

Problems of Export-Oriented Yellowfin Tuna Industry -Indonesia and the Philippines-

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Abstract. In this paper, we examine the problems inherent in the export-oriented tuna industry taking the Philippines and Indonesia as examples. Although problems are reduced to the depletion of or possible depletion of tuna resources, we intend to clarify the industry structure that may have led to such local depletion. Though Yellowfin tuna is the main species for investigation, we also refer to tuna as a whole and to skipjack specifically. In Chapter 1, we survey the overall tuna market. The characteristics are the concentration of production and consumption sites. In Chapter 2, we discuss the tuna industry in the Philippines. Small tuna and skipjack are caught by purse-seines with the combination of FADs. Tuna canning industry is also developed. In Chapter 3, we discuss the tuna industry in Indonesia, which is well endowed with tuna and skipjack resources. Since the canning industry is not fully developed, Indonesia takes the role of supplying the raw material to other countries. In Chapter 4, we point out that the structure of the industry does not inherently build in sustainable resource use mechanism. We consider who is responsible for the local depletion of resource, whether it is the producer, government, or the consumer.

Keywords. Export-oriented, Yellowfin tuna, Indonesia, Philippines, Sashimi-grade, Canned tuna

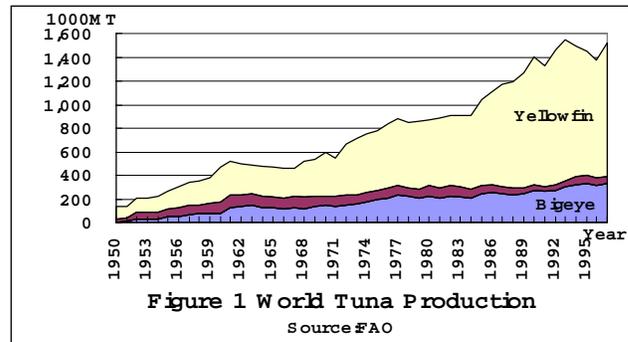
1. OVERVIEW OF WORLD TUNA AND CANNED TUNA MARKET

1.1 Tuna Producing Countries

Tuna, in the broadest concept, includes tuna, swordfish and skipjack: Each species has further divisions. In this paper, we focus our discussion mainly on Yellowfin tuna. We refer to other tuna species such as Bigeye tuna and Bluefin tuna as well as skipjack. Figure 1 shows the long-term trend of the production of Yellowfin, Bigeye and Bluefin tuna. We observe that the production of Yellowfin and Bigeye are increasing. Particularly, the production of Yellowfin increased dramatically after the late 1970's and late 1980's.ⁱ Table 1 shows the production of Yellowfin tuna by regions. Most of the catch occurs within five regions; about a half of it does in the Pacific and a half of production in Pacific region does in the Western Central. Table 2 shows Yellowfin production by country. From this table, we confirm that Indonesia (rank 2nd) and the Philippines (8th) that are located in the Western Central Pacific are major producers of Yellowfin. Production by Taiwan (4th) and Japan (5th) is also included in the catch in this region.

1.2 Tuna Consuming Countries

Now we turn to the observation of how the produced tuna is processed, distributed and consumed. Tuna including Yellowfin is mainly consumed in the form of canned tuna or Sashimi (raw fish).



1.2.1 Japanese Sashimi Market

In Japan, Yellowfin is mainly consumed as Sashimi: 84.6% of imported Yellowfin were Sashimi grade in 1998. The volume of total supply of Sashimi grade tuna (including Yellowfin, Bigeye and Bluefin) was 461,264 MT in 1996: 56.7% of total supply was imported (58.2% out of 491,683 MT in 1998). 34.0% of the world catch of tuna was consumed in Japan as Sashimi in 1996. Major exporting countries/ regions of Yellowfin to Japan are Taiwan, Guam, Malaysia, and Singapore in addition to Indonesia and the Philippines (Figure 2).

Area	Production (mt)	World total
Atlantic, Eastern Central	95,430	9.6%
Indian Ocean, Western	243,651	24.5%
Pacific, Eastern Central	194,044	19.5%
Pacific, Southeast	77,899	7.8%
Pacific, Western Central	301,226	30.3%
World total	993,646	100.0%

Source: FAO

Table 1. Production of Yellowfin Tuna by Area in 1996

Country/ Region	Production (mt)	Export Ratio	Import Ratio	Self Sufficiency
Mexico	127,815	0.095	0.002	1.103
Indonesia	115,549	0.179	0.002	1.215
Spain	102,980	0.455	0.519	0.884
Taiwan	82,891	0.819	0.001	5.519
Japan	80,135	0.059	0.643	0.380
France	72,650	0.769	0.437	2.434
Venezuela	71,248	0.044	0.030	1.014
Philippines	61,280	0.189	0.003	1.230
USA	47,187	0.117	0.388	0.693
Others	231,911	0.341	0.525	0.721
Total	993,646	0.310	0.372	0.909

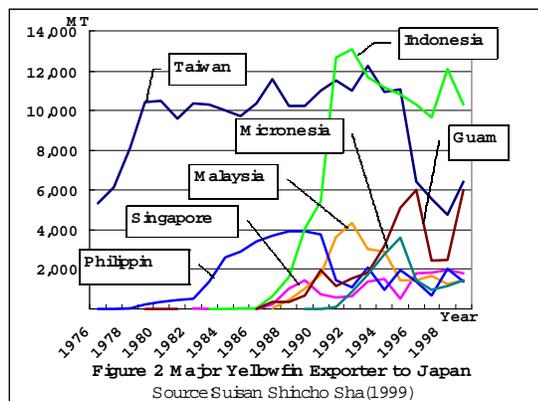
Source:FAO

Export Ratio:ratio of export volume in total catch

Import Ratio:ratio of import volume in net domestic consumption

Self Sufficiency:ratio of net domestic consumption in total catch

Table 2 Production and Trade of Yellowfin (1996)



There are two forms of distribution: Fresh chilled and frozen. In the case of frozen tuna distribution, tuna is frozen immediately after the catch as cold as -60 centigrade, and the temperature is kept until it reaches retailer's storage for sale. The speed of delivery is not important. Instead, modernized super-cold storage should be furnished in the catch vessel, carrier vessel, and port area in case it is transshipped. Wholesale price of frozen Yellowfin is US\$6.19/kg in 1997 (average price of six central wholesale markets in Japan), which is less than that of fresh Yellowfin. However the price dispersion by individual tuna as well as seasonal fluctuation is smaller than that of fresh Yellowfin because of the lower diversification of quality.

On the other hand, fresh chilled tuna is stored in icebox or dampened in chilled water in the vessel until it is unloaded. Then, the unloaded tuna is delivered to Japan by air transport. The speed is required from the catch to the final consumption. The fishing ground should not be too far from the unloading port. Although neither modernized vessel equipments nor landing facilities is necessary, periodical and frequent flight is necessary from the nearest airport since cargo space on passenger plane is the most

economical way of air transportation. In Figure 2, we show that Guam and Singapore are major exporters of Yellowfin to Japan. It is not because tuna is caught by vessels of these country and region, rather, the landing area of these country and region are used for the convenience of flight availability. The price of fresh Yellowfin is US\$9.14/kg in 1997 (average price of six central wholesale markets in Japan), which is higher than that of frozen tuna. There is a large price range, however, by individual species of tunaⁱⁱ. In order for an exporter to successfully export fresh tuna to Japan, one must be knowledgeable about the quality of the fish and handling operation.

It should be noted that there is one problem in the Japanese distribution system. Tuna is essentially distributed in the form of GG, i.e. a round tuna where the gut and gills are eliminated. It is more efficient to process tuna to fillet or steak before it is exported since an exporter otherwise cannot tell the quality of the meat and only 55% of the original weight is finally consumed as Sashimi. It is, however, not conventionalⁱⁱⁱ.

Sashimi market is attractive for producers and exporters in terms of the price. It calls for many troublesome quality requirements. In addition, the fishing gear acceptable to Sashimi grade is limited. Tuna is commonly caught by means of longline, purse-seine or hook-and-line methods. Tuna caught by purse-seine, the most productive gear among the three, is not suitable for Sashimi, as the meat is crushed by the weight of other fish when the net is pulled up.

1.2.2 Canned Tuna Market in the US and EU

Tuna for canneries does not question the way it is caught. Neither does the size or variety of tuna a matter for concern. Canneries in the developing countries are designed to operate using labor- intensive methods whereas those of developed countries are capital intensive (Suehiro 2000, p.18). Fresh and frozen tuna caught by purse-seiner, hook-and-line and long liners are delivered to canneries.

Canned tuna is not only made from Yellowfin but also from Albacore, Bigeye tuna and skipjack. In terms of volume, skipjack is the dominant species. Since separate data is not available, the following discussion of canned tuna includes all kind of tuna as well as skipjack. Major producers of canned tuna are the U.S. and EU (including Spain, Italy and France). These country and region account for 47% of the world production (Table 3). In terms of consumption, the share of these country and region is as high as 73% of the total consumed. The U.S. and EU are not only major producers but also major importers. Table 4 illustrates canned tuna producing countries that are dedicated to the export of the product to these country and region: They are

Thailand, Philippines, Ivory Coast, Ecuador, and Indonesia (statistics of Indonesia is incomplete). We find that export-oriented canneries are located in the Philippines and

Indonesia. Producer's price of skipjack was US\$0.50/kg in Indonesia in 1997(BPS Statistics).

Country/ Region	Production	Export	Import	Consump- tion	Produc- tion ratio	Consump- tion ratio
USA	306,551	4,475	87,937	390,013	24%	31%
Thailand	189,000	188,434	0	566	15%	0%
Spain	153,179	39,656	15,671	129,194	12%	10%
Italy	78,000	5,200	47,050	119,850	6%	10%
Japan	71,385	1,912	32,966	102,439	6%	8%
Philippines	69,114	69,114	137	137	6%	0%
Ivory Coast	61,012	61,012	0	0	5%	0%
France	39,243	29,047	92,689	102,885	3%	8%
Ecuador	26,453	26,453	0	0	2%	0%
Indonesia	23,500	31,074	325	-7,249	2%	-1%
EU*	291,235	93,016	332,474	530,693	23%	42%
Others	217,975	139,606	157,131	235,500	17%	19%
Total	1,256,225	615,096	610,970	1,252,099	100%	100%

* EU includes Spain, Italy and France

Soruce: FAO from Suisan Shincho Sha(1999)

Table 3 Production and Trade of Canned Tuna(1996)(MT)

Country/ Region	Production (MT)	Export Ratio	Import Ratio	Self Sufficiency
USA	306,551	0.015	0.225	0.786
Thailand	189,000	0.997	0.000	333.922
Spain	153,179	0.259	0.121	1.186
Italy	78,000	0.067	0.393	0.651
Japan	71,385	0.027	0.322	0.697
Philippines	69,114	1.000	1.000	504.482
Ivory Coast	61,012	1.000	0.000	61012.000
France	39,243	0.740	0.901	0.381
Equadol	26,453	1.000	0.000	26453.000
Indonesia	23,500	1.322	-0.045	-3.242
EU*	291,235	0.319	0.626	0.549

* EU includes Spain, Italy and France

Soruce: FAO from Suisan Shincho Sha(1999)

Table 4 Production and Trade of Canned Tuna (1996)

Among the three Asian suppliers of canned tuna, Thailand is unique. For the government decided to establish tuna canning industry in 1984 despite the fact that the country did not have any historical background of tuna fishery: Canneries were well established and even overtook the production of the Philippines in the end of 1980's. 90% of the materials are imported from neighborhood countries, namely, Indonesia and the Philippines (Aprieto 1995, p.168, Suehiro 2000, p.18). On the other hand, production of the Philippines, which used to occupy 70% of the share of the total U.S. import, stagnated because of the limited supply of tuna while the material import was prohibited until 1986. Since the late 1990's, canned tuna producers of the Philippines has been revitalized due to the fact that the fishing ground has been expanded by means of joint

ventures and illegal fisheries in other countries in addition to the fact that infrastructure such as fish ports and electricity has been developed in Davao and General Santos City.

Tuna resources in the Philippines and Indonesia are fully utilized for export irrespective of the products: fresh or frozen, Sashimi or canned tuna. On the other hand, the national preference of marine products is not competing with such export: They prefer palm-sized small fish. Cultured milkfish is also favored by both nations. Tuna and skipjack, being abundant in the water of both countries, were identified as valued products by foreigners and were induced to develop as export-oriented materials^{iv}.

2. CHARACTERISTICS OF THE PHILIPPINES TUNA INDUSTRY

Characteristics of the tuna industry in the Philippines are summarized as follows: first, fishing grounds and landing and processing areas are concentrated, and secondly, the industry is formulated by the leadership of private entrepreneurs.

2.1 Concentration in Fishing Ground and Processing Sites

General Santos City, located in southern limb of Mindanao Island of the Philippines, is named as the "tuna Capital of the Philippines". In Manila and Cebu, the capital and industrial/ tourism city respectively, significant volumes of tuna are unloaded and several canneries are located there. This is not because of the location of fishing ground but the attractiveness of the landing location. There, fishing ports can accept large vessels, infrastructure such as electricity and water necessary for canneries are well prepared, and periodical passenger flights to Japan that carry Sashimi grade fresh Yellowfin tuna depart from airports of these cities. On the other hand, in General Santos City and the nearby large city of Davao together account for about half of the tuna produced in the Philippines. Seven canneries produce 65% of the country's canned tuna for export^v. General Santos City became the tuna capital because of the resources in the area. Moro Gulf and Celebes Sea (Sulawesi Sea) is said to be spawning grounds for Yellowfin (Aprieto 1995, p.53).

In the late 1960's, American purse-seiners came to look for supplies of tuna for their canneries, and developed the fishing ground. Gradually, local entrepreneurs took over the production and slowly started canning factories. Tuna and skipjack are mainly caught by purse-seiners or "Pumpboats", a hook-and-line vessel. Both gears are combined with "Payaos", FADs or fish aggregating devices. Payao fishing used to be a traditional way of fishing. When the productivity of Payao fishing was investigated and admitted by FAO in 1979 (Aprieto 1995, p.66), local purse-seiners also started to adopt the technology^{vi}. Nowadays, 50 Payaos are set per unit of purse-seiner^{vii}. Payao technology was subsequently disseminated to Indonesia and Okinawa (Japan).

In General Santos City, there are 165 units of purseseiners operated by 43 fishing companies. About 3,000 traditional hook and-line vessels (Pumpboats) are also in operation. The total number of Payao is estimated to be 8,000^{viii}. Seven out of 12 tuna canneries for export are located in General Santos City and produced 69,000 MT in 1996. Canning materials are caught by purse-seiners. On the other hand, Yellowfin caught by hook-and-line vessels are

forwarded to Japan as fresh Sashimi grade tuna. In addition, longliners from Taiwan catch Yellowfin in the same fishing ground, unload the product at Davao port, and export to Japan as fresh sashimi grade tuna.

Lucrative tuna resources in the area attracted entrepreneurs who established convenient and efficient industry complexes. Depletion of local resources, however, occurred within a decade from late 1970's. Payao first began in Salangani Bay, until the the resources were depleted. Fishing ground then expanded to the Philippines EEZ water, but it was also depleted by the beginning of 1990's. According to an interview from a fishing company (Sep.1999), Payaos of various Filipino fishing companies are placed on the territorial boundaries between the Philippines and Indonesia. At the start of 1990's, Filipino fishing companies established joint ventures with Indonesia, Papua New Guinea, and the Solomon Islands (Aprieto 1995, P.141). These are formal arrangements to fish in other countries' water. Several hundreds of fishermen are said to be put in prison in Bitun city of Indonesia and in Palau as a result of informal (illegal) fishing^{ix}.

2.2 Initiatives of Private Entrepreneurs

In general, development of an industry by private initiatives without any governmental support is desirable. Moreover, it is noteworthy that local capitalists took over the businesses of American firms^x. Furthermore, there was no public fishing ports in General Santos City until the end of 1998. Three local fishing companies built their own fishing port facilities equipped with auctioning places (Gladysingco-Evans, 1995, p.32). Ice plants and cold storages were also provided privately. Such entrepreneurs then vertically integrated tuna industry, from catch to export, and financially assisted local.

Absence of the government or a management institution, however, essentially leads to the "tragedy of the commons". Free access to Payao technology accelerated the depletion of local resources.

As many as 16,000 workers are employed in seven canneries. These workers, however, are part-time workers: Every five months, they resign and apply to other canneries. For example, one cannery in the area produces tuna cans whenever the order from overseas meets the local condition of material supply. Factory workers go to the factory whenever the production occurs, and get their salary according to the number of days they worked. Such flexibility in canneries production contributed to the depletion of resource since neither the stable supply of tuna nor sustainable use of resource is a premise of the operation of the cannery.

3. CHARACTERISTICS OF INDONESIAN TUNA INDUSTRY

The characteristics of the tuna industry in Indonesia are summarized as follows. First, fishing grounds and landing areas are dispersed. Second, the government takes initiative in the management of the industry.

(1997, MT)				
	Tuna	% in Total	SkipJack	% in Total
Jakarta	3,331	22.1%		
Bali	5,211	34.6%		
Bitun	2,698	17.9%	16,272	51.5%
Ambon	1,217	8.1%	6,675	21.1%
Solong	1,476	9.8%	5,814	18.4%
Lainnya	934	6.2%	1,238	3.9%
Others	183	1.2%	1,618	5.1%
Total	15,050	100.0%	31,617	100.0%

Source: BPS, Perusahaan Perikanan 1997

Table 5 Tuna and Skipjack Production by Landing Area

3.1 Dispersed Fishing Grounds and Landing Areas

Although a significant volume of tuna is unloaded in Jakarta and Bali (Denpasar City), four other fishing ports also carry tuna and skipjack (Table 5). It is because tuna resources are abundant and scattered around Indonesian water. In fact, Yellowfin production of Indonesia is the second largest after Mexico (Table 2). When the production by Taiwanese vessels is taken into account, Yellowfin catch in Indonesian water would be the largest in the world. Dispersed unloading ports, however, would be a part of the reason why the canning industry has not been fully developed. Indonesia is essentially a country of material supply: It has not reached a stage of value-added production.

3.2 Governmental Initiative

Dispersed fishing ground is not a unique reason for dispersed unloading ports and stagnant canning industry. It is a reflection of the Government policy: equality in the development of all regions. When one establishes a canning factory, a fish-canning license has to be approved. Ministry of Industry, Agriculture and the local government coordinate to decide the capacity and location of the canning factory taking into account the condition of local resources (MA, 1995, p.57). The Government makes an estimate of the resource and produces a production plan. Table 6 reveals that the estimated production made in 1995 was optimistic. It estimated that the potential production in Indonesian waters is 6.7 mil. MT/year, whereas actual production was 2.7 mil. MT/year. Therefore, only 41% of the potential production was realized. Expected production of IEEF, fishery in EEZ water, in 1998 is 766,000 MT^{xi}, and it estimates that 660 units of new vessels should be

built in order to achieve the production level. The difference between total allowable catch (TAC) and expected production, 1.1 mil. MT/year is allocated to foreign vessels. The policy seems to have dual purposes: to promote the local fishery and the local economy through the utilization of lucrative fisheries resources and to obtain foreign currency by selling excess resources to foreign vessels.

	Total	IEEF	Zone
Potential Production Capacity (MSY)	6,864,119	2,323,780	4,540,339
TAC		1,860,000	
Realized Production	2,529,000	627,386	1,901,614
Expected Production	3,090,600	766,209	2,324,391
Quota for Foreign Vessels (TAC-EP)		1,093,791	

source: MA (1995), p.3, pp.50-51

Table 6 TAC and Expected Production of Indonesia (MT) (Marine Fishery)

Under the Wahid Administration, such policy goal has been stressed. It was decided to establish the Ministry of Maritime Investigation. The mission of the ministry is to administer fishermen who try to steal Indonesian marine resources, eliminate destructive fishing methods and recover from devastated fishing grounds. A Bogor Agricultural University scholar, Rokhim Dahuri, estimates that the loss incurred by the illegal fishery of foreign vessels is as much as US\$40 bil. per year (Inoue 2000, p.55).

In terms of the tuna fishery industry, it estimates the potential production of tuna as 178,368 MT including 87,123 MT of IEEF fishery and that of skipjack as 294,975 MT including 110,225 MT of IEEF fishery (MA 1995, pp.32-33). Since actual production was 122,750 MT for Yellowfin and 209,100 MT for skipjack in 1997, which is below the potential production, there was enough volume to be allocated to foreign vessels when illegal fishing is fully excluded.

Fishing gears for the tuna fishery in Indonesia are longliner, traditional hook & line, and purse-seiner combined with Lumpala (FAD). Hook-and-line fishing catches skipjack as well as tuna. There are 40 longliners with available super-cold storage facilities in 1993 that operated in Banda Sea and the Indian Ocean. The fish caught was unloaded in Jakarta, Ambon and Bitun, and then exported to Japan for frozen Sashimi grade Yellowfin. Longliners with icebox unload mainly in Bali (Denpasar city), and then the product is exported to Japan as fresh Sashimi grade Yellowfin. Purse-seiner with Lumpala was introduced from the beginning of 1990's after its success in the Philippines; it catches small tuna and skipjack for canning material. Major

fishing companies are state-owned, joint venture of the state and private company or operated by fishermen' cooperatives. There are 12 tuna canneries in Indonesia as of 1994: 5 in Bali, 2 in Bitun, 1 in Surabaya, Biak and Batam. Some of them are not fully in operation, others are not operated at all (OECF 1993, p.81, pp.167-173, OECF 1994, pp.43-51, p.137).

The Government aims at planned and harmonized development of the tuna industry. The lack of private initiative slows down the canning and processing sector and the whole industry stays as a material exporter.

4. PROBLEMS OF THE INDUSTRY

Depletion or the possibility of depletion of resources is a common issue that fishery sector always faces. In this paper, the problem exists in this point, too. The reason for the industry being in such a situation is because sustainable production mechanism is not built into the industry. The problems would stem either from the producers, government policy or the consumers. We will compare the situation of two countries and examine which sector is a main generator of the problem.

4.1 Producers

In the Philippines, the main reason for the depletion of resource is apparently the producers. Unlimited entry and competition put excessive pressure on the resources. Although owners of large fishing enterprise understand the problem of a vicious circle, "more catch ahead of others" is unavoidable because "If I do not take it, others will take it anyway"^{xii}.

Moreover, owners of these fishing companies do not pursue an establishment of a stable fishery business. They are rather intentionally shortsighted in a high-risk high-return fishery business. Many of them operate fishing companies as one of several branches of their conglomerates including banking, pawnshop, department store and auto shop^{xiii}. They do not starve even if tuna industry is not sustainable.

On the other hand, the operator of tuna industry in Indonesia is well controlled by the government. Inefficiency of public enterprise is a common phenomenon all around the world, and Indonesian tuna canneries are not an exception. It is, however, appreciated that the government sets TAC for tuna production^{xiv}. If it can eliminate illegal fishery or unreported catch, and if the government's estimation of TAC is appropriated, tuna production in Indonesia would be said to be in a sound situation for the resource.

4.2 Government Policy

It seems that the Government puts a low priority on marine fishery despite the fact that the both archipelagic countries possess long coastlines and large EEZ waters. Primary attention seems to have been paid to aquaculture^{xv}. It is natural in the sense that the nation's favorite fish is cultured Milkfish and cultured seaweed is one of the major exporting product in the Philippines. Cultured prawn is the main source of foreign currency and Milkfish is also a favorite fish in Indonesia. Moreover, in both countries, the average protein intake has not reached governmental goal yet. Aquaculture production is the only reliable and controllable source or the supply of protein.

On the other hand, the Filipino Government is unable to collect data of the municipal fishery. Most of fishers only sustain their livelihood in both countries whereas commercial fishery in the Philippines and IEEF fishery in Indonesia exists to feed foreigners. Government interest in the declining trend of tuna resources have not then strong enough to prevent the local depletion of the resource.

In Indonesia, however, the new administration is aiming to protect marine resources. Even if the primary purpose of the policy stems from locking out of illegal fishery, collection of license fee from foreign vessels, or national security, it is commendable that it has started to protect marine resources including tuna.

4.3 Distributors and Consumers

Lastly, we will examine how foreign consumers are connected to the depletion of tuna resources. There are two reasons for consumer to be unaware of the local depletion. One is that the price does not give any indication to the problem of local depletion. The other is that the retail price does not significantly reflect the increase in producer's price even if the local depletion gives an alert signal through the increase in producer's prices.

Tuna is already a world commodity. Even such limited product as Sashimi grade tuna is exported from 71 countries. If a local depletion of tuna in one country raises its production price, it will not be able to export at all but other 70 countries will compensate the fall in volume of exports to fill the gap. The effect on the retail price would be minimal. Canned tuna market is more worldwide so that the effect on the retail price would be much smaller than that of Sashimi product. Consumers have no way to be informed that there is local depletion in one country in the absence of a proper price mechanism.

Let us assume that the average imported price have risen in Japanese Sashimi market. It would be possible if tuna resource is depleted in Indonesia, a major exporter of Sashimi grade Yellowfin. The effect on the retail price, however, would be negligible because the margin between producer's price and retail price is very large. According to the field research conducted by Yamashita (2000, p.29), producer's price of fresh Yellowfin was US\$2.76/kg (US\$2.02/kg in Indonesia in 1997, BPS Statistics) while the retail price in Japan was US\$54.61/kg in 1999. Since 45% of the original weight is discarded, we count the price of a Yellowfin assuming its original weight being 40kg. Then, the producer's price of a whole tuna was \$110.4 and retail price was \$1201.5. It is nearly 11 times higher than the original price. The margin includes the costs of transportation, trade documentation, auction and cutting and profits of traders^{xvi}. The cost of tuna is only a mere 9.1% of the retail price. Therefore, even if the producer's price is doubled, the retail price would not be significantly raised.

Notes

ⁱ Within the Asian region, the volume of Japanese production has been stable at the level of 300 thousand MT after 1975. Ten years continuous increase ever after was a contribution of Taiwan and Korean vessels that started to build longliners with super-cold storages. After the middle of 1980's, Indonesia and the Philippines started to contribute the production. See Table 2.

ⁱⁱ For example, the price of 101 fresh Yellowfin tuna auctioned in Osaka wholesale market on Sep. 11, 1998 varied from US\$2.29/kg to US\$20.62/kg. Average price of US\$9.14/kg is an average of all these varieties. As we discuss later, producer's price of Yellowfin is far below the wholesale price. It is US\$2.02/kg in Indonesia in 1997, and US\$2.76 in the Philippines in 1999. It is still much higher than that of skipjack, US\$0.50/kg in Indonesia in 1997.

ⁱⁱⁱ Yamashita (2000, p.33) discusses the possible reasons. Recently, Sashimi market is expanding in the U.S. where fillet export is accepted.

^{iv} Aprieto (1995, p.5) states that tuna is consumed in high-income countries. It is exported from low-income countries to high-income countries. We confirmed the fact. It does not imply, however, that the price of tuna is prohibitively high for citizens in the exporting countries. For example, retail prices of food products in the Philippines in Sep. 1999 were as follows; US\$2.75/kg for frozen Yellowfin fillet, \$2.07/kg for frozen Chicken breast, \$0.18/155g for canned Mackerel and Sardine, \$0.25/155g for canned tuna.

^v Interviews from producers and DOA, Sep.1999.

^{vi} Thomas (1999, p.29) stresses that it is not solely the sake of Payaos but the combination of Payaos and lights that attract fish.

The market reacts against the resource in such a way that when the price goes up, consumers purchase less, then the volume of production decreases, giving less pressure to the resources for the time being until the stock of the resource recovers a sound level. If the retail price does not reflect the producer's price, an alert from the resource would not reach the consumers. A rise in retail price has a side effect, for consumers would have tried to know why the price had risen. If consumers feel a sense of responsibility over the depletion of local resources, they could have taken an action to preserve the resources.

At present, however there is no reason or means to inform the consumers of the crisis. As long as it is within the range of local depletion, producers and the government would have to take the responsibility over the loss of a valuable resource in their country.

^{vii} According to Thomas (1999, pp.14-25), 10 Payaos were set per unit of purse-seiner in 1980's. In 1995, it increased to 20-25. Information about recent numbers (50) is obtained from an interview with a manager of a fishing company in Sep. 1999. The company itself produces steel made Payaos.

^{viii} Interview, Sep. 1999.

Fishery regulation in the Philippines requires a license to a vessel over 3 gross tons. Such vessel is regarded as "Commercial Fishery" and allowed to operate in the sea further than 15km from the coastal line, while the sea within 15km is reserved for "Municipal Fishery". Pumpboat, a traditional wooden made canoe with outriggers, being enlarged and empowered as large as 15 gross tons, however, is regarded as "Municipal Fishery". It can operate without license and allowed to fish anywhere within the Filipino EEZ. Payao can be set as first-come, first-set basis without any permission.

^{ix} At the First tuna Conference in General Santos City (Sep. 2, 1999), a delegate of Palau was invited. When he declared the release of 150 Filipino fisher prisoners, participants of the conference applauded.

^x Within the same island, Mindanao, agricultural products such as Bananas and Pineapples are still farmed and processed by the US-Filipino firms such as Dole and Del Monte. Fresh products are exported to Japan and canned products are forwarded to the U.S., EU and Japan. This example in Agricultural plantation would give us a good contrast against Fishery.

^{xi} In Indonesia, marine fishery is divided by two: IEEZ and Zone. Zone fishery is operated by domestic fishers with the fishing vessels less than 30 GT and fish within the 12 nautical miles' territorial water. IEEZ fishery is operated by domestic fishers of vessels over 30 GT or all capacity of foreign fishers, outside the 12 nautical miles and within EEZ water. License is required for both types of fisheries.

Foreign ownership of fishery and cannery is conditioned as follows; it should obtain license as Foreign Capital Investment, and it should operate under the joint venture with national company, state-owned company or cooperative (MA 1995, p.17). Import of foreign vessels has been prohibited since 1990; leasing is allowed under certain condition.

^{xii} Cited by an owner of purse-seine company at the First tuna Conference, Sep. 2. 1999.

^{xiii} They do not only obtain profits from vertically integrated fisheries business but also does from financing medium-to-small scale fishers through the provision of capital goods such as vessels and/or operating expenses such as ice, foods, crew's advance salary and gasoline.

^{xiv} The production of highly migratory species such as tuna is to be managed by regional organization. In the absence of the organization, however, Indonesian conduct will be respected as the second best solution.

^{xv} Such judgment is made by subjective observation. For example, in the Philippines' annual fisheries data book "Fisheries Profile of the Philippines" issued by BFAR, data of aquaculture comes first followed by municipal and commercial fishery. In fact, increase in annual production of aquaculture products is dramatic while others stay stable. In a handbook for investors of Indonesian fisheries sector "Promotion of Business Opportunity in Fisheries Sector" issued by Ministry of Agriculture, a significant volume of pages are devoted to the introduction of aquaculture.

^{xvi} One reason for such differential is the form of import, i.e. tuna is imported in the form of GG.

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Acknowledgement

Field research trips to Indonesia and the Philippines were financially supported by JSPS (1995, 1997, 1998, 1999) and Nihon Seimei Foundation (1996). Research in Japan and paper presentation at IIFET were financially supported by Ministry of Education (Kiban C (2) 11660197, 1999-2000, Kiban B (1) 10460104, 1998-2000) and Meikai University Research Aid (1998-2000).