

## SEA CUCUMBER FISHERIES, UTILIZATION AND TRADE IN MYANMAR

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### 1. Introduction

The Union of Myanmar with an area of 675,577 square kilometers is situated between 92 degree 10 minutes and 101 degree 10 minutes east longitudes and 9 degree 52 minutes and 28 degrees 25 minutes north latitudes. The country has a long coastline which extends from 9 degree 52 minutes to 21 degree north latitude with a distance of 1,800 kilometers. With its large number of estuaries and islands the length of the total coastline is about 3,000 kilometers and the continental shelf area within 200 meter depth is 225,000 square kilometers. The coastline contains highly productive ecosystem such as mangrove, coral reefs, sea grass beds and marshy lands. These coastal ecosystems are a valuable resource for the people of the country, particularly for coastal communities. Coastal ecosystems have been utilized as a food source and income generator for centuries and the rate of exploitation is increasing at an alarming rate. Collection and exporting coastal ecosystem- associated organisms have contributed substantially to the foreign exchange earning of the country. The collection of sea cucumber for export is one such industry. A sea cucumber fishery has existed in Tanintharyi coastal areas for many years, but along the coastal areas in the Ayeyarwady and Rakhine began only about last 10 years ago, after the country changed its economy system to Open Market Economy from Socialist Economy in 1989. Sea cucumber inhabit along the coast of Myanmar. Sea cucumbers are a fascinating group of marine animals. Invertebrates such as starfish and sea cucumbers ancient animals. Their habitat chiefly among corals but are also found among rocks and in muddy and sandy flats. They are distributed from the shore to the greatest depths. Their lengths range from a few millimeters to more than 2 m and they occur in all color combinations; white, black, red, blue, green, yellow, violet etc. Some of them are really very beautiful while alive and are in great demand for aquaria. The Chinese, Japanese and Koreans consider them as a delicacy. The Chinese consume them in process form while the Japanese

and the Korean consume *Apostichopus japonicus*, fresh. The toxins of sea cucumber have antiviral, antitumoral, anticancerous and antifertility properties and find use in the pharmaceutical industry.

Numbering some 1,110 species worldwide, they are found in both tropical and temperate oceans, where they inhabit the intertidal zone as well as deeper waters. They appeared some 500 million years ago and are regarded as close to the line from which all vertebrates evolved. At present, nearly 1,400 species of sea cucumbers are known from all the seas in the world. Of these, only 15 species are used for processing at present. Inside the Mergui Archipelago mostly habitats include silt or sand bottoms, and sea grass meadows some in the reef and rocky bottom, and to 20-25 meter depths. Some small species also occur on the surface or barrel sponges or other sponge types.

### 2. History of Sea Cucumber Fisheries in Myanmar

Sea cucumber are locally known as “ Pin-lai-myawt “ but are not used locally as a food item or any other purposes. As with most sea cucumber producing countries, production is not meant for local consumption but rather for export to Asian countries ( Conand, 1990 ). At present only 10 species of sea cucumber were identified in Myanmar coastal areas. Although sea cucumbers were abundant along the shallow coastal waters fishermen were not harvested until buyers from China created a demand. The buyers purchased two species: *Holothuria nobilis* and *Holothuria fuscogilva* for very low price. Although buyers paid only one thousand kyats per kilogram of wet weight, fishermen earned a considerable amount of money because of the organism’s abundance in shallow coastal waters. The price increased up to five thousand per kilogram wet weight as suppliers

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dwindle. Harvesting at first was done by hand while wading or using snorkel gear in shallow waters. As the shallow areas were finished out scuba gear was used to exploit increasingly deep sea cucumber beds. Over the past three to four years, the sea cucumber fishery in the shallow areas off Myanmar declined rapidly. The fishermen and divers of these areas then turned to distant sea cucumber beds, such as Coco island, Preparis island and some parts of Andaman islands.

Sea cucumber is mainly harvest in November, December, January and February. Local divers harvest sea cucumber together with lobster, oyster and shell fishes. They are fairly interest in collecting only sea cucumber. This animal mostly found in Rakhing coastal area, Andaman Sea, Great coco, Little coco and inside the Mergui Archipelago. The group of fishermen based on the island and harvested sea cucumber together with lobster, oyster and shell fishes. The live animals are gathered from various reef and dried in the sun or smoke with charcoal.

### 3. Sea Cucumber Species Found in Myanmar

Current knowledge of sea cucumber biodiversity in Myanmar is poor, as few studies have been devoted. Even the Department of Fisheries has not yet undertaken research works in sea cucumber biology and fisheries some studies on these animals were done by universities for Master degree. According to these research papers it was learned that there are ten species of sea cucumber existing in Myanmar waters and utilizing for commercial purposes.

The sea cucumber species systematically identified from Myanmar waters are as follows:

Scientific Name	Common Name	Myanmar Name
<i>Actinopyga miliaris</i>	Black fish	Myawt mae
<i>Actinopyga lecanora</i>	Stone fish	Not myawt ni
<i>Thelenota ananas</i>	Prickly red fish	Na garr
<i>Thelenota anax</i>	Amber fish	Kha met
<i>Stichopus variegates</i>	Curry fish	Pein ne
<i>Stichopus chloronotus</i>	Green fish	Kyet hinn khar tee
<i>Holothuria nobilis</i>	Black Teat fish	Baung kyarr
<i>Holothuria atra</i>	Lolly fish	-
<i>Holothuria fuscogilva</i>	White Teat fish	Baung mae
<i>Bohadschia argus</i>	Leopard (tiger fish)	Kyar thit

1. *Actinopyga miliaris* (Blackfish) species habitat on reef flat of fringing and lagoon islet reefs and never found on barrier reefs. This species can found in the shallow waters depth range between 0 – 10 meters. The average total length of this species is 25 cm and common size is between 10 to 12 cm. This species is called “Myawt-Mae “ which means black sea cucumber.

2. *Actinopyga lecanora* (Stonefish) species like to live on hard substrates. It is nocturnal species. In day time it can found under large stones, in gaps in reef slopes or in sheltered areas. This species can found water depth range of 0 to 20 meters. Its common size is between 10 to 12 cm in length. This species is locally known as “Not-Myawt-Ni” which means red sea cucumber.

3. *Thelenota ananas* (Prickly redfish) species can found reef slope and near passes, on hard bottom with large rubble and coral patches. This species can found in the waters depth between 0 to 25 meters. Its common size is between 20 to 25 cm in total length and average size is 45 cm. Local communities called “Nagarr “ to this species according to dragon like appearance.

4. *Thelenota anax* (Amberfish) species habitat in reef slope, outer lagoon and near passes, on hard bottoms, large rubble and sand patches. This species prefer to live in water depth between 10 to 30 meters. Its common size is 15 to 20 cm in total length and the average size is 55 cm in length. Locally known this species as “Kha-Met “.

5. *Stichopus variegates* (Curryfish) species can found in sea grass beds, rubble and sandy-muddy bottoms. This species prefer to habit in the waters depth between 0 to 25 meters. The common size of this species is between 12 to 18 cm in total length and the average size is 35 cm. Local people called this species “Pain-Nair “ according to “Jack fruit “ like appearance.

6. *Stichopus chloronotus* (Greenfish) species can found on the reef flats and upper slop, mostly on hard substrate. This species can collect in the shallow waters depth between 0 to 15 meters. Its common size is 10 to 12 cm and average size is 18 cm in total length. Local name for this species is called “Kyet-Hinn-Khar-Thee “

7. *Holothuria nobilis* (Black Teatfish) species live in reef flats, slopes and shallow sea grass beds. It can collect in the water depth range between 0 to 20 meters. Its common size is 18 to 24 cm and average size is 37 cm in total length. Local people called “Baung-Kyar” to this species.

8. *Holothuria atra* (Lollyfish) species can found in inner and outer reef flats and back reefs or shallow coastal lagoons. Abundance on sandy-muddy grounds with rubble or coral patches and in sea grass beds. It can collect from shallow water, depth range between 0 to 20 meters. The common size of this species is between 15 to 20 cm and the average size is 20 cm in total length. Local name for this species is unknown.

9. *Holothuria fuscogilva* (White Teatfish) species can found in outer barrier reefs and passes, but also on sea grass beds. This species prefer to habit in the water depth between 10 to 40 meters. Its common size is 18 to 24 cm and average size is 42 cm in length. Local name for this species is called “Baung-Mae”.

10. *Bohadschia argus* (Leopard (Tiger) fish) species prefer to live in barrier reef flats and slopes or outer lagoons on white sand. This species can collect from the water depth 0 to 30 meters. The common size of this species is 12 to 18 cm and average size is 36 cm in length. Local people called this species “Kyar-Thit”, which means leopard, according to its appearance.

#### 4. The Main Sea Cucumber Market

Sea cucumber are a delicacy in the Far East; the Chinese consume them is processed formed while the Japanese and Koreans eat them fresh ( James, 2001). They are also used in the production of oils, lotions, cosmetics and tablets (Baine and Sze, 1999). Exports from Myanmar are usually in the processed form; the dried products are called beach-de-mer (Conand, 1998). The major export destinations for sea cucumber are China, Hong Kong, Korea and Japan. China has been the dominant buyers from Myanmar since 1999. Hong Kong, Korea and Japan are the second, third and fourth largest markets respectively. (Table 2). Since some fishermen are doing sea cucumber fishery illegally, information about sea cucumber are still lacking and statistical data are not sound enough to evaluate the situation of sea cucumber fishery in the country. For this reason, it was found that the yearly sea cucumber exported data are not stable. (Table 3)

**Table 2.** Sea cucumber exported from Myanmar (2004-2005)

Sr.No	Country	MT	US \$
1.	China	46.383	304,000.00
2.	Hong Kong	0.224	896.00
3.	Korea	0.085	1,275.00
4.	Japan	0.002	11.00

Source: Statistics of exported fish and fishery products (2004-2005) Department of Fisheries

**Table 1.** Summary Table for Sea Cucumber Species Composition in Myanmar

Sea Cucumber Species	Family Name	Local Name	Commercial Value
1. <i>Actinopyga miliaris</i>	Holothuridae	Myaw-mae	Medium
2. <i>Actinopyga lecanora</i>	Holothuridae	Nut-myaw-ni	Medium
3. <i>Thelenota ananas</i>	Stichopodidae	Nagar	High
4. <i>Thelenota anax</i>	Stichopodidae	Kha-mae	Low
5. <i>Stichopus variegates</i>	Stichopodidae	Pain-naei	High
6. <i>Stichopus chloronotus</i>	Stichopodidae	Kyet-hin-khar-thee	High
7. <i>Holothuria nobilis</i>	Holothuridae	Baung-kyar	Medium
8. <i>Holothuria atra</i>	Holothuridae	Baung-kyar	Medium
9. <i>Holothuria fuscogilva</i>	Holothuridae	Baung-mae	Medium
10. <i>Bohadschia argus</i>	Holothuridae	Kyar-thit	Medium

**Table 3.** Sea cucumber exported from Myanmar (2002-2003 to 2007-2008)

Sr.No	Year	MT	US \$
1.	2002 - 2003	23.66	236735.20
2.	2003 - 2004	0.88	4400.00
3.	2004 - 2005	97.094	826100.00
4.	2005 -2006	50.482	50100.0
5.	2006-2007	24.334	27400.0
6.	2007-2008	-	-

Source: Quality Control Unit, Department of Fisheries

### Local Market

After harvested sea cucumber, the fishers and his family processed or dried in the sun or boiled with sea waters and smoke with charcoal. The marine products collector or buyer visited directly and collected from fishers, who based on the island. All products were collected from the fishers and carried to Yangon main market. The dried sea cucumber market is always in China town. Chinese people preferred to eat very much and it costs about minimum 25,000 kyats / kg, to maximum 180,000 kyats / kg. according to species and sizes. ( 1000 kyats = 1 US \$ )

### 5. Present Status of the Fisheries

At present Myanmar fishermen are exploring sea cucumber beds in distant parts of the Indian Oceans. Although fishermen from Rakhine coastal areas and Tanintharyi coastal areas exploiting sea cucumber in their respective areas, fishermen from

Ayeyarwady coastal areas are prefer to go to the sea cucumber beds close to Andaman Island which have very good resources of sea cucumber as well as other aquatic resources. Fishermen used multi-day operating boat and global position system ( GPS ) to navigate far from shore. Boats range from 10.7 to 15.2 meter ( 35 to 50 feet ) with 25 to 45 HP engines. These boats are usually four to six years old and modified to accommodate 10 to 12 crew member. The crew consists of skipper, divers, a cook, a compressor operator and engine driver. At time these boats operate in group of two or three; by doing so they are able to maximize their profits by carrying fewer support personnel ( such as cook and compressor operator ) and a large number of divers.

The duration of fishing activity depends on the sea cucumber population and the number of boats and divers participating in the fishery. The harvesting method depends on the depth of the fishing ground. Snorkeling gear is used in shallow waters and the animals are collected by hand and place into the net bag. Sometimes, divers used small hand nets to collect sea cucumber from gullies and crevices on rocky bottoms. In deeper waters, scuba gear is used. The filled net bags are sent to the surface using lifting bags fill with air that is retrieved by the boat's crew. The catch is washed and store on ice in the hold.

The majority of the catch goes through collectors or middlemen for processing, which is mainly cottage industry involving family of collectors and middlemen. During processing sea cucumber are

**Table 4.** Summary for Consumption and Marketing of Sea Cucumber

Sea Cucumber Species	Family Name	Product Form	Locally consumed(C) Discarded(D) Traded(T)	Local Price (Kyats/Viss)	Main Destination
<i>Actinopyga miliaris</i>	Holothuridae	Dried	(T)	8,000	China
<i>Actinopyga lecanora</i>	Holothuridae	Dried	(T)	8,000	China
<i>Thelenota ananas</i>	Stichopodidae	Dried	(T)	60,000	China
<i>Thelenota anax</i>	Stichopodidae	Dried	(T)	60,000	China
<i>Stichopus variegates</i>	Stichopodidae	Dried	(T)	60,000	China
<i>Stichopus chloronotus</i>	Stichopodidae	Dried	(T)	60,000	China
<i>Holothuria nobilis</i>	Holothuridae	Dried	(T)	20,000	China
<i>Holothuria atra</i>	Holothuridae	Dried	(T)	20,000	China
<i>Holothuria fuscogilva</i>	Holothuridae	Dried	(T)	20,000	China
<i>Bohadschia argus</i>	Holothuridae			20,000	



guted, cleaned, cooked in boiling water for half an hour and dried. Processed products are then stored in the plastic boxes and channeled to the export markets.

## **6. Future Development of the Fisheries**

The Sea Cucumber fishery is not to be expected to grow much beyond the current level; it is instead likely to decrease in the near future due to the scarcity of the resource. Demand will continue to rise, however. As a result, it is expected that the new species will be introduced to the market. The depletion of wild sea cucumber stocks may have the effect of increasing the value of those that remain, so that low value species become medium value, and medium value species become high value. Although the principal market for beach-de-mer are East Asian countries, there is a possibility that the market will expand towards Europe, America and Canada, where many East Asians live. Improve processing and cooking methods, and increase awareness of antiviral, antitumoral, anticancerous, and pro-fertility properties of these products could also increase demand. ( James, 2001)

## **7. Management Measures**

There are no effective management measures in place to ensure sustainability of the sea cucumber fishery in Myanmar. Although most sea cucumber fishermen are aware of the negative impacts of the fishery and the rate of resource depletion, the high revenue that this fishery brings, the low amount of fishing effort required, and the scarcity of alternate source of income of the same magnitude, drive them towards harvesting all available sea cucumbers in the shortest possible time.

There is a lack of coordination at different levels of government, particularly at the Township level where authorities do not have the required knowledge or understanding to manage the environment. Monitoring stocks and trade in sea cucumber has been severely hampered in the past due to lack of expertise to identify both live animals and the cured products at the point of export. Sustainable use can be achieved through management of the resource. Replenishment of stocks by artificial culture and

re introduction is an option to consider. Financial constraints are a major obstacle to the implementation of an effective management system. Primary management costs are likely to be those associated with enforcement, provision of technical assistance, training, monitoring, and evaluation. These problems can be resolved with better understanding and dialogue between scientists and authorities.

## **8. Conclusion**

The sea cucumber fishery in Myanmar has decreased due to overexploitation. As a result, Myanmar fishermen and divers exploit sea cucumber beds well away from Myanmar waters as an illegal fishery because of the high demand and the high income provided by the industry. Factors that limit the sustainability of the industry in Myanmar are inadequate information about current stocks, exploitation rates, fishing grounds, and absence of resource management regulations and awareness programmes. Research into improved processing techniques and possible culture techniques are advisable.

## **9. Recommendations**

The following recommendation should be needed to take action in the future for sustainable fishery development.

- It is needed to collect sea cucumber catches data directly or indirectly from the fishers and stakeholders.
- The regional plan for data collection, study on biological and trade status of sea cucumber is urgently needed to implement.
- Identification of sea cucumber species and data collection of species composition from the catch along the coastal areas and landing sites are urgently needed to conduct.
- To identify and to provide information on current status and situation of sea cucumber based on series of meetings and documents are also required.
- Extension, education and public awareness program to local communities for conservation of sea cucumber is urgently needed to implement.