobsters brought in from neighbouring countries. Previously there was a steady supply coming in down from Palawan Island in the Philippines through Kudat but in recent years the volume had declined due to much better prices being offered by fish traders in Manila. Supplies from Manado, Indonesia and Sitangkai – Southern Philippines were brought in respectively via Tawau and Semporna. However, no official documentation is available on the actual volume of spiny lobsters being “imported” from these two countries. Supplies from Manado comprised mainly of the highly valued *P. ornatus* while supplies from Sitangkai comprised a combination of *P. ornatus*, *P. versicolor*, *P. longipes* and other species.

Culture of Spiny Lobsters

The culture of spiny lobsters in Malaysia is still in its infancy, with activities based in the State of Sabah – mainly concentrated in the Darvel Bay (Lahad Datu & Semporna), Kudat and Kota Kinabalu (Kinarut). Spiny lobster culture involved both grow-out of juveniles in marine cages and holding of adults in cement tanks and marine cages. Seed are obtained from local waters as well as from neighbouring countries. In the Darvel Bay, spiny lobsters are reared in marine cages at depths of 10-20 meters. Feed comprised of chopped trash fish given 1-2 times daily.

Issues and Challenges

Among the key constraints faced in the management and development of spiny lobsters in Sabah can be summarized below:

- Paucity of information for fishery management purposes
- Declining resources or overfishing
- Habitat degradation caused by destructive fishing practices
- Trans-boundary issues

Future Directions

Research

- Studies on the distribution, ecology and biology of spiny lobsters
- Stock assessment and population dynamics

Fishery Management

Fishing activities in Malaysia including spiny lobster fishing is enforced under the Fisheries Act 1985. With regards to the management of the spiny lobster fishery in Sabah, DOF Sabah is in the process of preparing the final policy draft with regards to:

- Only collection by hand/diving and pot fishing at night will be allowed.
- Identify and gazette reef areas as fisheries sanctuaries, MPAs or MMAs to be no-take zones for spiny lobsters.
- Control of live spiny lobster exports:
 - Exports for *P.ornatus*, *P.versicolor* and *P.longipes* will be regulated by minimum carapace length
 - The annual export quota of 70 MT will be reviewed with the export season restricted to the months between May and November only.
- All berried individuals must be released immediately upon capture
- Prepare and implement other relevant regulations leading to the sustainable management and development of the spiny lobster fishery

Aquaculture

Under the 3rd National Agriculture Policy, both aquaculture and deepsea fishing had been identified to be the focus of fisheries development in the country. Aquaculture is expected to contribute 600,000 MT or 30% of the total fish production by the year 2010. Sabah has the largest area of both land and sea that had been identified to be highly potential for aquaculture development. Focus will be on the culture of high value species including spiny lobsters targeting the overseas niche markets. With respect to the culture of spiny lobsters, emphasis will be on artificial seed propagation and development of suitable culture technologies and systems.

Concluding Remarks

To ensure the sustainable development and management of the spiny lobster resources in Sabah, issues pertaining to information paucity, overfishing, habitat degradation and trans-boundary matters need to be addressed. With declining resources at stake, aquaculture is perhaps the key factor to ensure the sustainability of the fishery. Since spiny lobsters is trans-boundary in nature, collaborative efforts among neighbouring countries should be realised.

References

- Azhar Kassim. 1999. Preliminary studies on the maturity size and growth rate after moult of *Panulirus ornatus*. B.Sc. thesis. Universiti Putra Malaysia. 87p.
- Pilcher, N. and Cabanban, A. 2000. *The status of coral reefs in Eastern Malaysia*. Global Coral Reef Monitoring Network (GCRMN) Report. Australian Institute of Marine Science.

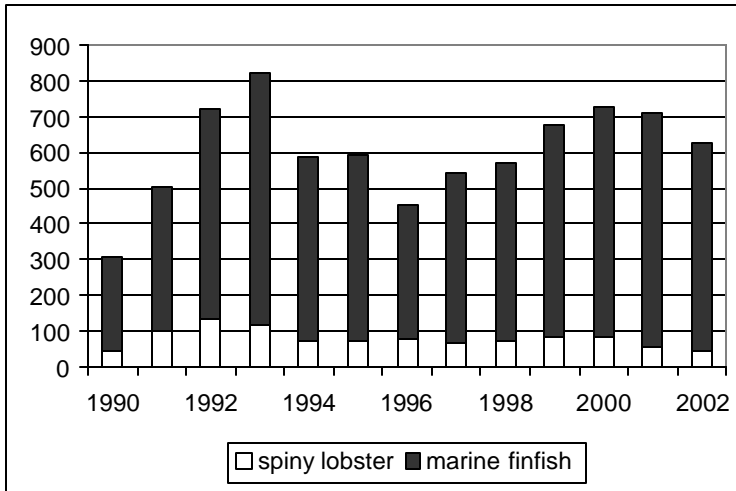


Figure 3. Annual exports of live marine fish, Sabah – Malaysia (metric ton)

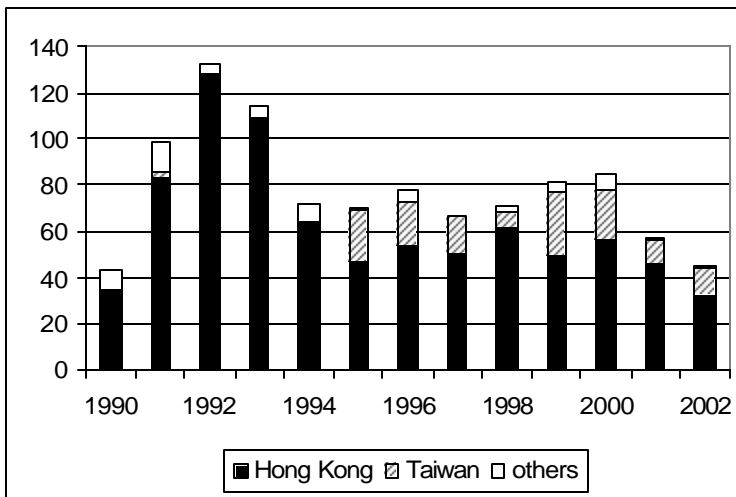


Figure 4. Annual spiny lobster exports by destination, Sabah – Malaysia (metric ton)

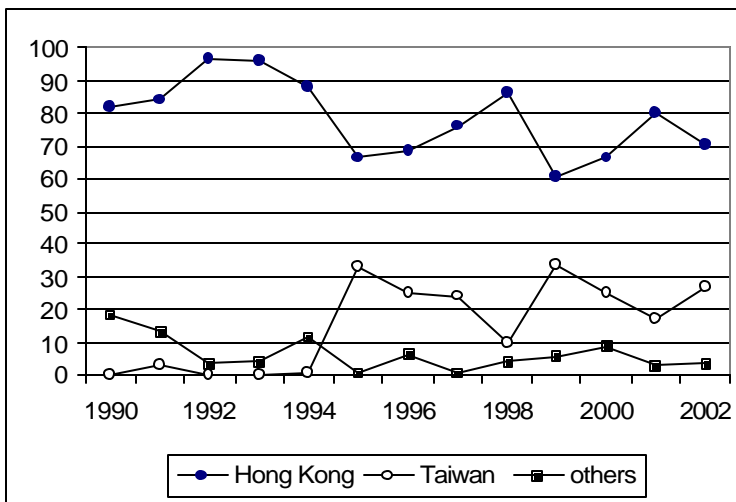


Figure 5. Annual breakdown of spiny lobster exports, Sabah – Malaysia (% annual)

Table 1: Spiny lobster export and import statistics, Malaysia

YEAR	Exports		Exports from Sabah ¹	Imports		Reexports	
	Q	V		Q	V	Q	V
1990	61	349	43	62	232	-	-
1991	106	623	99	30	338	-	-
1992	143	1,194	133	259	906	-	-
1993	144	1,295	114	73	1,385	-	-
1994	193	1,388	72	82	832	-	-
1995	66	1,553	70	58	996	-	-
1996**	91	2,042	77	533	2,056	-	-
1997	134	2,123	66	107	2,118	-	-
1998	122	1,951	70	76	1,010	45	293
1999	91	1,629	81	105	1,292	64	283
2000	121	1,838	85	86	1,737	38	248
2001	97	1,372	58	151	2,218	58	167

Q – quantity (metric ton); V – value (USD'000)
 In live, fresh, chilled and frozen forms ; Exports from Sabah in live forms only
 ** discrepancies for 1996 was due to trade statistics being obtained from two different data sources

Data sources
 FAO Fisheries Department, Fishery Information, Data and Statistics Unit
 URL: <http://www.fao.org/fi/statist/FISOFT/FISHPLUS.asp>

¹ – DOF Sabah annual fisheries statistics (data reported by the Royal Customs and Excise Department of Malaysia)

Table 2: Spiny lobster landings in Sabah, Malaysia (metric tons)

Year	Main Landing Districts				Total Landings	Annual Exports
	A	B	C	D		
1996	2.15	8.86	16.75	1.99	29.75	77.60
1997	6.27	11.19	13.17	7.01	37.64	67.12
1998	13.42	11.02	13.99	10.26	48.69	73.53
1999	11.94	11.14	8.45	1.57	33.10	82.76
2000	31.18	11.43	6.64	2.67	51.92	86.60
2001	31.64	16.53	4.41	2.72	55.30	60.20
2002	25.87	16.44	35.74	1.84	79.89	46.62
TOTAL	122.47	86.61	99.15	28.06	336.29	494.43

A – Tawau; B – Semporna; C – Kudat; D – Kota Kinabalu (including from Kota Belud)
 Source: Department of Fisheries Sabah annual fisheries statistics

Table 3. Biological data of *P. ornatus* cultured in marine cages, Darvel Bay, Sabah

Sex	N	CL range	TL range	BW range	Length Weight Relationship
M	51		136-343	118-1,900	BW = -8.7010 + 2.7388 Ln TL ($r^2 = 0.9824$)
F	52		113-420	58-2,270	BW = -9.0475 + 2.7936 Ln TL ($r^2 = 0.9810$)
M	103	45-139		84-2,220	BW = -6.3373 + 2.8466 Ln CL ($r^2 = 0.9839$)
F	93	21-140		21-2,520	BW = -6.6636 + 2.9304 Ln CL ($r^2 = 0.9332$)

CL – carapace length (mm); TL – total length (mm); BW – body weight (gram)
 Minimum size at maturity: Male – 98 mm CL; Female – 107 mm CL
 Source: Azhar Kassim (1999)

Table 4. Annual export of live lobsters by destination, Sabah - Malaysia

Quantity (metric ton)													
DESTINATION	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
China							0.14		0.94				
Brunei	0.20	0.05	0.29	0.30			0.25	0.10					0.17
Hong Kong	35.17	83.11	127.85	109.33	63.65	46.55	53.10	50.37	61.70	49.47	55.91	46.13	32.02
Japan	0.10	0.90					4.25				0.29		
Singapore	7.56	12.00	4.55	4.46	8.33	0.55		0.09	1.91	4.59	6.96	1.76	1.29
Taiwan		2.59			0.24	23.22	19.55	15.73	6.86	27.28	21.53	9.97	12.15
Domestic	0.06	4.15	0.41				0.31	0.83	2.12	1.42	1.91	2.34	0.99
TOTAL	43.09	102.80	133.10	114.09	72.22	70.32	77.60	67.12	73.53	82.76	86.60	60.20	46.62
Value (RM million)													
DESTINATION	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
China	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.066	0.000	0.000	0.000	0.000
Brunei	0.006	0.001	0.006	0.006	0.000	0.000	0.003	0.004	0.000	0.000	0.000	0.000	0.008
Hong Kong	0.682	1.379	2.801	2.805	2.332	2.440	3.246	3.450	4.672	3.844	4.304	3.590	2.584
Japan	0.002	0.009	0.000	0.000	0.000	0.000	0.245	0.000	0.000	0.000	0.019	0.000	0.000
Singapore	0.086	0.187	0.116	0.169	0.465	0.018	0.000	0.006	0.144	0.286	0.438	0.121	0.064
Taiwan	0.000	0.045	0.000	0.000	0.015	1.546	1.553	0.979	0.548	2.200	1.638	0.842	0.976
Domestic	0.002	0.085	0.006	0.000	0.000	0.000	0.019	0.072	0.119	0.092	0.213	0.160	0.066
TOTAL	0.778	1.707	2.929	2.981	2.811	4.004	5.075	4.509	5.549	6.423	6.612	4.712	3.699
Source: DOF Sabah Annual Fisheries Statistics													