

## 2 *Namako and iriko*

### Historical overview on *holothuria* (sea cucumber) exploitation, utilization, and trade in Japan

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Growing concern over environmental protection has caused some unease about the extinction of certain food cultures in the world. Whale, for example, has been consumed by the Japanese for centuries but whaling is currently limited only to that carried out for scientific purposes or small-scale coastal whaling. From an eco-political perspective, three viewpoints concerning the whaling issue should be pointed out (Akimichi 1994). First, whale is a general term that covers more than seventy species of which only some species are in danger of extinction. Therefore, discussion on biodiversity conservation has to be species specific. Second, whale must not be considered only as a food resource. In Japan, it has been utilized in many ways as non-edible resources: its flexible baleen has been used in traditional puppet shows as well as a fishing tool; whale oil has been used for insect repellent in rice fields; and bone meal has been used for fertilizer. The users of these by-products do not always live in whaling communities. Indeed, most of them live inland but still utilize whale by-products. Third, the Japanese not only make good use of the entire whale, they also worship the whale as a symbol of good luck for all kinds of fishing. Japanese people appreciate their existence and pray for the ever-lasting symbiotic relationship between men and whales. Thus, each whaling community worships the whale's soul at temples and shrines. Evidence for this can be seen in the many tombs for whales on the Japanese Archipelago. A total ban on whaling would destroy the whalers' cultural and religious system in Japan.

The whaling issue in Japan, thus, cannot be properly understood simply from the black and white viewpoint of whether to protect them or not. Nevertheless, it may be reasonable to manage highly migratory marine resources such as whale and tuna among stakeholder nations, because no country can claim them as their own resource. On this ground, I appreciate the efforts of the International Whaling Commission (IWC) and other international organizations to conserve pelagic marine resources. However, international intervention may not be suitable for management of all kinds of marine species, especially for demersal or benthic species which are used almost exclusively by coastal people. Trepang, also known as *beche-de-mer* or dried holothurian, is a good example for examination since (1) it is a benthic animal which lives nearshore that is usually managed by the local residence; (2) it has been used for the last several hundred

years by the coastal people; and (3) the USA, in the twelfth Convention on International Trade in Endangered Species (CITES) meeting in November 2002 (CITES n.d., CoP12 Doc. 45),<sup>1</sup> proposed that the international holothurian trade be controlled or banned.

As I will discuss later, the trepang market is almost exclusive to Chinese dietary culture.<sup>2</sup> It has been a part of the Chinese cuisine for, at least, 400 years. Trepang has been a major export commodity from Japan and Southeast Asia to China for at least 300 years; however, it has never been a static industry and has experienced changes throughout its history. The major change is the globalization of the production sites. For example, trepang is, nowadays, produced and exported to almost everywhere around the globe; in particular, Hong Kong imported trepang from at least fifty-five countries and regions in 2004 (Hong Kong 2005). Interestingly, most local producers do not consume trepang themselves. It has been developed as an export-oriented commodity from the beginning. In other words, the fisherman harvests trepang not for subsistence but solely for commercial purposes, regardless of a fishery's size, equipment, and capital. This is one characteristic of the holothurian fishery industry. The second characteristic of trepang is its high commercial value. In Japan, although prices of other types of fish remain low under deflation, trepang is one of the few items with its price going up. This is simply because of the expansion of the Chinese market as a result of its active economy; and is why international pressure on holothurian conservation is mounting.

CITES excludes cultured species from its jurisdiction and the Food and Agriculture Organization (FAO) of the United Nations encourages culturing holothurian. However, culturing holothurian has several problems, including species availability and cost (Lovatelli *et al.* 2004). First, the only species currently being cultured is the temperate spiky *Stichopus japonicus* in Northern China. Yet, not all trepang species are equally consumed in China. Strong local favourites exist. For example, Northern Chinese prefer *S. japonicus*, while Southern Chinese prefer tropical non-spiky species such as *Holothuria scabra* and *H. fuscogilva*. Since cultivation of the tropical species is still in the experimental stage, aquaculture of the temperate spiky species cannot fill the demand of the consumer in Southern China. Even the Northern Chinese preference for the spiky *S. japonicus* is for that only produced in Northern Japan. Therefore even if Northern China were able to culture enough volume of *S. japonicus*, the problem would remain.

Second, holothurian cultivation is a capital intense enterprise. Therefore, the CITES agreement will leave a small but relatively rich group of holothurian cultivators unscathed, but will surely threaten coastal societies worldwide which depend on holothurian fisheries. Thus, the CITES decision may not only damage the coastal village economy and fishery cultures in the world, it may also affect the dietary culture of the Chinese, which appreciates trepang dishes.

Before banning trepang trade worldwide, we need to investigate diversity in 'trepang culture' around the world. In order to better understand the structure of the industry, especially between Chinese consumers and producers from other

countries, it is necessary to look at the historical development of the industry: how it expanded and how the neighbouring countries were involved. To this end, Japan is probably the best case to examine because the Japanese have exported trepang to China for at least the last 300 years and the history of the trade can be traced systematically. Price of the dried Japanese holothurian has been rising. In addition, Japan has been practicing communal resource management for a long time and it is highly appreciated (Feeny *et al.* 1990).

How could Japan produce trepang for such a long time? How were the holothurian resources exploited? What is the fisheries system in Japan? To explore these questions, this chapter will briefly introduce: (1) the history of the trepang industry in Japan; (2) fisheries regulations regarding resource management; and (3) efforts to manage holothurian resources by local fisheries cooperative associations in the Rishiri district, Northern Hokkaido, where people depend on the stationary coastal resources such as sea urchin, kelp, and holothurian.<sup>3</sup>

### History of the trepang industry in Japan

Just when trepang became popular in China is controversial. Conand (1990: 14) simply noted that more than a thousand years ago, the Chinese started seeking trepang in Indian, Indonesian, and Philippine waters. However, from socio-economic and historical viewpoints, we need more accurate and precise information about the trepang industry and its development because first, Chinese trepang culinary culture has involved neighboring maritime peoples; and second, most of the producers, except Japanese and possibly the Koreans, do not eat trepang, but they began to produce trepang only to meet demand from other nations.

Although it is difficult to provide historical evidence on exactly when the trepang culinary culture began, it is reasonable to assume that the popularity of trepang increased in China around the sixteenth to seventeenth centuries. This idea is supported by Chinese literature and evidence of trepang trade occurring between China and neighbouring nations. First, in Chinese literature, the earliest record about trepang as food is said to come from a book called *Wuzashu* or *Miscellanies of Five Items* written by Xie Zhaozhi in 1602 (the late Ming period).<sup>4</sup> In this book, it is explained that trepang mildly invigorates the body of man, similar to ‘ginseng’, which is the reason it is called ‘hai-shen (sea ginseng)’ (Dai 2002: 21–23). From descriptions in *Wuzashu*, we can assume that eating trepang became popular in China at the end of the sixteenth century.<sup>5</sup>

The second piece of evidence which supports the above supposition would be records of trepang trade between China and neighbouring countries; one such country was Japan. In the Edo period (Tokugawa period, 1601–1867) the Shogunate government controlled all foreign trade. It was in 1698 that the Japanese officially began exporting trepang, called *iri-ko* in Japanese, to the Qing dynasty in exchange for Chinese silk and medicines.<sup>6</sup> During the same period, trepang, harvested from tropical waters, was also one of the important trade items that European countries brought into China in exchange for tea, silk, and porcelains.<sup>7</sup>

Japan started producing trepang as early as the eighth century. It was used as a kind of tax to the ruler, though it is not clear how it was cooked and consumed in those days. In this sense, it was different from other neighbouring trepang producers such as the Philippines and the Pacific Islands, where people had never produced trepang for their own consumption. In other words, Japan already had the know-how for producing trepang when China’s market expanded in the late sixteenth century. However, this does not mean that Japan simply exported surplus trepang out of its domestic market. The Tokugawa feudal government not only encouraged coastal people in the existing maritime communities to produce more trepang for export but also encouraged newly opened Hokkaido, in the northern most part of the Japanese Archipelago, to be a major trepang production site for export purposes. The reason Hokkaido was chosen for the major production site was two-fold. First, the cultural minority, the Ainu, who lived in Hokkaido provided a source of labor for trepang production (the Ainu were often forced into such work). Second, trepang produced in Hokkaido had more spikes than those from elsewhere in Japan, a factor highly appreciated by the Chinese.

Under Tokugawa’s trade regulations, trepang had to be gathered in Nagasaki, an official trading port, and classified into ten categories depending on its quality and size.<sup>8</sup> Figure 2.1 illustrates the trend of trepang exports from Japan in the seventeenth and eighteenth centuries based on *Catalogue of Imports and Exports in Chinese Trades* (Nagazumi 1987).<sup>9</sup> Although the catalogue is not complete, it can greatly contribute to reconstructing a picture of Sino-Japanese trade. There

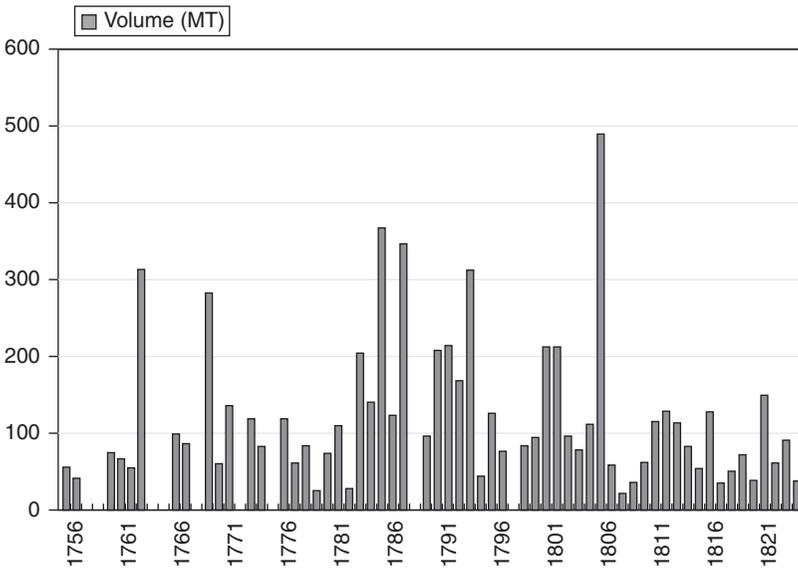


Figure 2.1 Trepang export from Japan 1756–1823 (compiled from Nagazumi 1987).

Note  
Q is indicated by metric ton and mean value JPY/kg.

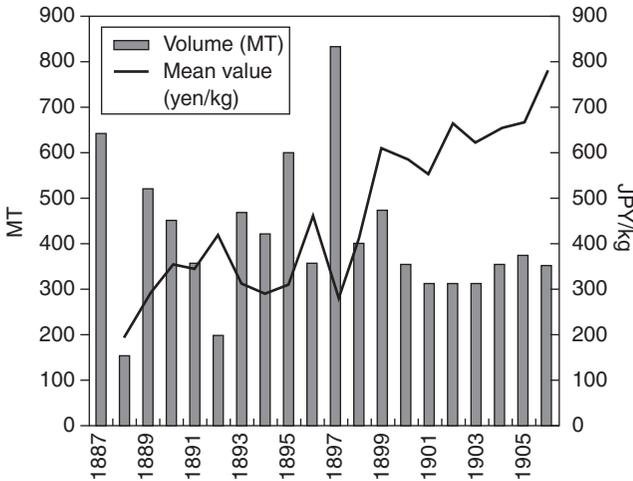


Figure 2.2 Volume and mean value of trepang production in Japan 1887–1906 (compiled by the author from the statistics of the Ministry of Agriculture and Trade [1889–1909]).

is no doubt that a considerable amount of trepang was exported every year, but only the number of straw bags, known as ‘hyo’ and not actual volume, was marked on the original record. This is the reason it is impossible to draw a bar in Figure 2.1.<sup>10</sup>

In 1763, the volume exported reached 317 tons. This was the year when imports of gold and silver from China to Japan began. Since the Tokugawa government did not have sufficient copper in exchange, more trepang was needed for trading with China. In 1785, the year the Tokugawa government began to operate directly by appointing contractors throughout the archipelago to collect trepang, exports reached 371 tons (Arai 1975). Thereafter production continued to increase and exports reached a record high of 487 tons in 1805.

Tokugawa’s monopoly in the trepang trade lasted until 1865, after which, European traders came into this trade together with Chinese traders. Two years later, Japan experienced the Meiji Restoration and free trade was encouraged. In the Meiji Government, trepang continued to be one of the major profitable commodities. This, in particular, encouraged the Government to open more fishery grounds in parallel with the inland cultivation in the Hokkaido area. Hakodate in southern Hokkaido, in addition to Nagasaki, became one of the leading trading entrepôts for the Japanese trepang trade. Though the trepang in Hokkaido is comparatively small, they have thick spiny bodies which are highly appreciated by the Chinese market, especially people in northern China. Thus, trepang produced in Hokkaido became important and Hakodate played an important role in the trepang trade.

Unfortunately, no concrete trade statistics of trepang exports after the Meiji period are available.<sup>11</sup> We have only trepang production statistics from 1887 to

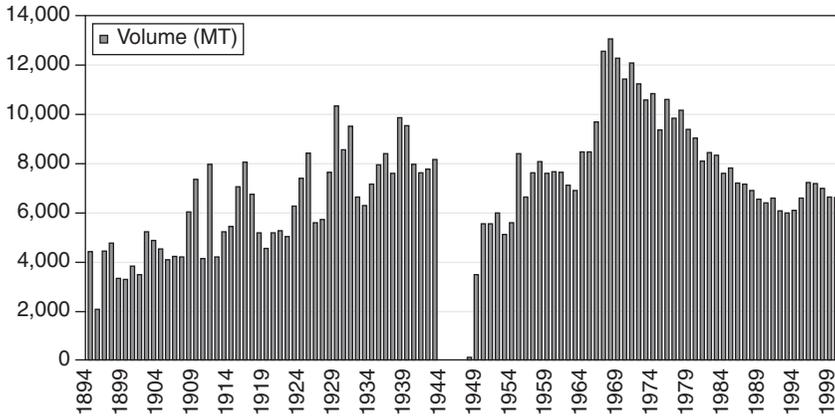


Figure 2.3 Holothurian catch in Japan 1894–2000 (compiled by the author from the statistics of the Ministry of Agriculture, Forestry, and Fisheries [1950–2002]).

1906 as shown in Figure 2.2. According to Figure 2.2, an average of 435 tons per year was produced during that period, which is more than the highest record in the Tokugawa period. Since there was little domestic trepang demand in Japan, it is reasonable to interpret that almost all of it was exported. On the other hand, we have conclusive holothurian landing statistics as shown in Figure 2.3. In 1968, holothurian landings marked a peak of 13,023 tons, while a low of 5,996 tons was recorded in 1993. After 1993, the holothurian catch became stable at the 6,000 tons level. Two possible reasons for the recovery of landings are, first, due to aging fisheries populations, forage pressure may have decreased, and second, holothurian fisheries are well managed under the current fisheries policy. This policy will be examined in the next section.

### **Fisheries law system in Japan<sup>12</sup>**

To understand Japanese holothurian fisheries, it is necessary to explore the fisheries system regulated under fisheries law since 1949. The basic principle of the law is to maintain order in fisheries through adopting the ‘fishery rights’ system for fisheries that are strongly fixed in coastal waters, and adopting the ‘fishery permit’ systems for fisheries that are highly mobile in offshore waters. In addition, the law directs that decision-making concerning important matters be administrated by fishery adjustment agencies such as Fishery Adjustment Commissions (FAC), which are mainly composed of fishery operators and fishery employees.

#### ***Fishery rights***

In order to maintain order and adjust fishery operations among operators, a system of fishery rights over the public waters has been established. The fishery

right, controlled by prefectural governors, allows certain fisheries to be operated exclusively in given waters.<sup>13</sup> Only local fishery cooperative associations are eligible for the right. To regulate the application and the exercise of this right, local fishery cooperatives have pre-determined regulations for exercising fishery rights, i.e. target species, fishing seasons, and the method of catching. They also oversee the fishing activities conducted by individual members. The 'fishery rights' can be divided into three categories: common fishery, fixed (set-net) fishery, and demarcated fishery (aquaculture). The first category is further classified to three types: (1) a fishery operated to gather or take seaweed; (2) a fishery operated to gather or take shellfish, or (3) a fishery operated to gather or take the stationary aquatic animals and designated by the Minister of Agriculture, Forestry, and Fisheries. The holothurian is one of the animals designated to the third category. Thus, no one can gather holothurian without a fishing right in the given waters.

### ***Fishery permits***

Certain types of fisheries may not operate without a fishery permit. A fishery permit is different from a fishery right. Issuing the permit means an administrative action to lift the prohibition in a specific case is required, and in general fishery is prohibited in order to conserve marine stocks. There are numerous types of fisheries, and at present almost all important fishing types require a fishery permit. There are two types of permits: those issued by the Minister of Agriculture, Forestry, and Fisheries and those issued by the prefectural governor.<sup>14</sup> The latter type, called a 'Governor Permitted Fishery (GPF)', observes the regulations of each prefecture. Small-scale trawl fisheries that employ a powered vessel of less than fifteen gross tons are regulated under the GPF. Dredge net fishery for holothurian also falls under this category. The GPF is valid for ten years. To renew the GPF, the fishery is required to discuss with the prefectural government the fishing-ground plan. For conservation reasons, it is more difficult to apply for new permits than for renewal of old permits.

### ***Fishery adjustment system***

There are two types of fishery adjustment commissions: the Sea-area Fishery Adjustment Commission (SFAC) and the Broad-area Fishery Adjustment Commission (BFAC). Taking fishery conditions into consideration, the Minister of Agriculture, Forestry, and Fisheries divides the sea into sixty-six sea-areas across the nation. In principle, an SFAC is set up for each sea-area in each prefecture and is under the authority of the prefectural governor. Each sea-area is a unit for fishery adjustment and therefore, fishery management. The SFAC is generally composed of fifteen commissioners. Of the commissioners, nine members are to be elected from fishermen through official election, and six (four academics with fishery expertise and two persons representing the public interests) are to be appointed by the governor. The SFAC plays an advisory role and

all matters handled by the administrative agency in regard to fishery rights and permits must not be implemented until after consulting the SFAC. As for the GPF, each prefectural fishery adjustment regulation provides that a governor has to consult with the SFAC before granting a permit. In addition, the SFAC has the authority to make decisions concerning the arbitration, instruction and authorization of the permit.

To conclude this section, according to the observed Fisheries Law in Japan, regardless of commercial or self-consumption purposes, no one, without fishing rights, can freely collect holothurian because the animal is designated as a species regulated by common fishery rights. Even if one has the fishing right, they can fish only by using hooks, clips and twists, or by diving. Those who wish to fish holothurian with dredge nets have to apply to the prefectural governor for a permit because the dredge net fishery is designated as a GPF. Thus, the prefectural governor, together with the SFAC, plays an important role in resource management especially for holothurian fisheries in Japan.

### **Holothurian fisheries in Japan**

In Japan, fresh holothurian is generally called *nama-ko* while the dried form, trepang, is called *iri-ko*. Apart from species found in subtropical waters in Okinawa, the most common species in the Japanese Archipelago is *S. japonicus*. In his classic study, Choe noted two other holothurians that are commercially harvested in the temperate waters around the archipelago. These are *Parastichopus nigripunctatus*, called *oki-ko*, the offshore holothurian, and *Cucumaria japonica* called *kin-ko*, the golden holothurian (Choe 1963: 1). However, I understand that these two species currently are rarely harvested and thus only a small quantity is processed.<sup>15</sup> In the following discussion, holothurian or trepang refers only to *S. japonicus*.

Until the nineteenth century, well-off Japanese often ate trepang but this is currently not the case.<sup>16</sup> On the other hand, in the domestic market, holothurian is commonly consumed as raw in slices soaked in a mixture of vinegar and soy sauce. For contemporary Japanese, holothurian is a seasonal delicacy preferred only in winter, especially during the winter solstice and the New Year, since it is believed that body temperature rises after consuming holothurian. The body colour of *S. japonicus* varies from red to green to black. For raw consumption, the red one is preferred and its price is almost double that of the green and black varieties.<sup>17</sup> Most of the processors, therefore, prefer to process the green and black ones into dry product.

### **An example of a fishery organization: Semposhi Fisheries Cooperative Association, Northern Hokkaido**

Rishiri is a small island lying at the northern tip of Hokkaido. The island has two municipalities: Rishiri Town and Rishiri Fuji Town. Field research was conducted in the Rishiri Town Municipality in July 2003 and July 2004. Rishiri

Town currently has a population of about 3,000, of which 400 are engaged in fishing. Apart from holothurian, Rishiri is famous for kombu/kelp (*Laminaria ochotensis* Miyabe), sea urchin (*Strongylocentrotus intermedius* and *S. nudus*), octopus, and Atka mackerel (*Pleurogrammus azonus*) fisheries.<sup>18</sup> Most of the fishermen are engaged in small-scale kelp and sea urchin fisheries that takes place nearshore, only in summer.

There are two fishery cooperative associations in Rishiri Town: Semposhi Fisheries Cooperative Association (SFCA) and Kutsugata Fisheries Cooperative Association (KFCA). Their fisheries are governed by the Soya SFAC (SSFAC). A *S. japonicus* fishery is classified into the following four types according to the fishing gear used and the methods employed: (1) dredge net fishery, (2) hook fishery, (3) clip and twist fishery, or (4) diving. Spear and dart fishery is not common because of the damage inflicted on the holothurian body by the tools are employed. Most of the catch is by dredge net fishery. For instance, in the SFCA, more than 98 percent of the catch is from dredge net fishing. In July 2003, eleven dredge net operations were permitted.

In the Semposhi district, dredge net fishing was once very common and the fishermen processed their catch into trepang themselves. However dredge net fishing had stopped by the end of World War II. It became active again in 1982 with three fishing vessels being employed. The reason for the revival was coincidental. The municipality tried to transplant deep-sea sea urchin collection by dredge net to the shallow waters. During the experiment, holothurian was discovered in abundance. The municipality thus subsidized dredge net fishing. This was the beginning of the current holothurian dredge net fishing in SFCA.

Dredge net fishing is conducted in waters forty to fifty meters deep because there are fewer holothurian in shallow waters. The closed season for holothurian fishing is regulated under SSFAC. In the case of the Rishiri district, holothurian fishing is not allowed from 1 May to 15 June, since this period is thought to be a spawning season. Following SSFAC's regulations, the SFCA divides the fishing period into spring (March and April) and summer (end of June and July) periods with a break between 1 May to 15 June.

## Resource management at SFCA

The SFCA practices an integrated resource management program that combines several management tools such as size limit, quota limit, closed season. In 1990, the SFCA decided that holothurian under 130 g should be released. The reason is that undersized holothurian was not profitable because the trepang processors would under-price the catches. Though there were no trepang factories on Rishiri Island, the islanders fished holothurian for trepang processing purposes and earned their living by selling to the trepang processors located on mainland Hokkaido.

As mentioned earlier, Japanese prefer to eat raw holothurian only in winter; thus catches at SFCA would be out of season. There is little demand even in the big cities in spring and summer. Therefore, their catch has to be dried into

trepang, which helps to introduce the size limit practice. According to an SFCA marketing officer, if 95 per cent of the weight is lost when trepang is processed, then, 130 g of holothurian becomes 5 to 6 g of trepang. This means there are about 100 to 120 pieces for 600 g ('kin' in traditional Chinese volume unit) and this size is considered the minimum in the Chinese market.<sup>19</sup> The market prices are very low below this size so it is reasonable to introduce a size limit under 130 g.

From 1999, the SFCA voluntarily limited their catches to not more than fifty tons a year. The reason for the quota is economical rather than scientific. At that time, there were ten vessels engaged in dredge net fishing and they discussed what quota was reasonable for the operators.<sup>20</sup> The result was five tons per vessel per one season. The quota limit may be raised or lowered if the situation changes. According to the SFCA personnel, fishermen are aware that holothurian demand remains steady, so they try to maintain the current level of catches. This is because in Hokkaido, generally fishermen had learned hard lessons in previous years from abalone and sea urchin fishery. They rushed for them and exploited the resources entirely. Therefore they would like to maintain the current level of landings even though their annual income may be reduced.<sup>21</sup>

The dredge net fishermen have long felt that the spawning season should be different from what the SSFAC had ordained. In 2001, they co-worked with extension officers on the research of the spawning season in their district. The result was that the period from the end of July to August would be the spawning season. Based on the research results (Rishiri District Fisheries Extension Office 2001), the SFCA applied to the SSFAC for changing of the closure period of holothurian fishing from 20 July until the end of September. The proposal is still being examined by the SSFAC. If the application is approved, the SFCA will begin fishing holothurian from the beginning of March to the day the total catch reaches fifty tons.

According to the SFCA, they are not sure what are the best measures to implement for resource conservation. However, they are eager to put into action any worthwhile suggestions that would benefit the environment. The SFCA wants to enhance the stock of holothurian juveniles but they are not able to get surplus fries. They asked several fishery experimental agencies, both governmental and private, even some beyond prefectural boundaries, but none of them yet produces enough fries to enhance the supply. The SFCA is eager to exchange ideas and learn more from other fishery associations and organizations. In January 2001, representatives from holothurian fishermen from the SFCA visited the Aomori City Fisheries Experimental Station and other fisheries associations in Aomori Prefecture to exchange ideas about resource conservation. There, they learned that starfish are considered a natural enemy of the sea cucumber and they ordered starfish caught by dredge nets not be thrown back into the sea.

## Conclusion

The dredge net fishermen do not rely solely on holothurian at the SFCA. Most of them engage in *kombu* kelp and sea urchin fishing when it is in season. Some work part-time as carpenters and construction workers as well. For better resource management, it is important to allow multiple usage of marine resources. Reading the market and multiple usage of waters and marine resources are keys to holothurian resource management. The SFCA is good at reading the market as evidenced in the size limit imposed on *S. japonicus*. In addition, the SFCA assessed the profit level and concluded that only larger fish should be caught. SFCA totally closed abalone fishing in 2003 until today for resource conservation. In 2002, they opened abalone fishing only twice and found that the abalone were too small. The SFCA, therefore, decided to close abalone fishing until the abalone grew large and profitable enough. Sea urchin fishing is another example of reading the market. Even during the sea urchin fishing season, the SFCA does not allow its members to fish sea urchin every day. Reading the market price, the SFCA decides when to fish and what to fish, either *Strongylocentrotus intermedius* or *S. nudus*. If the market is low, they ban sea urchin fishing even though the weather is suitable for fishing.

The SFCA has successfully managed the stationary coastal resources so far. However, the situation is changing. For example, the small specimen of trepang under 5 g is now marketable in China. This is mainly because of changes in Chinese consumption habits. Traditionally, the Chinese cut a large specimen into pieces and guests shared the food served on a big plate. However, with the recent fashionable trends, some call it *nouvelle chinoise*, each person is served one whole specimen served on a small individual plate. The result is the smaller specimen is valued more highly and fetches a higher price than the larger specimens. The SFCA is aware of this trend but they decided to continue the 130 gram regulation to ensure the sustainable use of the resources.

However, not all fisheries cooperative associations act as the SFCA. Some fisheries cooperative associations in Hokkaido have no size limit, exporting not less than one gram dried specimen. According to one trepang importer in Hong Kong, starting in 2005, he began to receive specimens of around 2.4 g, something which had never happen before. He was worried about resource depletion. According to him, the experienced fisheries cooperative association, that has long been dependent on trepang, knows how to manage the resources, but the fisheries cooperative associations, which had recently began trepang fishing, did not care about sustainability. He requested the Japanese government take action against over-fishing.

However, since the spirit of the post-war fishery reform is democracy and decentralization, each fisheries cooperative association has to consider their own resources utilizations in consultancy with the SFAC. Also, situations are different from region to region and country to country, meaning it may be unrealistic to establish holistic or comprehensive regulations for resource management. The problem lies in how to set up a division of management similar to the Japanese

SFAC, and how to take into consideration the regional historical characteristics while planning resource management. Toward this end, we have to understand the diversity of ecology, culture, and human beings.

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### Notes

- 1 The present chapter uses the term ‘holothurian’ for fresh animals and ‘trepong’ for dried holothurian products. CITES is an international agreement between Governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival (CITES n.d.). The CITES held an expert meeting on holothurian trade in March 2004 in Kuala Lumpur, Malaysia and I had an opportunity to attend the meeting.
- 2 Technically speaking, it is not totally for exportation, since Japanese also consume holothurian in various ways such as raw meat in slices with vinegar and soy sauce, dried ovaries, and salt-fermented intestines.
- 3 An earlier form of this chapter first appeared in the proceedings of the workshop on advances in sea cucumber aquaculture and management (ASCAM) organized by FAO in Dalian, China October 2003 (Akamine 2004).
- 4 Jiaxin Chen, a Chinese leading marine biologist noted that the medical effect of trepong was first recorded in *Bencao Gangmu* published at the end of sixteenth century (Chen 2004: 25). However, to my understanding, there is no mention of trepong in the *Bencao Gangmu* but in the *Bencao Ganmu Shiyi* (Zhao 1765 reprinted in 1971: 495).
- 5 The animal should be dried for at least a month in storage and the dried form must be soaked in water overnight and be repeatedly simmered for about a week until re-hydration. From production to consumption, it requires complicated and time-consuming procedures. This is one of the reasons why trepong is considered a delicacy.
- 6 Even earlier than this date, Korea exported trepong to China by land in 1648 (Sasaki 2002: 219). It is also confirmed that an Annan ship also exported some amounts of trepong in 1683 (Yamawaki 1995: 223), and in 1861 three Taiwan ships exported a total of 0.9 metric tons of trepong (Nagazumi 1987: 254–255).
- 7 Macknight, who wrote an exhaustive archeological study on Makassan trepong fisheries in northern Australia, assumed the beginning of the trepong industry to be between 1650 and 1750 (Macknight 1976).
- 8 Trepong was the top export commodity in value followed by ‘kombu’ or kelp. Also, trepong was the second top exporting commodity in volume after *kombu*.
- 9 Nagazumi researched Dutch archives on Japanese trade with China because there are, unfortunately, few records on Sino-Japanese trade left both in Japan and China. Interestingly the Dutch were so concerned about their Chinese competitor that they intensively recorded information about the Sino-Japanese trade.

- 10 For example, in 1788, a total of 4,630.5 bags of trepang, at least, were exported by eleven ships. The bag was originally used to pack rice but its weight for trepang would be equal to 120 kin (72 kg). Thus, the number is estimated at 333.4t of trepang exported in that year.
- 11 There are no independent statistics available on trepang export in contemporary Japan, since the figures are lumped together with other marine animals. Unfortunately, we have no way of knowing how much trepang is produced in Japan. One possible way to estimate the amount is to ask independent exporters, which is beyond the competence of the present author.
- 12 As for description in this section, the author relied on information given by Kaneda (1995) and Overseas Fishery Cooperation Foundation (n.d.).
- 13 The fishery right was first officially announced by the former Fisheries law in 1901 but a similar custom was widely practiced under Tokugawa's feudal system.
- 14 The small scale coastal whaling falls under the Minister Permitted Fishery (MPF).
- 15 In 1999, I saw dried *P. nigripunctatus* in retail shops in Chinatowns in Yokohama and Kobe, where dried *S. japonicus* cost 25,000 yen/kg and dried *P. nigripunctatus* 18,000 to 20,000 yen/kg. Several shop owners said that dried *P. nigripunctatus* was processed in fishing communities facing the Japan Sea and its total production was estimated to be not more than 200kg a year. It was once popular in the Korean market. However, the author has never seen the dried *C. japonica*, though dried *C. japonica* was exported to China before World War II from northern parts of Japan. Several newspapers reported that there was one processor who experimentally processed dried *C. japonica* in Kushiro, eastern Hokkaido and exported it to Shanghai in June 2005. Interestingly, the Japanese name for *C. japonica*, *kin-ko*, is commonly used to refer to dried *S. japonicus* among trepang processors in Japan.
- 16 The ovaries called *ko-no-ko* (holothurian's baby) are dried and the intestines called *ko-no-wata* (holothurian's entrails) are salt-fermented. These by-products are rare and expensive, and thus they were good income sources for trepang processors. One of the processors in Yamaguchi once said to me, 'Sales from *konoko* and *konowata* cover expenses and all running costs while the sales from trepang becomes net profit.' However, due to the recent health-conscious trends, salty fermented food no longer sell very well. Processors have to make more trepang in pursuit of profit. This situation may affect resource management in the future.
- 17 The red holothurian lives in reef areas so that the dredge net cannot be used for collection. The *ama* divers collect the red variety manually. This may be another reason for the high price.
- 18 Lying in the northern tip of the Japanese Archipelago and having beautiful mountains, Rishiri is also famous for tourism, especially in the summer season.
- 19 According to a processor in Yamaguchi Prefecture, the larger holothurian is not always better for processing. There are two groups of dried holothurian that the Chinese market prefers: individuals with a dried weight of 11 to 17g and those of 18 to 23g. They would be equivalent to 220 to 340g or 360 to 460g in fresh form. Thus, holothurian over 500 grams, when wet, is not suitable for processing into the dried form.
- 20 Coastal fishing based on the common fishery right allows use of vessels of 0.4 gross ton with a 9.9hp engine. Fishermen are free to engage in holothurian fishing as long as they do not use dredge nets.
- 21 The SFCA does not expect to have more fishermen beginning dredge net fishing for the following reasons – A dredge net is made of iron and costs around 330,000 yen (US\$2,800) for one set. The dredge net weighs around 400kg and, including wires, it weighs 700 to 800kg. The fishing vessel is regulated under 15 gross tons and it is common to employ 240 to 300hp engines. Most of the fishermen in SFCA enjoy *kombu* and sea urchin fishing with small boats and there are only a few fishermen who have fishing vessels over 3t. Thus, the cost is considerably high to begin dredge net fishing.

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# **Food and Foodways in Asia**

Resource, tradition and cooking

**Edited by Sidney C.H. Cheung and  
Tan Chee-Beng**

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