

SOME REMARKS ON THE PRESENT STATUS OF *BECHE-DE-MER* INDUSTRY OF MALDIVES AND ITS LESSON FOR THE LAKSHADWEEP

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ABSTRACT

The *beche-de-mer* industry in Maldives is of recent origin. The exports started in a modest way in 1986 and during the current year Singapore imported maximum quantities from the Maldives. At present nine species are processed in the Maldives along with the best grade holothurian *Holothuria (Microthele) nobilis* which is in abundance. The Lakshadweep and Maldives being contiguous areas in the Arabian Sea the faunal composition is similar. Processing can first be taken up by Minicoy people who are ethnically connected with the Maldivian people. Because of their relations and contacts they can see and learn the processing and initiate it in Minicoy. Later processing can be extended to other islands since the holothurian fauna is similar and abundant in other islands.

INTRODUCTION

The Maldivian Archipelago consists of over 1200 coral islands, all low-lying accumulations of coral sand and rubble and originating out of 26 atolls. If the unvegetated sand banks are included, the total number of islands is around two thousand. They extend from latitudes 7° 6' 39" N and 0° 4' 48" S and between longitudes 72° 32' 30" E and 73° 45' 54" E in the Western Indian Ocean. The atolls stretch in an approximate north-south direction, forming a long narrow chain extending 860 km from north to south. The single chain of atolls widens in the centre, to form a double chain nearly 120 km across at the widest point.

The Maldives are well known for its richness of the sea-cucumbers. Pearson (1913, 1914) reported on the holothurians of the Maldives in a cursory manner. In recent years Clark and Davies (1966) have listed some sea-cucumbers from the Maldives. It was possible for one of us (MA) to visit the Maldives in recent

years and collect some information on the *beche-de-mer* fishery.

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HISTORY OF THE *BECHE-DE-MER* INDUSTRY

The fishery for *beche-de-mer* in the Maldives is of very recent origin and seems to have commenced in 1985. A trail shipment of 31 kg of Prickly Redfish (*Thelenota ananas*) was made to Singapore in late 1985. A second species, white Teatfish (*Microthele nobilis*) has been collected and exported from late 1986. Since 1988, nine species are being processed and exported. Joseph and Shakeel (1991) and Joseph (1992) wrote about the *beche-de-mer* industry of the Maldives. The second paper is a review of the *beche-de-mer* fishery in the Maldives.

HOLOTHURIAN RESOURCES

In the Maldives perhaps the best grade holothurians are available for *beche-de-mer*

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processing. *Holothuria (Microthele) nobilis* and *Thelenota ananas* are the species which yield high quality *beche-de-mer*. They are abundant in many of the islands. At present about ten species are used in the processing.

Thelenota ananas (Pl. I A) is one of the most valuable species for processing. It grows to 700 mm in length and weighs 2-6 kg in living condition. It is characterised by the presence of numerous large pointed teats in groups of two or three all over its body. It is found at a depth of 2-30 m on clean sandy bottoms of the reef and in enclosed lagoons. It was the target species at the beginning of the *beche-de-mer* fishery in the Maldives resulting in depletion of the resource from shallow water areas within a few years. It is now very rare in most of the islands and only a few are reported to be available and these are in deeper waters of 20-25 m outside the reef. Processed material ranges in length from 125-225 mm.

Although *Holothuria (Microthele) nobilis* (Pl. I B) is reported to be the most valuable species in Maldives this product fetches lower price than *T. ananas*. The presence of six contractile teat-like projections seen in the living condition is the most distinguishing feature of the animal. It grows to 400 mm in length and 2-3 kg in live weight. It is found in two colours. The white teatfish is more valuable than the black one and occurs in waters 3-30 m depth in coral sand in reef passages and in sea grass beds. The black form is found on clean sandy bottoms in shallow water of 3 m depth. This species was also harvested selectively in the beginning of the *beche-de-mer* fishery in the Maldives. It is now very rare and at present taken from deeper waters and from outer surf areas. Processed material is 100-200 mm in length.

Stichopus chloronotus (Pl. I C) is very dark green looking almost black in colour. It grows upto 400 mm. The body is quadrangular in cross section with numerous prominent teats at each corner of the quadrangle. It is found freely on the shallow waters of the lagoons and on the reef flats with broken coral rubble, in depths upto 2 m. Large specimens are taken from depths of 9-10 m. It is quite abundant in most of the islands. This species is often listed as of little or

no commercial value, because it degenerates slowly when taken out of water and tends to break up when boiled. Maldivian fishermen keep green fish in sea water right upto the time of processing. It fetches third highest price next to *T. ananas* and *Holothuria (Microthele) nobilis* of all varieties exported from the Maldives. Processed material ranged in length from 60-125 mm.

Actinopyga mauritiana (Pl. II A) has a cylindrical body and a flattened underside. It is brick red in colour on the dorsal side and white on the ventral side. It grows to a length of 300 mm and weighs in the living condition from 0.5-1.0 kg. It is commonly found near the low water mark where the surf breaks on the outside of the reef, firmly attached to the rocks. Processed material ranges in length from 100 to 150 mm.

Actinopyga miliaris (Pl. I D) is black or dark brown in colour and cylindrical, growing upto 300 mm and 0.5-2.0 kg live weight. It is found in shallow waters of more than 2 m in clear water on reef flats and on algal beds.

Actinopyga lecanora (Pl. II B) is dark brown in colour and grows to a length of 400 mm and is found at depths 2 - 10 m, often on the under side of stones and on coral sand with sea weeds.

Actinopyga echinites (Pl. II C) grows upto a length of 300 mm on sandy bottoms and among live corals. Some of the nocturnal species are collected at night using torches.

Bohadschia marmorata (Pl. II D) is short and thick, with uniformly distributed dark brown spots on its light yellow to light brown body. It grows upto 400 mm in length and extends sticky cuvierian threads when disturbed. It is commonly found on coarse coral sand, grassy bottom and sometimes underneath coral rock. This species remains buried in sand during the day and are active during the night. Fishermen from many islands collect them at night with the help of torches along with species of *Actinopyga*.

Holothuria atra is most abundant on the Maldives. It is black in colour, cylindrical, with a smooth body surface. It grows to 600 mm. The red fluid 'holothurian' given off, when the body surface is rubbed is toxic. Smaller specimens

occur in large numbers in ankle deep water in sandy reef flats. Inside the reef it reaches 300 mm length and is found upto a depth of 6 m. Larger specimens of 600 mm in length usually occur in deeper waters outside the reef. *Holothuria atra* fetches very low prices. Nearly 90% of the catch comprises of less than 100 mm when processed. *Holothuria atra* was exploited only from 1991 as other species became scarce.

Microthele axiologa is a large species, growing upto 600 mm in length and 2-4 kg in live weight. It is almost cylindrical in shape and has prominent wrinkles on the upper surface and a slightly flattened underside. The colour is dark orange or brown above, with pale grey sides and underside. It is found in deeper waters (10-40 m) on sandy bottoms.

Thelenota anax grows to a length of 800 mm, is square in cross section and has many tubercles on its body. It is found in fine sandy bottoms at depths greater than 10 m. It is taken only in a few islands.

The names of different species of sea-cucumber commercially harvested and exported from the Maldives are given in Table 1.

SCUBA divers. The sea-cucumber fishery is during non-tuna season in most of the islands. The peak tuna fishery season is either during the Southwest monsoon (May to October) or the Northeast monsoon period (November to April) depending on the geographic location of the island. Even during the tuna fishery season some fishermen go for sea-cucumber if the tuna fishing is poor. When the fishery started sea-cucumbers were picked by hand during low tide from the intertidal region and from shallow water lagoons of less than one metre depth. As the resource became less abundant in these areas, snorkeling and use other aids helped to exploit the resources in deeper waters, upto 15-25 m. SCUBA diving for sea-cucumbers, which is now spreading rapidly, developed in response to the depletion of the high valued species *T. ananas* and *M. nobilis*, in shallow waters. SCUBA diving has started in 1989. The bulk of the catch is collected from a depth range of 5-30 m. It is estimated that there are about 50 SCUBA divers.

PROCESSING

Processing of sea-cucumbers is done in the fishermen's own island or on other islands. The fishermen process frequently on uninhabited

TABLE 1. Names of commercially harvested holothurians from the Maldives

Scientific name	English (Trade) name	Maldivian (Dhivehi) name
<i>Microthele nobilis</i>	White Teatfish	Batu
<i>Microthele axiologa</i>	Elephant's Trunkfish	Elephant
<i>Actinopyga</i> sp.	Blackfish/Killofish	Kalhu Kiru
<i>Actinopyga mauritiana</i>	Surf Redfish/Sandfish	Mushi
<i>Thelenota ananas</i>	Prickly Redfish	Molhu
<i>Thelenota anax</i>	Turtleshell	Turtle (Kachala)
<i>Halodeima atra</i>	Lollyfish	Fulhi (Holhi)
<i>Stichopus chloronotus</i>	Greenfish	Feeru (Kudi Kashi)
<i>Bohadschia marmorata</i>	Amberfish	Hudu Kiru

Source : Joseph (1992)

FISHING METHODS, AREAS AND SEASONS

Where there is an organised sea-cucumber fishery, the sea-cucumbers are collected by

islands. Cleaning of sea-cucumbers is commenced on the fishing boat itself, while it is returning to the base after a fishing trip. A horizontal cut is made on the upper or lower side

of the animal to remove the internal organs and they are thrown into the sea. The rest of the cleaning is done on the shore. The cleaned sea-cucumbers are cooked in a oil drum which is cut lengthwise. Aluminium vessels used in the preparation of tuna, are also used in some islands. In most of the islands the sea-cucumbers are introduced into warm waters.

For large and thick walled species like *Thelenota ananas* and *Holothuria (Microthele) nobilis* cooking is generally done for 45 minutes. Other species are cooked for 15 to 30 minutes. The sea-cucumbers are generally sorted species-wise for processing. In another method the viscera is removed as far as possible without cutting the specimen. The product is boiled for 30 minutes, wahsed and buried for 12-18 hours. After retrieval a ventral cut is made mid-ventrally and then the sea-cucumbers are cooked again for 30 minutes. This method is reported to yield a better product than the more popular cooking method.

In some islands Prickly Redfish is cooked twice, 30 minutes at a time with a change of water in between. After cooking the product is smoke dried to reduce the moisture content. Short splinters are usually placed across the cut ends to keep the sides wide apart. This facilitates proper drying of the inner side. Smoking is done inside kitchens or on platforms generally constructed with coconut leaf stems. When the fishermen undertake long trips they resort to smoking in their boats. The smoke dried material is then sun dried.

MARKETING AND EXPORT

Beche-de-mer produced in the islands is either taken to Male or sold in the islands. Some of the major exporters have agents in the islands purchasing on their behalf. The exporters usually get the *beche-de-mer* into their warehouses within a month of processing. They are sorted into different varieties and packed in polypropylene bags just two or three days before shipping. Earlier the material was kept for nearly two months, but since 1990 no exporter keeps *beche-de-mer* in his warehouse for more than 20 days. Then it is shipped out, usually in container. In maldives six persons are

exporting *beche-de-mer* chiefly to Singapore and Hong Kong and to a much less extent to Taiwan. Exporters have to obtain an export licence for a fixed sum. No export duties are leived on the export of fishery products from the Maldives. Only very small quantities of *beche-de-mer* is consumed in some Male hotels and some resorts and rest is exported. Table 2 gives the Export of *beche-de-mer* during 1985-1990.

TABLE 2. Export of *beche-de-mer* from Maldives during 1985-1990

Year	Quantity in tonnes	U. S. Dollars
1985	0.31	28
1986	2.557	25,540
1987	33.886	337,921
1988	553,114	4,496,327
1989	410,286	2,240,892
1990	745,925	3,307,230

Source : Ministry of Fisheries and Agriculture.

PROBLEMS FACING THE FISHERY

Decreasing catches

The *beche-de-mer* fishery in the Maldives developed at a very rapid rate from 2 tonnes to 745 tonnes within a very short period of 1986-1990. The yearly catches continued to rise rapidly, but the income generated showed a decreasing trend in recent years. This is due to the decreasing catches of the high valued species and the increased catches of the low value species. The average value of *beche-de-mer* per kg dropped from US \$ 9.99 to US \$ 4.43 in five years time. If the spawning populations which are generally found in greater depths are removed by SCUBA diving, recovery may take a very long time.

The nocturnal species : Some of the species like *Bohadschia marmorata* and *Actinopyga* sp. are fished in the nights using torches. The increased catches of *B. marmorata* are due to selective harvesting and not due to real increase in abundance. The possibility of depletion through intensified night fishing cannot be ruled out, particularly when other high value species are in short supply.

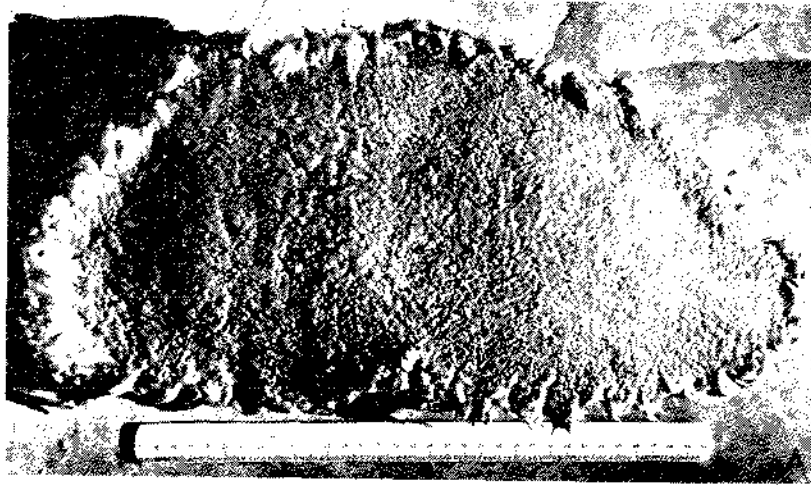


PLATE I A. *Thelenota ananas* (Ventral view), B. *Holothuria (Microthele) nobilis*, C. *Stichopus chloronotus* (Processed) and D. *Actinopyga miliaris*.

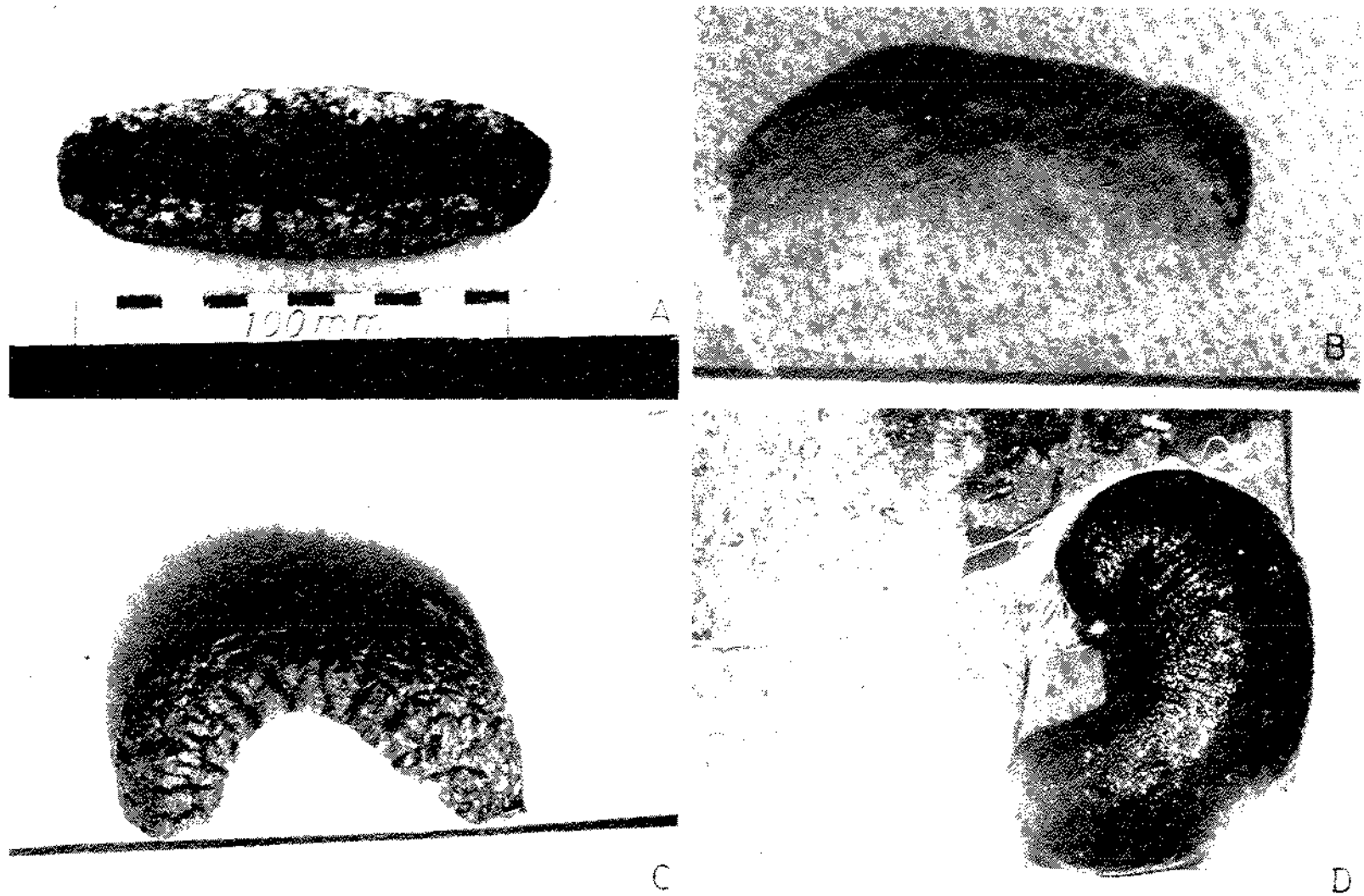


PLATE II A. *Actinopyga moerhousii* (Processed), B. *Actinopyga leuconera*, C. *Actinopyga celinites* and D. *Behadischia marmorata*.

Harvesting juveniles : Very low value species like *Holothuria atra* forms the main stay today due to its abundance. Due to overfishing very small forms also are harvested. Large proportion of juveniles are seen in the processed material.

Poor processing : Correct methods of processing are not taught to the Maldivian fishermen. Some of the pioneer exporters who received instructions at the commencement of the fishery passed on the fishermen. No books are available in local language explaining the correct methods of processing. Foreign buyers have complained about the poor quality of *beche-de-mer* from the Maldives. If the quality is improved the value of the exported material will go up by thirty percent.

Migration of fishermen : There is considerable amount of migration of fishermen to other atolls in search of *beche-de-mer*. There have been instances where migrant fishermen have been turned back by Atoll chiefs. The migrations will increase with more and more fishermen desiring the benefit from this resource. Fishermen are of the view that for a sedentary resource like this it is better to be left for the people of an island/atoll.

LESSONS TO LAKSHADWEEP

The Lakshadweep and the Maldives being continuous chain of Islands in the Arabian Sea, the faunal composition is remarkably same. All

the species mentioned above are also distributed in the Lakshadweep.

1. In Lakshadweep also processing can be taken up for all the nine species listed above.
2. Exploitation should be judicious and should not be directed at particular species.
3. Use of SCUBA for fishing sea-cucumbers should not be introduced.
4. Collection of night fishing with the help of torches should not be taken up.
5. A data collection and monitoring mechanism should be established.
6. Regulations should be introduced giving exclusive right to the fishermen of Lakshadweep only.
7. Fisherfolk should be instructed in the correct and hygienic methods of processing to achieve maximum economic returns from the processed product. Different species are processed in different ways. In the beginning itself correct methods of processing should be taught by demonstrations, leaflets, radio and television talks.
8. The establishment of sea-ranching programme for sea-cucumber, with the active participation of fishermen should be considered. By sea-ranching programme the natural populations can be enriched.

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