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**The Shrimp Export Boom and
Small-Scale Fishermen in Myanmar**

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Abstract

This paper examines the impact of the recent shrimp export boom in Myanmar on the economic state of small-scale fishermen. Results indicate that there has been an active increase in shrimp fishing stimulated by expanding export demand. With this, the income of shrimp fishermen has increased dramatically in the past 10 years. However, future prospects appear gloomy due to the possibility of over exploitation of shrimp resources.

Keywords: Fishery, Resources, Export

JEL classification: N5, Q2

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Introduction

Globalization is a rather recent phenomenon for Myanmar's fishery sector. In the British colonial period, a wide range of commodities such as rice, timber, and minerals from Myanmar were sold in the international market. However, marine resources remained largely untapped (U Khin 1948). In the socialist period, only limited amounts of fishery products were exported through state owned economic enterprises. Only after private export began in the mid 1990's did fishery exports grow in any significant way, and this led to the expansion of fishing activities geared toward the international market. In neighboring Southeast Asian countries, export oriented fishing industry developed in the 1960's and 1970's (Hirasawa 1984). Thus, Myanmar was 30 years behind in the shift to export oriented fishing. In a sense, Myanmar was the last frontier in Southeast Asian marine waters to which the wave of the globalization came.

Shrimp is the commodity primarily leads the recent expansion of Myanmar's fishery exports. After the economic transition in the late 1980's, shrimp began to account for about 70% of total fishery exports in value and continues to increase by 20% per annum. The purpose of this paper is to examine the impact of the shrimp export boom on the economic state of small-scale fishermen in the coastal areas of Myanmar.

Concerning the process of transformation from subsistence-oriented to commercial-based fishing, it is often said that even though total catch may increase at the national level, the economy of small-scale fishermen may not necessarily improve (Bene 2003). Based on surveys conducted in a fishing village in Rakine State in Myanmar, this paper examines such propositions by providing research to answer the following three questions: (1) Who are the small-scale fishermen engaging in expanding shrimp fishing? (2) What is the extent of the benefit? To be more precise, what is the income that fishermen obtain from shrimp fishing? (3) Will the benefit last?

One of the objectives is to identify small-scale fishermen actively engaged in Myanmar's shrimp industry. Thus, the main target of analysis is owners of shrimp fishing boats. Crews hired by these shrimp boat owners¹ and those who engage in other type of fishing are only referenced when necessary.

As far as the author is aware, only limited research has been done on the current condition of Myanmar's fishing industry, and the paucity of statistical information may be one of the primary reasons. Another may be the fact that the changing status of this industry is a quite recent development. This paper is a case study, and more research is necessary for a

¹ Analysis of these crews is very important for understanding the improvement of the economy of the fishing community and is left for future research.

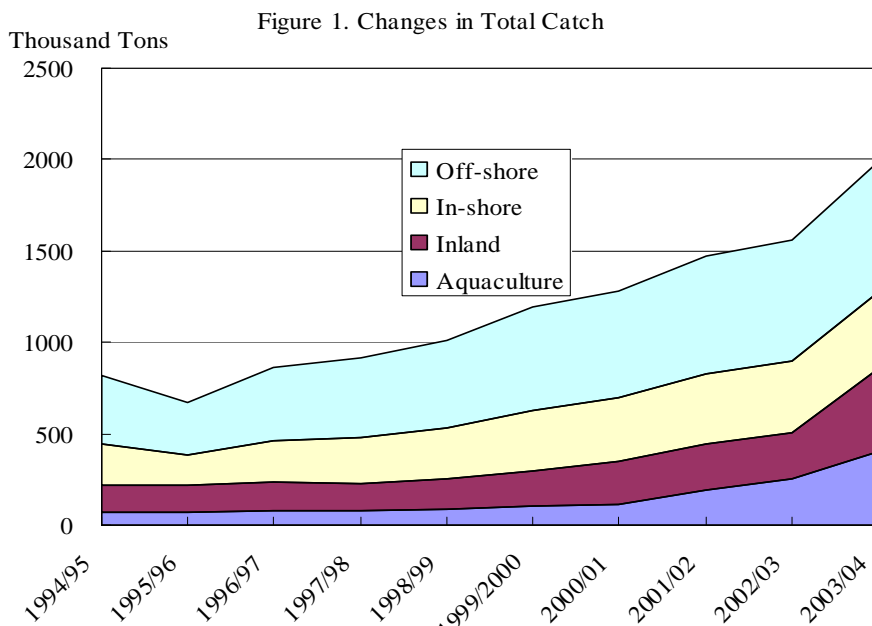
comprehensive understanding of Myanmar's fishery sector. However, this paper aims to clarify the rapidly changing status of fishing village economy and to set a precedent for further research on Myanmar's fishery sector and fishing communities.

Section 1 includes discussion of the general condition of Myanmar's fishery sector and especially the expansion of shrimp exports. Section 2 describes the study village and associated fishing activities. Characteristics of small-scale shrimp fishermen and the factors that determine their entry into fishing are clarified in Section 3. Section 4 includes examination of income and profitability in the shrimp fishing industry. Section 5 presents analysis of the short and mid-term income fluctuations and indicates that the income from shrimp fishing is likely to decrease in the long term. Conclusions are provided in the final section.

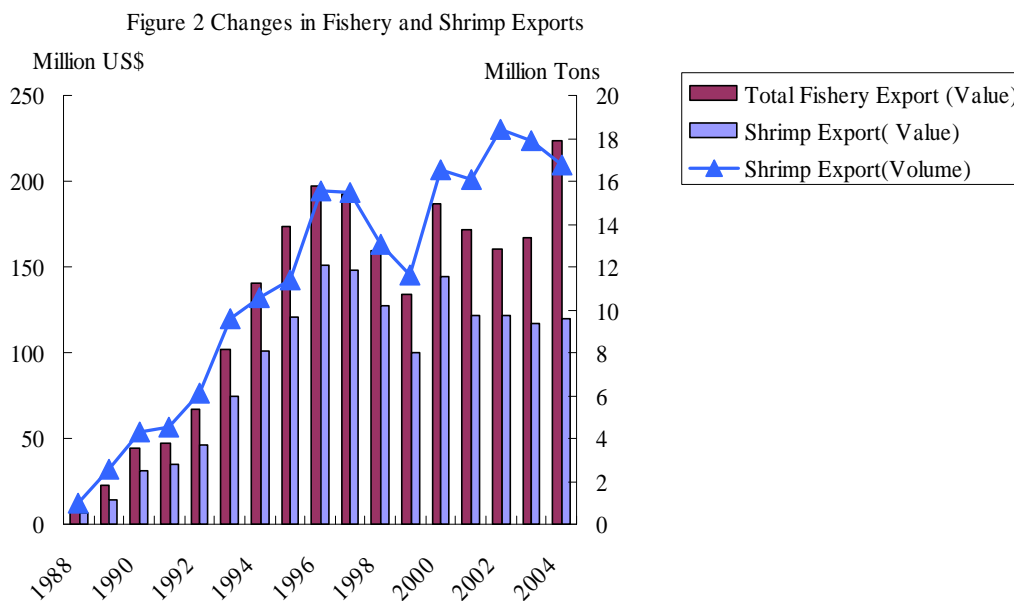
1. Development of the Fishing Industry in Myanmar

Figure 1 shows changes in the total catch in Myanmar. Availability of statistics allows the change since 1994-95 to be shown. The catch has been increasing constantly since 1995-96 irrespective of the type of fishing off-shore on-shore,² inland or aquaculture. The total catch reached two million tons in 2003-04; this is a three-fold increase compared to 1995-96. The increase is two-fold in the coastal fisheries where small-scale fishermen mainly engage in fishing activity.

² In-shore fishing refers to those operations within 5 nautical miles of the waters of Rakine State, Ayeyarwaddy Division and Mon State, and within 10 nautical miles of the waters of Tanintharyi Division.



Source: CSO *Statistical Yearbook* 2004, DOF[2004].

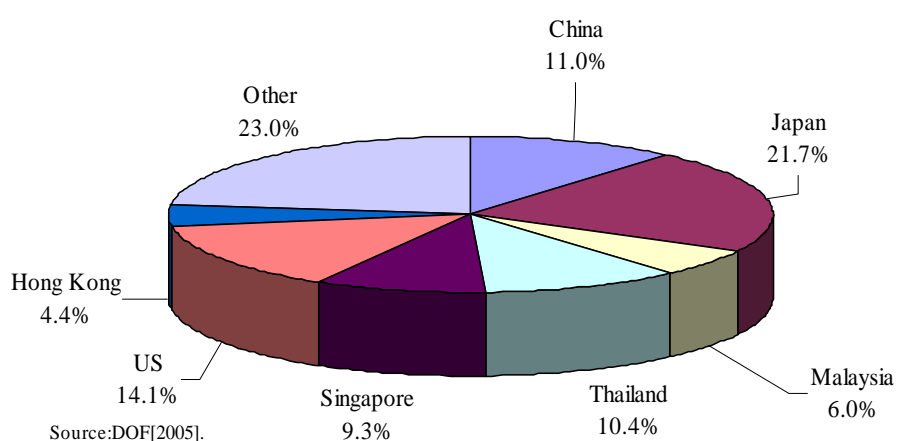


Source: UNCOMTRADE.

This increase of total catch results from the growing demand for export, especially shrimp. Changes in the value of exports of fishery products that have been compiled from importer statistics since 1988 are shown in Figure 2. Exports have been increasing constantly and reached US \$200 million in 2004. Frozen shrimp accounts for the largest share and averages 72% of the total export value for 1988-2004. Though reasons are unclear, shrimp exports decreased

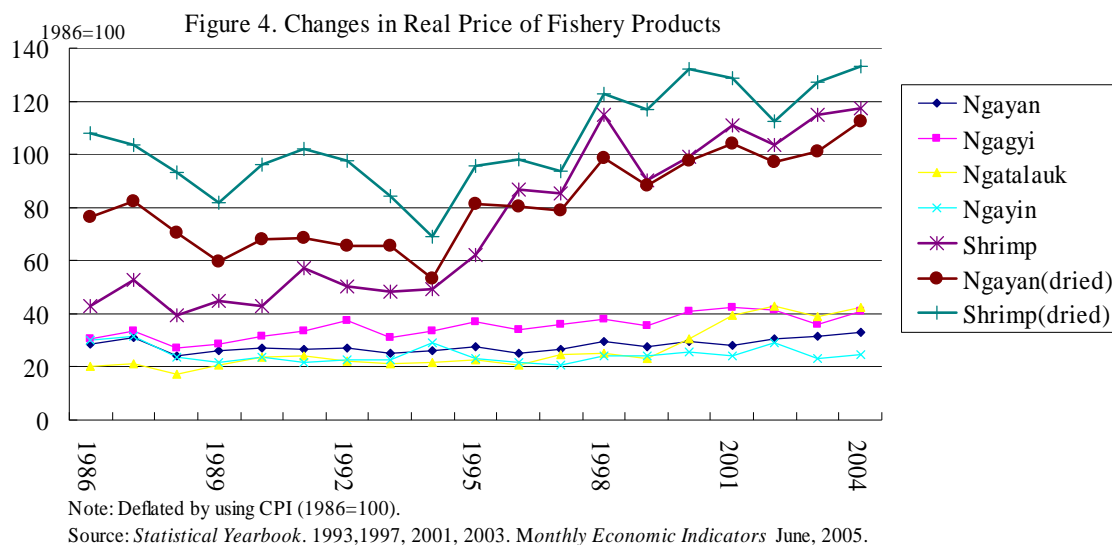
dramatically both in terms of value and volume in 1999, but thereafter volume again increased rapidly. These shrimp were exported not only to developed countries such as Japan, the US, and the EU, but also to neighboring countries such as China, Malaysia, Thailand, and Singapore (Figure 3). The increase of exports to China has drawn particular attention in recent years. Export to China was only 27 tons in 1995-96 but grew to 2900 tons in 2002-03. The rate of increase in value is moderate compared to that of volume, and this is probably because the destination of Myanmar's shrimp shifted from developed countries to markets such as China and Thailand where the unit price was lower.³

Figure 3. Share of Shrimp Importers (Based on Import Value) (FY 2002-03)



The trend in prices clearly reflects the steady increase of fishery exports. Figure 4 shows prices of fish products (wholesale) deflated by CPI. It indicates that the price of fresh shrimp has been soaring since 1994. The price of dried prawns accompanies the upward trend of fresh shrimp prices. This is in clear contrast to the prices of carp and cat fish which are consumed primarily in the domestic market. The sharp increase in the price of shrimp after 1994 reflects the beginning of private export of shrimp on a wider scale.

³ The import unit price of shrimp (total import value divided by total import volume) is US \$6.1 for the US, US \$5.1 for Japan, and US \$4.1 for China.



2. General Overview of the Study Area and Village

The study was conducted in a fishing village in Thandwe Township in Rakhine State. Thandwe Township consists of a town and 63 village tracts. The population is about 140 thousand. The main industries in the Township are fishing, agriculture and tourism.

The fishing sector in Thandwe consists of off-shore fishing and in-shore fishing. Extensive type of shrimp farming has also been practiced in some areas since 2000. However, due to decreasing yield and a surge in production costs, some shrimp farms have stopped production in recent years. Thus, the share of cultured shrimp is nominal, and the majority of shrimp are from marine fishing, as indicated in Table 1. In-shore fishing plays an important role in terms of catch (fish and shrimp) for marine fishery. Among fishing commodities marketed to other areas, shrimp is the second most important commodity following salted dried fish⁴ (Table 2).

Table 1. Total Catch in Thandwe Township
(December, 2004~November, 2005)
(Ton)

	Fish	Shrimp
Off-Shore	374	452
In-Shore	5006	517

Source: DOF, Thandwe.

⁴ “Salted dried fish” refers to anchovies and sardines. These are primarily for the domestic market, but some are exported to China and Bangladesh through border trade.

Table 2. Outflow of Fishing Products
from Thandwe Township

(December, 2004~November, 2005)

Type	Volume(ton)
Shrimp	533.6
(salted) dried fish	1660.0
Marine fish	224.7
Squid	66.4
Salt pickled fish	239.0
Canned products	11.5
Mollusks	5.0
Freshwater fish	2.4
Lobster	3.4
Crab	22.6

Source: DOF, Thandwe.

Shrimp and fish landed in Thandwe Township are processed in factories either in Yangon or in Thandwe. Because the number of frozen processing factories in Thandwe has been increasing since the mid 1990's (Table 3), it is very likely that the volume processed in local factories is now larger. The increase of factories in Thandwe is due to competition designed to assure the supply of raw material, shrimp. In order to obtain high and stable prices in the export market, the acquisition of fresh raw materials as well as their prompt processing is indispensable for exporting companies. In fact, A company listed in Table 3 purchased shrimp from village brokers since the establishment of the factory in 1996, but it opened its own purchasing depot in villages in 2005. This is a reflection of the competition among processors for the raw material. According to a village broker who was in the job well before the expansion of shrimp exports, the volume that can be collected at present is only one-twentieth of what could be collected in 1996, and the number of the fishermen that can be dealt with has decreased to one-third the number of 1992 even though the total number of shrimp fishermen in the area was increasing. The competition is great even at the very end of the marketing chain.⁵

⁵ This is based on an interview with a shrimp trader in the S village tract (October 2006).

Table 3. Factories Established in Thandwe

	Established Year	Main Destination of the Products	
A	1996	Japan	China
B	1998	Japn	China
C	2002	China	
D	1998	China	

Source: Author's Survey.

The field survey was done in a fishing village (S village tract hereafter) which is located about 19 km from Thandwe town. S village tract consists of 5 sub-villages, and the total population was 1143 in 2006. As indicated in Table 4, many households are dependent on fishing for their livelihood. The survey was done in the two sub-villages (A and B). These two sub-villages have the largest number of households and are the center of fishing activities of the village tract. There are agricultural households in these sub-villages, but generally the acreage they hold is small (two to five acres on average), and cultivation is primarily practiced for their own consumption.

Table 4. Household Distribution in S Village Tract

Village	A	B	C	D	E
Total Number of Household =(A+B+C)	564	327	98	70	84
Fishery Household(Owner + Crew) =A	278	170	59	15	68
Owner Household	143	70	19	1	22
Crew Household	135	100	40	14	46
Agricultural Household=B	130	83	14	39	8
Non-Agriculture/Fishery Household=C	156	74	25	16	8
Share of Fishery Household (%)	49.3	52.0	60.2	21.4	81.0
Owner Household	25.4	21.4	19.4	1.4	26.2
Crew Household	23.9	30.6	40.8	20.0	54.8
Share of Agricultural Household (%)	23.0	25.4	14.3	55.7	9.5
Share of Non-Agriculture/Fishery Household	27.7	22.6	25.5	22.9	9.5

Source: Author's Survey.

Table 5. Sample Fishermen

	Total	Sub-Village A	Sub-Village B
Boat Owners	32	12	20

Source: Author's Survey.

Interviews using questionnaires were conducted with fishermen twice in 2006 after a

preliminary survey in 2005. Thirty-two boat owners were interviewed (Table 5). Main questions related to household structure, assets held, history of fishing, fishing season, ownership of fishing gear, catch, sales prices, non-fishing income, and credit relationships.

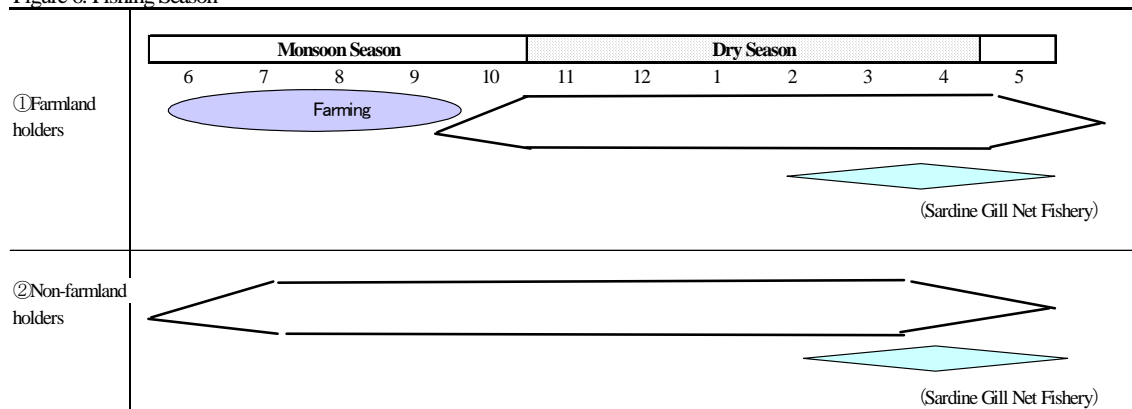
3. Shrimp Fishing and its Actors

3.1 Background of Shrimp Fishermen

Within the study area, the major gear used for shrimp fishing is the three-layered gill net,⁶ and this has been used for a long time in the study village. A shrimp broker, who was an agent for the State Fishery Enterprise then, first introduced the net to this village in 1978. The catch obtained by the three-layered gill net was far larger than that obtained with the one layer net that had been commonly used until then. Thus, fishermen quickly switched to the three-layered gill net. Mechanization of fishing boats equipped with five to six horse power engines also began at about the same time in the late 1970's.

Figure 6 shows the typical fishing season in the study village. Besides shrimp fishing, sardine and anchovy fishing is common in the village. Those who own farmland do not fish in the monsoon season because this is the busiest time for farming. Since the catch of shrimp tends to decrease around March in the dry season, a majority of shrimp fishermen switch to sardine gill net fishing which they expect larger catches.

Figure 6. Fishing Season



Source: Author's Survey.

Shrimp gill net fishing is normally done by three crews. Most boat owners work as a crew on their own boat. Owners and crews divide the total catch by a ratio of 6:4. Each crew receives rewards by dividing the total share of all crews by the number of crews. If working as a crew

⁶ Some small-scale trawlers are said to be in operation to catch shrimp in the waters of the study area. These are basically prohibited. However, due to the difference in the volume of catch, such operation seems to be expanding and tolerated at the field level.

member, the owner can also receive a portion of the crew's share. All operating costs, such as for fuel and repairs, are borne by the owner.

Table 6 includes major characteristics of the fishermen who engage in shrimp fishing. Not only are those who were born into fishermen households engaging in shrimp fishing but also many whose fathers were farmers, traders, and public servants. It signifies that there is an active entry into the fishing sector from other sectors.

Table 6. Characteristics of Shrimp Fishermen

Number of Samples	Number of Family Members	Average Age of Household Head (years)	Education (years)	Main Occupation of Father					
				Farming	Fishery	Public Servants	Commerce	Other	Unknown
32	4.8	41.3	6.5	17	6	4	2	1	2

Source: Author's Survey.

Table 7. Background of Shrimp Fishermen

	Number	Crew → Owner	Entry from Other Sector
New	14	6	8
Old	18		
Total	32		

Note1: "New" refers to those who became the shrimp fishing boat owner for the first time.

Note2: In others, four are from agriculture, one from public service, two from grocery store, and one is unknown. Some from agriculture, some are still continuing to farm.

Source: Author's Survey.

Table 7, which shows the fishing history of interviewed fishermen, endorses this point. Class mobility among fishermen is especially noteworthy. There are many "new" fishermen who have entered from other occupations (farmers, public servants, and grocery store management). This implies that fishing in the area holds very attractive economic opportunities even for those who have no experience. Further, six owners used to be members of crews. This indicates a strong possibility for upward class movement among fishermen. Even those that started fishing without production assets can become owners of such assets. This is in clear contrast to those landless agricultural laborers who are hardly able to be landed farmers in most areas of Myanmar.⁷ Shrimp fishermen in the study area include those who have been fishing quite a long time and those who have just started. And the mobility of the fishermen class is high, and crew members

⁷ It has been almost impossible for agricultural laborers to be farmers even in the case of exported pulse production areas that developed rapidly in the 1990's. See Okamoto (forthcoming).

can become owners in a relatively short period of time.

3.2 Requirements to Become a Shrimp Fisherman

The key to becoming an owner of a shrimp fishing boat is in being able to prepare sufficient capital. Table 8 compares the required fixed costs according to different types of fishing (prices are for 2005-06). The amount of capital needed for the shrimp gill net fishing is almost equal to that of sardine gill net fishing and far less than anchovy purse seine fishing. In this sense, capital needed for shrimp fishing is not so large.⁸

Table 8. Comparison of Initial Investment Costs According to the Type of Fishing (Prices in 2005-06) (million kyat)

	Shrimp Gill Net Fishing	Sardine Gill Net Fishing	Anchovy Purse Seine Fishing
Boat	0.3-0.4	0.3-0.4	2-2.5 3-5
Engine	0.25-0.3	0.25-0.3	0.5-0.7
Net	0.2-0.3	0.5-0.6	6
合計	0.75-1.0	1.05-1.3	11.5-14.2

Note1: Horse power of the engine is as follows. (1) Shrimp /sardine gill net fishing boat (5-6hp), (2) Anchovy Purse Seine boat (18-25hp)

Note2: Anchovy purse seine fishing requires two boats.

Note3: The market exchange rate was 1120 kyat/US\$ (2005-06 average)

Source: Author's Survey.

How is the required capital financed? According to Table 9, owners have to have a certain amount of their own capital. Because the financial market in Myanmar is generally underdeveloped, owners cannot depend on institutional finance such as banks. Instead, if funds are short, they must depend on either traders or relatives and friends. In these cases, half of the required capital is usually financed by personal funds, and the rest comes from credit or gifts from others.

Table 9. Means of Raising Capital to Purchase Fishing Gears (person)

Own Capital	Own Capital+ Credit from Traders			Own Capital+ Credit from Relatives and Friends		
	No Interest	With Interest	Unknown	No Interest	With Interest	Unknown
2	4	2	3	2	1	0

Note1: The interest rate was 10% for two cases and 6% for one case.

Note2: This was obtained from only 14 fishermen.

Source: Author's Survey.

⁸ However, the capital costs for small trawl fishing is very high. It is about four times that of shrimp gill net fishing.

Viewing details of financing for the interviewed fishermen, several patterns emerge. The first pattern includes those who financed themselves and in addition used credit from the trader who introduced the three-layered gill net to the village in the socialist period (8 fishermen out of 14). In those days, it is very likely that information related to new techniques or gear was not accessible to small-scale fishermen in distant areas. However, the trader not only introduced new gear that could dramatically increase catches but also financed fishermen in order to allow them to purchase the new gear. Fishermen in the study village took advantage of this arrangement and started shrimp fishing on a wider-scale.

The main interest of this paper is not on the financing of these “old” fishermen but rather on those “new” fishermen who began shrimping after 1990. There are two patterns here: First, some started as crew members in shrimp gill net fishing. They accumulated some money in this process. At the same time, they obtained some assistance from traders and relatives, and they became the owners of boats (4 persons). The period that they worked as crew members was not so long and ranged from three to eight years. If they could acquire credit to supplement their own savings, there was a good possibility that they could become the owner of the fishing boat. The second pattern is that some members of the younger generation received full support from their parents when they started working independently (2 persons).

Basically, the financial barrier to begin shrimp fishing as an owner of the boat is not so high since fishermen can start with accumulated capital through fishing (within relatively short period of time) or even with the financial assistance from relatives and traders (meaning that is affordable scale for those providers who are not necessarily affluent).

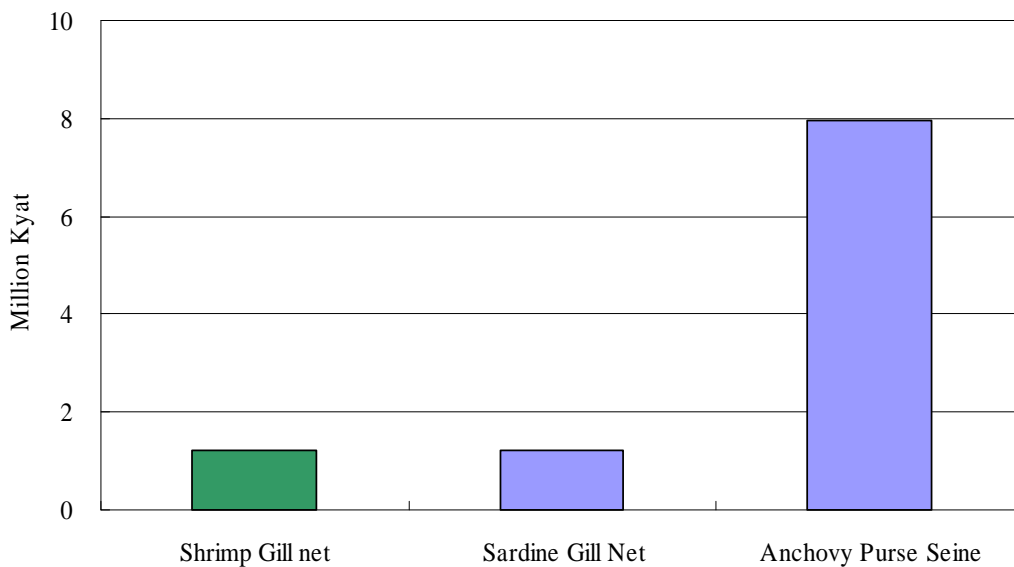
4. Income and Profitability of Shrimp Fishing

Figure 7 shows the income estimation of shrimp gill net fishing compared with other type of fishing.⁹ The estimation was done as follow. Tiger, white, and pink are the major varieties of shrimp caught in the waters of the study area. Gross revenue is estimated based on the days and months that each fisherman goes fishing multiplied by the average daily catch according to each variety of shrimp and the median price. Other fish are also caught while shrimping, and these are also an important income source for fishermen. However, these are excluded from the estimation of income because the variety of fishes caught is great, and the fishermen do not usually remember the details of these catches. Calculation of the ratio of the share between owners and crews was explained in Section 3. If the owner goes fishing, the share as a crew member is added to his total income. This part signifies the wage for the owner’s own labor. Current expenditures such as for fuels, wage payments for crews, interest on loans, license fees,

⁹ For a detailed explanation of the estimation, see Appendix Table.

and depreciation costs are included in the “cost”. In calculating the depreciation cost, it was not possible to obtain all necessary information for the year in which fishing gear was purchased or the price paid by each household. Thus, the lowest price of the gear in Table 8 is taken as a base price, and the durable years for a boat are assumed to be ten. An engine is assumed to have six years, and the net is thus four years. If a fisherman is engaged in two types of fishing activities using the same boat and engine, half of the depreciation cost is accounted for in each type of fishing.

Figure 7. Fishery Income According to Type of Fisheries



Source: Author's Survey.

The result of estimation shows the income of shrimp gill net fishing to be almost the same level as that of sardine gill net fishing, but it is far less than anchovy purse seine fishing. This implies that income from shrimp gill net fishing is not as high as might be expected.¹⁰ Nevertheless, this level of income is quite high compared to income that could be obtained from other sectors. There are 19 households that also get income from the farm sector (average holding is 3.8 acres). Based on their holding acres and yield, the average gross revenue is 296,000 kyats.¹¹ Note that this is not “income”, but “gross revenue” before deducting the

¹⁰ However, the income potentially gained from small scale shrimp fishing is estimated about 4 million kyats and far larger than the gill net fishing.

¹¹ Since it was not possible to obtain information regarding the production cost for each paddy, the author could not estimate income. Besides paddy farming, some farmers are also cultivating groundnuts, but the author could not obtain detailed information. Thus, the estimation of paddy gross

production cost. Nevertheless, the scale of fishery income is far larger than farm gross revenue. Even the income from grocery stores, which is one of the most lucrative income sources in the non-farm sector, is 420,000 kyats on average. It is still far lower than fishery income, including that from shrimp fishing.

Looking at profitability, the shrimp fishing seems to provide a better picture when compared to other types of fishing. Table 10 gives an estimation of capital profitability based on the profit and the initial investment cost for each type of fishing activity. The initial investment cost used in this estimation is the minimum and maximum investment cost shown in Table 8. Since credit is usually provided on a monthly basis in rural Myanmar, the profitability is indicated on a monthly basis to allow comparison with the prevailing interest on credit. The profitability of shrimp gill net fishing ranges between 7.1 and 9.5 % per month,¹² and it is much higher than sardine gill net or anchovy purse seine fishing.

Table 10. Comparison of Profitability (%/month)

	Shrimp Gill Net	Sardine Gill Net	Anchyovy Purse Seine
Case of Minimum Investment Cost	9.50	7.07	6.04
Case of Maximum Investment Cost	7.13	5.71	4.68

Source: Author's Survey.

The common interest rate found in rural Myanmar is 5 to 15 % per month, and it can be over 10% if there is no collateral (Okamoto Forthcoming). Based on the profitability of shrimp fishing, this shows that initiating shrimp fishing by depending on loans does not pay financially if fishermen cannot provide collateral. In fact, this supports the fact that most shrimp fishermen started fishing by depending on their own capital, and fewer depended on loans carrying interest.

5. Short-Term Fluctuation and the Long-Term Decrease of Shrimp Fishing Income

The previous section showed that shrimp fishing provides relatively high income with very good profitability. However, fishery income, including that from shrimp fishing, tends to fluctuate quite widely in a very short term, and this creates a large discrepancy in income among the fishermen.

There are three main factors related to short-term fluctuation of income. The first factor

revenue is shown as a rough reference.

¹² The profitability of small-scale shrimp trawl fishing is estimated as 9.87% for minimum investment cost and 6.66 % for maximum investment cost.

involves natural conditions such as weather. It is quite obvious that fishermen cannot go fishing if the weather is bad. For example, there may be 15 fishing days per month in a normal monsoon season, but once the weather gets rough, fishermen may be able to go out to sea only three to four days per month. Even if fishermen can go out fishing, the condition of the fishing grounds and the variety of fish in the sea changes every day. One day may yield a bumper catch, but the next day may produce none.

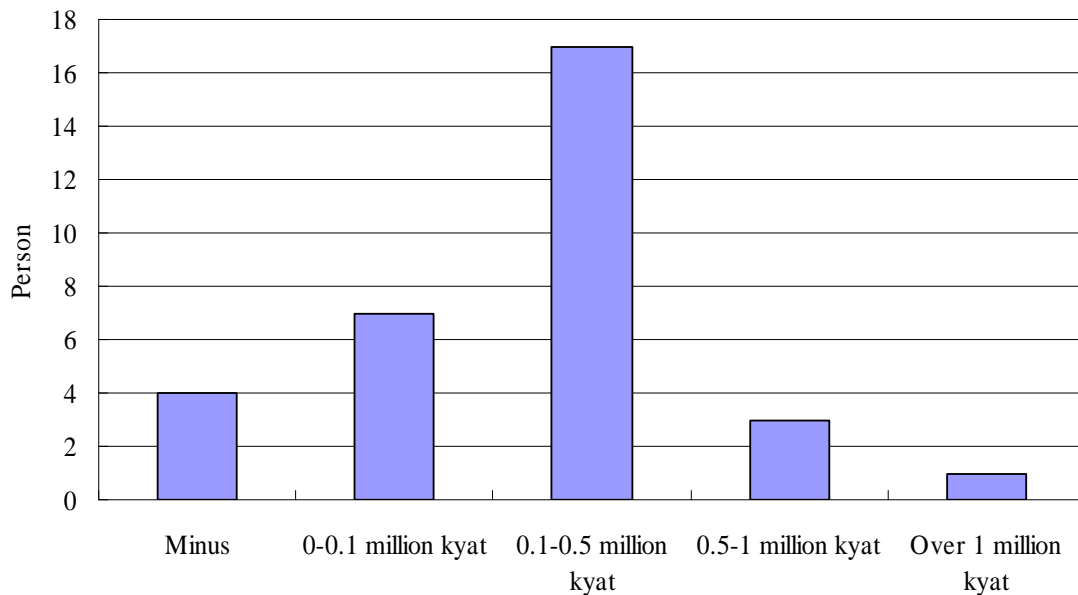
The second factor concerns the difference in technique and experience among fishermen. Even if fishermen go out under the same weather conditions, the same fishing ground conditions, and with the same equipment, the catch can vary significantly among different boats. This is due to differences in the knowledge and experience of fishermen. The coefficient of variation for the catch of sample fishermen (assuming they face the same fishing conditions) is 1.09 for tiger, 0.66 for pink, and 1.04 for white. All exceed 1 and show that there is a wide variation among fishermen.

The third factor relates to the fluctuation of operating costs, especially the cost of fuel. Fuel costs account for the largest share in current expenditures. The total cost of diesel oil and engine oil is about 70% of the total cost (see Appendix Table). If the cost of fuel rises, profit will be reduced dramatically. Oil prices have been increasing worldwide since 2005, and Myanmar has not been an exception in receiving a negative impact as an oil importer. The price of diesel oil was rather stable (between 1.4 and 1.9 dollars per gallon from 2000 to 2004) but increased to 2.5 dollars in 2005 and further to 3.4 dollars in 2006.¹³ Under these circumstances, fishermen reduced fishing days per month and/or shortened the overall fishing period.¹⁴ The fluctuation of input prices can change patterns of fishing and thus lead to fluctuations in income from fishing.

¹³ This was calculated using the market exchange rate. Diesel oil prices were provided by Tokyo-Mitsubishi Bank, Yangon Office, and the exchange rate was obtained from various sources in Yangon. The price of diesel in Thandwe is usually a bit higher than the price in Yangon. However, it was not possible to collect time-series data for Thandwe, so the Yangon price was used as an alternative.

¹⁴ Since 2006, some off-shore fishing boats have also stopped operating because of high fuel prices.

Figure 8. Distribution of Monthly Income



Source: Author's Survey.

Figure 8 includes the distribution of monthly income from shrimp fishing. It shows wide variation among those whose income is minus to those over 1 million kyats. Even if a fisherman has good knowledge and much experience, there are uncontrollable factors such as weather and natural conditions of the fishing grounds. This kind of short term income fluctuation can be regarded as unavoidable.

How can shrimp fishermen continue operations despite income fluctuation that may even lead to negative income? Credit from shrimp traders plays a role. There are about 10-15 shrimp traders in the study village. These shrimp traders often provide loans to the boat owners as working capital for operation. The provision of working capital assures a stable supply of raw materials (shrimp from those fishermen). As noted earlier, the competition among traders is increasing sharply. Thus, traders see the credit provision as a very useful tool to hold a continuous trading relationship and get stable supply of shrimp. Normally, no repayment date is set, and there is no explicit interest payment for this kind of credit. However, the price paid for the shrimp of those credit-linked fishermen is usually less than the price paid to non-credit receivers. The price of the village traders is generally lower than that initially offered by the companies. Nevertheless, fishermen continue to deal with traders in the villages so that they can depend on them when they find themselves short of capital. Given the wide fluctuation of income in shrimp fishing, they view the relationship with the traders as a kind of insurance. Table 11 indicates to whom fishermen are selling their shrimp according to the level of monthly fishing income. It clearly shows that the lower the income, the higher the share of the fishermen

that have trading relationships with the traders in the villages and receive credit from these traders. Fishermen with negative income sell shrimp to the traders in the village and depend on credit from them.

Table 11. Buyers and Credit Relationships (person)

Monthly Income (kyat)		Minus	0-0.1 million kyats	0.1-05 million kyat	0.5-1 million kyat	Over 1 million kyat
Buyers	Processing Factory		1	5		2
	Village Trader	5	8	11	1	2
	Family		1	1		
	No fixed buyer				2	
	Total	5	10	17	3	4
Those have credit relationship with the buyer		5	3	5		

Source: Author's Survey.

In addition to the short term fluctuation of income, there is a strong possibility of long-term change in income level within the study area. This is due to the decreasing trend of catch per shrimp boat.

No	Shrimp Species	Mid 1980s	Mid 1990s	2000	2003	2004	2005
1	Tiger				3.0		0.2
	White				2.0		2.0
	Pink				0.1		0.1
2	Tiger				0.5	0.4	0.3
	White				3.0	2.3	2.0
	Pink				0.4	0.4	0.4
3	Tiger	4.0	3.3	1.3			0.5
	White	8.0	6.7	2.5			1.7
	Pink	8.0	6.7	3.3			0.5
4	Tiger			0.5			0.2
	White		5.0	3.0			1.0
	Pink		5.0	4.0			1.0
5	Tiger		0.3				0.1
	White		1.2				1.0
	Pink		0.3				—
6	Tiger			0.5			0.2
	White			2.0			1.0
	Pink			0.5			—
7	Tiger	10.0	5.0	3.0			2.0
	White	20.0	5.0	3.0			3.0
	Pink	5.0	3.0	2.0			1.5
8	Tiger	3.0					0.3
	White	5.0					0.5
	Pink	5.0					0.5
9	Tiger		2.0	0.5			0.3
	White		10.0	1.0			1.0
	Pink		5.0	1.0			0.5

Note: 1viss equals 1.63 kg.

Source: Author's Survey.

Table 12 illustrates changes in catch per boat based on interviews with the fishermen. These estimates primarily depend on the memory of the fishermen, so some related to earlier times may not be precisely accurate. Nevertheless, figures are sufficient to grasp the general trend of how catches are changing. According to the table, catch per boat per day has been continuously decreasing when compared to 10 or 20 years ago. This is probably due to the growing number of shrimp fishing boats in the waters surrounding the village. Since the mid 1990's, shrimp fishing income and profitability have risen along with the expansion of shrimp exports. This has led to more people entering the shrimp fishing business. As a result, there are many more fishing boats in the same fishing grounds than there were in the past. Further, there are reports that some in-shore and off-shore trawls are operating in the same area, although such activity is

prohibited.¹⁵ Because of this rapid increase in the number of boats chasing shrimp resources, the catch per boat per day has decreased quite dramatically in a short period.

The decreasing rate of catch in the past five years ranges between 30 to 80 % depending on the type of shrimp (calculated based on Table 12). If a catch were 30% higher than the present level, the shrimp fishermen's income could be as high as 1.8 million kyats. If it were 60% higher, it would reach 2.4 million kyats; this exceeds the income from anchovy purse seine fishing. Profitability would also rise to 15.1 to 20.1 % per month. It is quite likely that shrimp fishing was very attractive when fishermen could get these levels of catch compared to other types of fishing. High income and high profitability led to continuous new entry into shrimp fishing. Thus, shrimp could have been over exploited, leading to the present level of the catch.

Unfortunately, no comprehensive resource survey has been done since the 1980's, and no systematic data related to catch according to fish species is available. Thus, it is difficult to know exactly how much shrimp resources remain in the sea. However, even with limited information from fishermen, the declining status of resources seems quite obvious. This is a typical example of "Tragedy of Commons" (Hardin 1968).

What will happen if the current trend continues? Assuming the present rate of profitability in shrimp fishing, it is most plausible that entry into the business will continue given that there are no other attractive economic activities in the area.¹⁶ Suppose the level of operation costs remains the same. Table 13 gives an estimate of the profitability when the average catch decreases 30%, 40%, and 50% of the present level. If the catch decreases by 30%, the profitability would be reduced to from 2 to 4% per month. In the case of a 50% decrease, there would be no profit.¹⁷

¹⁵ The catch of shrimp in off-shore areas has also been decreasing in recent years. Consequently, off-shore boats sometimes come into in-shore areas. Further, the catch of the in-shore trawling is reported to be decreased as well.

¹⁶ Anchovy purse seine fishing seems to be getting popular in the Thandwe area as an alternative high income source. The level of potential income is shown in Figure 7. However, compared to shrimp fishing, the initial investment cost is quite high, and entry may not be so easy.

¹⁷ Same picture applies to in-shore shrimp trawl fishing if calculated in the similar way.

Table 13. Changes of Profitability According to Change in Catch (%/month)

	Present	Catch decrease by 30%	Catch decrease by 40%	Catch decrease by 50%
Case of Minimum Investment Cost	9.50	3.82	1.93	0.00
Case of Maximum Investment Cost	7.13	2.87	1.45	0.00

Source: Author's survey.

Short term income fluctuations noted earlier occur under this long-term decreasing trend of catch per boat. The average income gradually decreases, and income fluctuation is inevitable. This suggests that fishermen with negative income are very likely to in future. Some may have to exit from shrimp fishing.

If fishing efforts continue to increase at the present level, shrimp fishing will not be an attractive economic opportunity as it stands now. New entry will stop at some point. However, it is possible that shrimp resources are overexploited to the extent that recovery is no longer possible by that time.¹⁸ In such a case, the dynamic improvement of the economy of small-scale fishing which occurred in the past 10 years will no longer be sustainable.

Conclusion

Globalization of Myanmar's fishing industry led to growing shrimp exports from the mid 1990's. Based on a village case study, this paper examined the impact of this globalization on the economic status of small-scale fishermen. Major findings of the analysis are as follow.

Entry into small-scale shrimp fishing became very active from the mid 1990's due to growing shrimp exports. In addition to those fishermen who had been shrimp fishing since the socialist period, there were many new entries from other sectors.

Financial constraint was not a serious threat to entry into shrimp fishing. The initial requirement for purchasing fishing gear and boats remained in a scale that could be met by the accumulation of capital from fishing activities together with financial assistance from relatives and loans from traders.

Income that can be obtained from shrimp fishing is far larger than income from other sectors. Indeed, it is more than farm income or major non-farm income. Further, the profitability of shrimp fishing is much higher than that of other types such as sardine or anchovy fishing.

¹⁸ According to interviews conducted at a Japanese shrimp export company in Yangon, if shrimp fishing continues at the present level, shrimp will be depleted in the coastal waters of Myanmar within 10 years. If fishing boats with higher levels of equipment are used, the resource depletion will proceed much faster (October 2006).

High income and high profitability have been the main incentive for entry into shrimp fishing. Thus, small-scale fishing in the coastal areas, at least with those who own shrimp boats, has received great benefit from the expansion of shrimp exports.

High income from shrimp fishing is probably not sustainable in the mid and long term because of the increasing competition due to continuous entry into shrimp fishing. This “Tragedy of Commons” is continuing steadily and rapidly. When income fluctuates under a long-term declining trend of catch, more fishermen may have to exit the shrimp fishing business. If some kind of the fishing resource management is not begun soon, the dynamism that improved the economy of small-scale fishermen in the coastal areas of Myanmar in the past 10 years will not be sustainable in the future.

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Appendix Table. Estimation of Income for Fishing Boat Owners

		Shrimp Gill Net Fishing	Sardine Gill Net Fishing	Anchovy Purse Seine Fishing	
Number of Samples		32	30	11	
Average Operating Months	Month	5.8	4.0	6	
Average Operating Days per Month	Day	16	17	21	
Catch (Viss/day)	Tiger	0.7	—	—	
	White	1.8	—	—	
	Pink	1.6	—	—	
	Flower	—	—	—	
	Sardine	—	142.7	250	
Selling Price (Kyat/Viss)	Anchovy	—	—	500	
	Tiger	13,000	—	—	
	White	8,000	—	—	
	Pink	4,000	—	—	
	Flower	—	—	—	
Selling Price (Kyat/Viss)	Sardine	—	250	250	
	Anchovy	—	—	400	
	Owens' Gross Revenue = ①	Kyat	2,840,432	2,459,930	33,075,000
	Wage Payment to Crews = ②	Kyat	1,136,173	983,972	21,498,750
	Current Cost = ③		798,455	433,606	1,997,500
Fuel Cost	Kyat	555,820	387,119	1,200,000	
Net Purchasing Cost	Kyat	200,000	0	0	
Fishing Gear Maintenance Cost	Kyat	42,635	46,487	797,500	
Depreciation Cost = ④		32,175	144,675	1,575,000	
Boat and Engine	Kyat	32,175	32,175	495,000	
Net	Kyat		112,500	1,080,000	
Interest Payment = ⑤	Kyat	7,500	0	0	
License Fee = ⑥		10,950	6,450	35,500	
Total Cost ⑦ = ② + ③ + ④ + ⑤ + ⑥	Kyat	1,985,253	1,568,703	25,106,750	
Owner' Net Revenue ⑧ = ① - ⑦	Kyat	855,179	891,227	7,968,250	
Revenue as Crew = ⑨	Kyat	378,724	327,991	0	
Owens Annual Total Income ⑩ = ⑧ + ⑨	Kyat	1,233,903	1,219,218	7,968,250	
Owens Monthly Income	Kyat	212,284	302,285	1,328,042	

Note 1: In ②, the shares of the crews are converted to monetary terms and treated as hired wages.

Note 2: A shrimp gill net can be used for a year. Thus, there is no depreciation cost.

Note 3: If the shrimp and sardine gill net fishermen use the same boat and engine, half of the depreciation cost is accounted for each fishing venture.

Note 4: License fees for crews are also paid by the owners.

Note 5: ⑨ is the wage for labor of an owner working as a crew as well.

Note 6: 1 viss equals 1.63kg.

Source: Author's Survey.