



Efforts to Conserve Sea Cucumber Resource

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There are about 100 known species of sea cucumber in the Philippines, 25 of which are harvested commercially. These are found in shallow waters within the wide seagrass soft bottom beds as well as in coral reef areas. The Philippines is the 2nd largest exporter of processed sea cucumber meat known as “trepang”. Sea cucumber is a marine echinoderm, named after its cucumber-like shape. In other countries, it is known as sea slug because of its sluggish locomotion. Sea cucumber is considered the Philippines’ 4th priority fishery commodity. Its processed meat, which ranks 8th among the country’s major fishery exports, is a multi-million US dollar industry. In 2002, the Philippine export of trepang amounted to 4.42 million USD and increased to 4.93 million USD in 2004 (FAO Fishstat Plus 2006). More than 60 coastal municipalities in 14 regions of the country depend on sea cucumber fishery for their livelihood. Trepang is almost synonymous to the Chinese cuisine, making it a major export product from Southeast Asia to China and Hongkong for many years. In 2004, the sea cucumber export from Southeast Asia was dominated by Indonesia (2648 mt valued at 5.32 million USD) surpassing that of the Philippines. Being an export-oriented commodity in the Philippines, the market of sea cucumber plays an important role in the country’s resource management and conservation efforts.

More than half of the sea cucumbers traded in the Philippines belong to the genera *Holothuria*. The others belong to genera *Actinopyga*, *Bohadschia*, *Stichopus* and *Thelenota*. Akamine (2001, 2002) noted that *Holothuria*

scabra and *H. fuscogilva* are the most popular species sold in Hongkong and Singapore while *Actinopyga echinites* is most popular in China and *Stichopus horrens* and *S. hermanni* are popular in Korean market. In the Philippines, there are no data on the rate of extraction of this resource. Nevertheless, the Philippine Bureau of Fisheries and Aquatic Resources (BFAR) recognized the localized depletion of this heavily exploited resource. While confirming such observation, the fishermen are now saying that it is taking them longer time than before to accumulate a certain volume of sea cucumber required by middlemen for trans-shipment to Metro Manila for export. Some said they have to resort to collecting the low-value species in order to meet the demand even if these are traded at much lower prices.

In the Philippines, sea cucumbers are harvested and dried for direct selling to middlemen or sold fresh in nearest local markets. Some fishers collect sea cucumber as by-catch from traditional fishing activities. Some dive into deeper reefs for the high value species collected individually. There is no regulation nor monitoring of the catch, and there is also no size nor value restriction neither is there a closed season not even tax collection on landing. The fishermen are not size selective arguing that the middlemen buy whatever catch they could produce regardless of the size. As recently reported, the Philippine trepang industry produces more low value species for export than before. The Philippine wild sea cucumber population is on the verge of collapse due to massive international trade of the

processed meat. Despite increased effort, there has been a dramatic decline in traded dried and salted sea cucumber from 1407 mt in 2002 to 1079 mt in 2004 (FAO Fishstat Plus 2006).

Conservation and Management Efforts

As one of the major exporters of sea cucumber, the Philippines is also a signatory to the CITES. The “impending inclusion of Holothuriidae and Stichopodidae species in Appendix II of CITES” encouraged the Philippines to implement measures addressing the issue on the country’s sea cucumber industry. The Philippines agreement to: limit or regulate the export of Appendix II species taken from the wild; impose acceptable regulatory measures; and develop the culture technology for Appendix II species, prompted the government to exert efforts to promote a conservation and management program for the country’s sea cucumber resource. The responsibility of implementing such program was given to the National Fisheries Research and Development Institute (NFRDI) as the research arm of BFAR.

Many factors have constrained the country’s management efforts because of many reasons that include the absence of fishery regulations and management plan on the fishery and breeding of sea cucumber; and the absence of inventory and monitoring of existing stocks in both unexplored and exploited areas. Other factors include lack of baseline survey to ascertain the extent of depletion; problems in species identification that render available fishery statistics unreliable and meaningless; and lack of understanding on the holothurian life history. These factors have hindered the sustainable development of the sea cucumber industry in the country. In order to address these concerns, the NFRDI in 2006 implemented a project on the Fishery Investigation and Molecular Applications for the Sustainable Use and Development of Commercial Aspidochirotid Holothurians (Sea Cucumber). The project comprises three major activities, namely: (1) stock assessment and fishery investigation; (2) population genetics and DNA profiling; and (3) identification of good stock of selected species for breeding and hatchery program using molecular markers.

This project aims to “combine the traditional and innovative approaches in addressing the complex management and development issues on Philippine sea cucumber fisheries”. Specifically, it also aims to: conduct regular monitoring of the catch and trade in all existing collection sites; and create database of genomic DNA profile of the commercial holothurians as listed in the CITES as protected species. For taxonomic purposes, the identification of stock origin and forensic investigations are also being carried out.



NFRDI conducted marine and land-based surveys in 10 regions of the country, where the marine underwater surveys were done in the entire collection areas of sea cucumber. The land-based data were collected from fishermen through interviews on the quantity of their landed catch and processed meat. Other information were also gathered such as species name, length, weight, production value and trade route.

Initial Findings

Identifying through their shapes and “ossicles”, 33 commercial species from the five major genera of aspidochirotids have been identified in major locations in the country. The aspidochirotids were also observed to be substrate selective. The low value species are abundant but low in densities in muddy/mangrove and sandy/seagrass areas while the high value species are found in deeper areas,



NFRDI Researcher conducting the marine-based sampling of sea cucumber

coral reefs and lagoons but their densities are very low due to over-harvesting.

The spatial distribution in seven sites of the country indicated that *Actinopyga* sp. were commonly found in Cagayan Valley and La Union in northern Philippines. *Holothuria* sp. is found in La Union and Zambales (northern Philippines), Panay Island and Eastern Samar (central Philippines), Zamboanga-Sibugey and Compostela Valley (southern Philippines). *Bohadschia* sp. and *Stichopus* sp. were observed mainly in Compostela Valley.

Sea Cucumber R&D

In order to hasten resource conservation and management of sea cucumber, R&D activities have been conducted to enhance the natural stock with hatchery-bred individuals using broodstock developed through culture or collected from the wild, specifically by the Bolinao Marine Laboratory (BML) of the Marine Science Institute of the University of the Philippines. BML reported that its researchers have successfully pilot-tested the production of *H. scabra* in the hatcheries (Gamboa and Juinio-Meñez, 2003) while grow-out trials indicated that juveniles in cages had better survival rate when cultured at larger sizes while also showing positive growth in coral sand and muddy seagrass substrates.

Since the hatchery technology for *H. scabra* is ready for pilot-testing in other parts of the country, BML intends to set up hatcheries outside Luzon area, i.e., in the Visayas and Mindanao areas, to fast track the reseeding intervention that would enhance the recovery of depleted stocks. BML has also examined the potential of sea cucumber to mitigate feed wastage and initial findings showed that sea cucumbers placed at the bottom of the tank where milkfish is grown can remove feed and fish wastes like NH_4 , PO_4 and NO_2 (San-Diego-McGlone *et al.*, 2003). The potentials of polyculture can therefore, be an alternative technology that is not only environment friendly, but also adding value to the investment.

The NFRDI also started conducting a study on the effect of sea cucumber as bioremediation under fish cages. The study aims to provide remedial measures in the accumulating wastes under fish culture cages and at the same time growing sea cucumber as an alternative means of livelihood. The study also intends to establish the effect of sea cucumber on the soil and water qualities in fish cage areas.

Conclusion and Recommendations

Sea cucumber and its processed meat trepang are sources of food and income for marginal fishers in the coastal areas in Southeast Asia. In a situation like the Philippines and learning from experiences with other commercially important commodities, the sea cucumber industry should be backed

up by breeding and hatchery efforts to cover for the over-exploitation that oftentimes result in resource depletion.

The absence of regulations, lack of law enforcement arresting the violators and weak judicial system led to the irresponsible over-exploitation of the resources especially for commodities like the sea cucumber whose fisheries are highly dependent on the wild stock. Efforts of the Philippine Government to conserve the country's sea cucumber resource are now with the hands of the NFRDI. The initiatives of NFRDI are envisaged to serve as basis for the establishment of effective measures to ensure sustainable and continuous harvest; and development of aquaculture technique for sea cucumber. In totality, these efforts are aimed at achieving food security, job generation, and increased income for the fisherfolk.

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