

New Resource for the Indian Beche-de-mer Industry and its Management

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Abstract

Sea cucumber processing was introduced to India by the Chinese more than one thousand years back. All these years only *Holothuria scabra*, *H. spinifera*, and *Bohadschia marmorata* were processed. In recent years the price of *Beche-de-mer* shot up in the international market like Hong Kong and Singapore. Therefore the processors started looking for new resources. *Actinopyga echinites* was discovered in 1990 off Vedalai in the Gulf of Mannar and *A. miliaris* in 1991 off Tuticorin. Since then these two species are also collected from other localities in the Gulf of Mannar. The new resources were quickly overexploited and within two years they are already in need of conservation and management. In the Lakshadweep in 1994 for the first time *Holothuria nobilis*, *Thelenota ananas*, *H. atra*, *Actinopyga mauritiana* and *Stichopus chloronotus* were processed. At present the exploitation of the sea cucumbers is regulated as a measure of conservation. There is still ban on the collection of sea cucumbers in the Andaman and Nicobar Island. Full details of the new resources, their exploitation and management are presented in the paper.

Introduction

Although sea cucumber processing was introduced to India more than one thousand years back, the processing was restricted only to a few species. Hornell (1917) in his classic paper on the Indian *Beche-de-mer* industry, its history and recent revival mentioned only *Holothuria scabra*, *H. spinifera* and *Bohadschia marmorata* as important species for processing. These three species alone were processed till 1989 in the Gulf of Mannar and Palk Bay. Of these three species, *Holothuria scabra* is the most important and forms more than 90% of the species processed. *Holothuria spinifera* was once rated high in the International market but in recent years it is not preferred. Only stray specimens of *Bohadschia marmorata* are collected particularly around Kilakarai for processing. James and James (1994c) gave an account of commercially important species of sea cucumbers occurring in the Indian seas.

Surprisingly, till 1989 not a single specimen of *Actinopyga* species was reported from the Gulf of Mannar. *Actinopyga echinites* was collected for the first time off Kilakarai in 1989. Subsequently, a good resource of this species was located off Vedalai. James and Badrudeen (1995) described this new resource from the Gulf of Mannar. *Actinopyga miliaris* was discovered off Tuticorin in 1990 for the first time.

Description of new resources and their exploitation

Holothuria nobilis is one of the most valuable species for processing. It is commonly known as Teatfish or Mammyfish. The body is loaf-shaped with teat-like projections at the side seen specially when the animal is alive and in water. It grows to a length of 400 mm and the live weight varies from 2-3 kg. Body wall is thick and varied in thickness from 10-15 mm. It occurs in two color forms viz., white and black. The white form is also known as *Holothuria fuscogilva*. The white

form is more expensive and is found on clean sand near turtle grass. Black form is found in the lagoon with fine coating of sand. Processed material costs US \$ 6.00 to 14.00 depending on the colour. In the Indian seas it is distributed in the Lakshadweep and Andamans. Recently, a single specimen of the white form was taken from the Gulf of Mannar.

Stichopus chloronotus is commonly called Greenfish. The body is quadrangular and green in colour. The tips of finger-like processes are orange in colour. It grows to a length of 300 mm. It usually occurs beyond the low water mark. It occurs gregariously in the lagoons of some Islands like Kiltan and Chetlat in the Lakshadweep. The species has medium value. One Kg of processed material costs U.S. \$ 9.00. In the Indian seas it is distributed in the Lakshadweep and the Andaman and Nicobar Islands.

Thelenota ananas is commonly known as Prickly Redfish. This species grows to a massive size and reaches a length of 700 mm. The live weight varies from 3 to 6 Kg. Colour in the living condition is reddish-orange on the dorsal side and bright orange on the ventral side. It is distributed on clean sandy bottoms at a depth of 2-30 m and rarely found in the lagoons of the Lakshadweep. One Kg of processed material costs U.S. \$ 11.00. In the Indian seas it is distributed only in the Lakshadweep.

Actinopyga miliaris is commonly known as Blackfish. This species is chiefly fished around Tuticorin. The colour is totally black. Weight of the specimens ranged from 0.5 to 2.0 Kg. They are cylindrical and massive. It is distributed mainly in less than 10 m depth on pure sand. This species is exploited since 1990 from Tuticorin and within four years the natural populations were ruined due to overfishing. In 1990, 450 t of this was collected. During 1991, 1992 and 1993, 250, 100 and

40 t were collected respectively by skin diving. In the Indian seas this species is distributed in the Gulf of Mannar, the Andaman and Nicobar Islands and also in the Lakshadweep. One Kg of processed material costs US. \$ 7.5.

Actinopyga echinites is commonly known as deep water Redfish. It reaches a length of 300 mm and the live weight varies from 0.5 to 2 kg. Colour in the living condition is uniform brown. Processed material costs U.S \$ 4.00 per kg. During 1990, 260 t was exploited and during 1991, 1992 and 1993 40, 25 and 22 t were collected respectively. In the Indian seas it is distributed in the Gulf of Mannar, the Andaman and Nicobar Islands and the Lakshadweep.

Actinopyga mauritiana is commonly known as Surf Redfish. The body is cylindrical with a flat ventral side. It reaches a length of 300 mm and the live weight varies from 0.5 to 1.0 kg. Colour in the living condition is brick red on the dorsal side and white on the ventral side. It is a medium value species. One kg of processed material costs U.S. \$ 6.50. These species was processed for the first time at Lakshadweep in 1994. In the Indian seas this species is distributed in the Andaman and Nicobar Island and the Lakshadweep.

Holothuria atra is commonly known as Lollyfish. It is a low value species, but occurs in large numbers. It reaches a length of 600 mm. It occurs on dead coral reef flats with sandy or muddy patches. On the reef flat the length range is 200-300 mm and on the outer edge of the reef it reaches a length of 600 mm. One kg of processed material of this species costs only one U.S. dollar. In the Indian region this species is distributed abundantly in the Gulf of Mannar and Palk Bay, the Andaman and Nicobar Islands and the Lakshadweep.

Management measures

Sea cucumber resource is very vulnerable for over exploitation since the sea cucumbers do not offer any resistance at the time of capture or make any attempts to escape from the captors. Also they do not have defensive mechanisms against man. They are very slow growing animals taking two years to reach maximum size. According to Joseph (1992), in the Maldives the processing of sea cucumbers was introduced only in 1986 with a modest export of 2 tonnes. This shot up to 800 tonnes in 1990 in a span of four years leading to the depletion of stocks. The same problem is faced by all countries including India. In case of over exploitation the catch per unit of effort decreases and also the average size of the animals fished falls. Despite continuous fishing over a long period the sea cucumber population has not become extinct since they are too adept at hiding under stones and too low value individually to make it worthwhile to collect every last one. Also the fecundity is high since a large sized female releases more than one million eggs. Particularly the juveniles are cryptic in their habits. When they reach adult size they come out of hiding. For this reason young

ones are not seen on the coral reefs during collection. The stocks of sea cucumbers are not estimated at any place. Data on catch and effort and weight of the specimens landed are not collected. Still the biology of many commercially important species is imperfectly known.

Beumer (1992) wrote on the Queensland fishery where separate areas are set apart, quantities are notified and permits issued. Adams (1992, 1994) described the management facilities in Fiji, Tonga, Solomon Islands and Cook Island. Fiji, at first banned the export of material less than 75 mm in length, in the case of *H. scabra*. Later the export of *H. scabra* was totally banned. They permitted only Fiji natives to fish the sea cucumbers and the use of scuba was also banned. In Tonga Solomon also the scuba was banned and the minimum size of exploitation was notified as 120 mm. Finally a permit from the Minister is required. In Solomon Islands, to rehabilitate the stocks the catch is reduced. Restrictions are also put on the size, effort, gear and season. Here also the use of scuba is banned. Marine reserves are set up and the size frequencies are regularly monitored. In Cook Island fishing during the breeding season is prohibited. Other management measures are the division of the ref. area into sections, rotation of harvests between Island, establishing grades, minimum size for each species, establishment of reserve area, limiting the entry to a few for each Island, keeping good records from time to time from harvesting to sale. Holland (1994) reported that Fisheries department requires exporters to record the area where the sea cucumbers are caught, the quantity and the value of the processed *beche-de-mer*. Optimal management will depend on reliable data on distribution, age and growth, fishing mortality, natural mortality, catch per unit of effort, fecundity and recruitment of each species. Joseph (1992) gave a number of recommendations including that the collection and export of *Thelenota ananas* should be suspended for 4-5 years, use of scuba should be banned, less than 6 processed *H. arta* should be stopped, night fishing for nocturnal species such as *B. marmorata* should be discouraged, data collection and monitoring mechanism should be established, fisherfolk should be taught the correct and hygienic method of processing and finally establishing of sea ranching programme for sea cucumbers. When these recommendations are implemented the *Beche-de-mer* fishery will recover.

Government of India took a step in the right direction by banning the export of material less than 75 mm in length in 1982. Since this product is not having any internal market and the whole thing is exported, this is the most effective method to manage the resource. The industry brought in lot of pressure to get the ban lifted. This matter was discussed by several expert committees and finally it was decided that there is no scientific justification to lift the ban imposed by the Government of India.

James and James (1994a and 1994b) wrote on the

management and conservation of sea cucumbers. Some of them are highlighted below.

Size regulation

Size regulation is the most important measure for conservation. On processing the length is reduced by 50%. Therefore the *beche-de-mer* of 75 mm which is allowed for export corresponds to nearly 190 mm length in the fresh condition. *Holothuria scabra* is immature at this length. It is desirable to allow the animals to spawn atleast once in their lifetime to replenish the stocks. If this is not taken care of, the populations will be depleted drastically as it happened in and around Tirupalakud In the Palk Bay. The average size of the sea cucumbers collected from Tirupalakudi is only 155 mm. In this connection it is pertinent to note that the *Beche-de-mer* of *H. scabra* exported from East Africa and Indonesia is 100-180 mm in length. While there is a ban to export dried *Beche-de-mer* below 75 mm, there is absolutely no ban on fishing small forms. This ban also should be enforced strictly by the Tamil Nadu Fisheries Department as they are doing for the chank fishery. Holothurians are usually brought along with chanks in Tamil Nadu. Therefore it is easier to regulate and monitor the catch. The Lakshadweep administration took some laudable steps to restrict the collection of *H. nobilis* below the length of 150 mm when a person from Madras processed at Androth and Davaratti some years back. Material below the length of 200 mm must be banned from fishing. Even if they are caught and brought to the shore, they can be put back into the sea since they live out of water for a long time.

Closed seasons

The sea cucumbers should not be fished round the years for processing. There should be closed seasons during the breeding season. *Holothuria scabra* breeds in the Gulf of Mannar during March-April and also during November-December to a minor extent. Collection should not be made during these months.

Extension of areas of collection

Traditionally sea cucumbers are collected for processing from the Gulf of Mannar and Palk Bay for more than one thousand years. The fishery should be extended to Andaman and Nicobar islands and to the Lakshadweep.

Processing of other species

Holothuria scabra formed 90% of the material collected. This put in a lot of pressure on this species. In 1989 *Actinopyga echinites*, in 1990, *A. miliaris* and in 1991, *Holothuria atra* were collected in large numbers for processing. Both *H. scabra* and *H. spinifera* are endangered species due to over exploitation. The processing of other species relieves pressure on the target species.

Need for biological information to regulate exploitation

For the management of the sea cucumber fishery, information on catch and effort, weight of the specimens (correct length measurements cannot be taken in case of sea cucumbers because of constant expansion and contraction), breeding season, fecundity has to be recorded for each species. Estimates on age and growth have to be made. Even though several species form fishery in several parts of the world, the above information is sadly missing. In the absence of the above data it is not possible to estimate the stocks and calculate the maximum sustainable yield. Basker (1994) has reported on the biology of *H. scabra* from the Gulf of Mannar.

Sea ranching

One of the methods to enhance the natural populations is to produce seed and sea ranch them in suitable areas. Japan and China were pioneers in seed production of sea cucumbers. In 1988, seed of *H. scabra* was produced at for the first time at Tuticorin Research Centre of CMFRI. Since then seed of this species is produced on a number of occasions. The sea ranching programme should be taken on a large scale to study the effect on the natural populations. Before sea ranching, unit areas have to be marked and surveyed for the populations. The same areas have to be resurveyed after six months of sea ranching to see the increase in the number of specimens in the area. James *et al.*, (1993) wrote on the sea ranching of sea cucumbers.

Closed areas

It is well known that certain areas are the breeding grounds for the sea cucumbers and also in certain areas juveniles are found in large numbers. Collection in such areas should be totally banned. Normally the inshore areas have more number of juveniles than the offshore areas. So such areas should be treated as out of bounds for catching of sea cucumbers. In Port Blair (Andamans) in 1977, a bed of juveniles of *H. scabra* was located near the South Point. Such areas should be protected from collectors.

Development of organised Beche-de-mer industry

The *Beche-de-mer* industry is not in an organised manner. *Beche-de-mer* processing factories can be opened on the Gulf of Mannar and Palk Bay side. Hornell (1917) mentioned about a Government Factory at Tirupalakudi with the economics worked out. He suggested that another factory can be opened at Vedalai. In Sri Lanka, a *Beche-de-mer* factory was opened in 1974 at Mannar under the Fisheries Co-operative Society. In order to run the factory successfully, they have to process atleast 1.2 tonnes of *Beche-de-mer* per month. The processing by selected and trained staff to ensure uniformity, hygienic conditions, greater care for better standard and quicker production are primary requisites for the success of the industry. Bad weather conditions do not affect the processing, individual

suppliers of raw material will find continuous employment and the society can afford to expand and improve the quality of *beche-de-mer*. It is worth making afford under co-operative sector by opening one or two factories along the Gulf of Mannar and Palk Bay. The *Beche-de-mer* industry can thus be managed in a better and organised manner.

The Senior author visited most of the Islands in 1995 and submitted a detailed report on the resources, exploitation and management of sea cucumbers to the Lakshadweep Administration. Based on the report, ten recommendations have been issued by the Administration for immediate implementation.

Collection of sea cucumber from Agatti and Kalpeni islands is banned with immediate effect. Exploitation of sea cucumbers is banned from all the islands during the breeding season. Processed sea cucumbers less than 75 mm in length should not be allowed to go out of the islands for marketing. Collection of *Thelenota ananas* is totally banned. Use of SCUBA for collection and installation of driers and de-scummers for processing is banned. Specimens of *Actinopyga* less than 300 mm in length should not be collected. Bangaram island and adjacent areas are declared as natural reserves. All fishery units will maintain proper records on the details of area island and total number of persons engaged in collection and processing. Sea cucumbers can be collected only by license holders. The Administrator will select suitable persons for issuing licenses for exploitation from all islands except Kalpeni, Agatti and Bangaram lagoon.

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