Livelihoods & Food Security Trust Fund

Myanmar

Prawn Value Chain Analysis

Rakhine State, Myanmar

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Abbreviations

DoF	Department of Fisheries
MK	Myanmar Kyat
PL	*Penaeusmonodon* post larvae
PCR	Polymerase Chain Reaction
USD	United States Dollars

Units used and conversion table:

	International		Local (Myanmar)	
Weight	Kilogram	1.0	Viss	0.6
Area	Hectare	1.0	Acre	2.47
Currency	US$	1.0	M Kyat	813

Acknowledgments

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Executive Summary

In the late 1990s and early 2000s prawn farming (*P. monodon*) expanded in Rakhine State. Prawn farming was based on an extensive production system, relying on wild post-larvae trapped in ponds. The sector was developing, with expansion of the farmed area. However, the technology used in the sector did not improve, and after a few years yields started to decline. Prawn farms suffered from recurrent cyclones, high mortality rates and the high cost of dike maintenance. In 2011-2012, the yield was low and in some townships more than 50% of prawn ponds had been abandoned.

This study investigates the prawn value chain in Rakhine State, focusing on Cyclone Giri-affected areas. We interviewed key informants in the prawn value chain as well as the different stakeholders in the supply and market chain in Sittwe, Pauktaw, Myebon and Kyuakpyu townships. We aimed to understand the value chain, as well as the costs and benefits of the different production systems, and to highlight difficulties and opportunities in the sector.

Production systems

As of 2012, extensive prawn production systems in the study area are still widespread, with almost no input use and more than half of ponds relying on wild seeds trapped in the ponds. We distinguish between different farm types based on farm sizes, with small medium-scale farms (up to 20 ha), large scale farms (up to 50 ha) and private investors with farms of up to 200 ha. Local farmers in villages can be considered medium or better off households, since they have access to land in villages were on average 50% of households are landless.

The different systems faced high mortality rates in May 2011 and farm results were negative in some cases, especially for local small- and large-scale farmers. The yield of *P. monodon*varied between 15 to 70 kg/ha/year. The peak production season started from May to August, and the low production season was during the dry season from December to March.

Local farmers do not have access to extension services or input providers. Access to post-larvae was more difficult in late 2011 compared to previous years, with a lower amount of PLs imported from Bangladesh. The actual production of the 2 operating governmental hatcheries in the study area is below 5 million PLs while the demand is estimated at around 100 million PLs. Farmers can purchase PLs from local catchers and depots, government hatcheries or importers providing PLs reared in Bangladeshi hatcheries. When there is a shortage of PLs during the stocking period, farmers cannot afford to invest in PLs due to high prices. As a result, the stocking density drops below 2.5 PL/m^2 per year and most local farmers rely solely on natural PLs trapped in their ponds.

The economic data show that most farm-related investment goes into dike maintenance and wage labor and that little investment goes into inputs and pond preparation. Farms also rely on other aquatic resources for their financial sustainability. Other prawns, crabs and fish harvested in the pond act as a safety net for small- and medium-scale famers. However, most farms are in debt, which explains the high number of abandoned ponds in the study area.

A farm's financial status is linked to the cash advances provided by traders and local collectors. This informal loan system is a characteristic of the entire value chain with traders and exporters financing lower levels in the value chain (collectors and farmers). However, with falling yields and crop failures recently farmers have not been able to repay their cash advances, which has affected the entire loan system and cash flow in the value chain.

Value chain and export

Most *P. monodon* production is exported to Bangladesh, transiting through Sittwe. A smaller volume is exported to Yangon. The difference in volume exported to Bangladesh compared to Yangon has been exacerbated by international sanctions on Myanmar's products. Yangon and local processing factories in Rakhine cannot compete economically with Bangladesh. For Sittwe, Myebon, Minbya and Pauktaw producers, export to Bangladesh presents lower transport costs, shorter routes with less weight lost and higher selling prices. The change in export tax, from 10% to 2% modified the export routes chosen by traders, with a higher share of the exported *P. monodon* passing through the legal border gate to reach Bangladesh.

Traders in Kyaukpyu township market about 70% of their production to Yangon, due to lower transportation costs and higher prices in Yangon compared to Sittwe. Traders in Kyaukpyu do not have direct access to export and need to export their production through Sittwe, increasing their trading cost.

In all locations, processing is limited to the farm, where farmers remove the heads of the prawns and market headless prawns. Collectors and traders just sort the prawns according to grade and package them for chilled transport. Only one processing company (freezing and packaging prawns) in Kyaukpyu operates in the study area.

Cost and margin analysis shows that operating costs (transport, labor, spoilage and ice) are the main costs for traders and collectors. Producers have to pay a high cost for their loans, which reduces their profit even in case of successful yields. Most of the profit margin is captured by intermediaries, collectors and traders. Investment in equipment is limited, and there is no investment in vehicles. Traders and collectors outsource transportation, thereby avoiding a large capital outlay and informal fees along trade routes. This practice illustrates the reluctance of market actors to invest in fixed assets due to uncertainty about future business prospects. At each transaction, the weight loss is estimated to be 2% to 3% of the value and an estimated 7% of the total value is lost along the market chain.

Traders exporting to Bangladesh face high costs for regulatory fees. In addition to a license fee and waste management fee, traders have to pay an export tax, re-grading at the selling point and agent fee. However, informal fees were not estimated and might represent a non-negligible share of the overall cost. According to traders, most of their margin lies in the exchange rate of foreign currency and re-grading of product.

Term of exchanges and informal loans

The loan system along the value chain reduces farmers' profits with collectors and traders offering a lower price of about 500 to 1,500 MK per viss (300 to 900 Mk per kg). A similar price difference can be observed between collectors and traders in the peak season when supply is important. The price difference is smaller when supplies are low or when demand increases because of competition among traders.

The terms of exchange between farmers and local collectors also includes unfair weight scaling practices and a different grading system. Collectors sort the prawns by size and then sell them to traders according to a grade system different from the one they use when purchasing the prawns from producers. Collectors pay a low price to farmers because they purchase prawns that have not been sorted according to grade. These collectors then sort the prawns and then sell them to traders at a higher price. Similar practices were also reported by traders during their transactions with buyers in Bangladesh.

Scenario and recommendations

During the study, several drivers affecting the prawn sector were highlighted. We classified the drivers into two categories, *Global drivers* related to international markets, prices, export taxes, exchange rates and international sanctions on Myanmar's products; and *Local drivers*, related to climate, access to inputs and knowledge and loan systems within the value chain.

One future (ideal) scenario based on these drivers includes a favorable global environment for prawn sector development, with high demand for exports and lower trade barriers and taxes. At the local level, this scenario would include investment in the value chain in order to increase access to knowledge and inputs. Such investment would support the development of an improved extensive system based on hatchery-reared PLs, with a limited impact on the environment.

This scenario can be achieved in the future but requires investment and transfer of knowledge to the producers. Technical changes will require the modification of the production system, shifting from a traditional system that depends on natural resources to a system based on a low stocking density of hatchery-reared PLs. To enable this change, production units have to be smaller and better maintained, and both pond and water quality have to be improved using fertilizers and lime.

In the meantime, the government should encourage the private sector to invest in prawn production through hatcheries, nurseries and input suppliers. Knowledge and information systems, both for technical and market aspects, need to be improved through various formal and informal networks such as the market chain.

The prawn sector in Rakhine State has been in decline for a number of years. The sector, based mostly on the use of natural resources, needs a deep change in order to grow and benefit the local population. This change will require a shift in production systems that cannot happen without external investment and involvement of the local stakeholders in the sector.

1. Introduction

1.1. SCOPE OF THE MISSION

The scope of the assignment was to analyze the prawn value chain in Rakhine State and highlight opportunities for future intervention to support the development of brackish water prawn farming in Giri-affected areas of Rakhine State. The analysis was carried out with an emphasis on taking into account the entire value chain, from producers to retailers and exporters.

1.2. GEOGRAPHY AND CONTEXT

Rakhine State is located on the western coast of Myanmar along the Bay of Bengal. It includes a total of 17 townships and has 344 miles of coastline. It also includes several islands in the gulf of Bengal and shares a border with Bangladesh to the north (Figure 1).

In October 2010, the area was hit by Cyclone Giri. Around 26,000 persons were affected, leaving 100,000 homeless. The most affected townships were Myebon, Kyaukpyu, Pauktaw and Minbya. It was estimated that 50,000 acres (>20,000 ha) of coastal aquaculture ponds were damaged.

Rakhine State has a high number of households severely food insecure according to the Vulnerability Analysis and Mapping Unit (VAM) of the World Food Programme (WFP). It is estimated that in the four Giri-affected townships, almost 150,000 households are severely food insecure, while more than 350,000 households are moderately food insecure. More than 50% of this population are among the most vulnerable and rely on non-agricultural wage labor. Other findings from the Food Security assessment show that the level of household debt is high in the villages (85% of households) and that lack of job opportunities is a major issue.

The area is characterized by a low population density and has highly isolated villages. These factors result in less trade and lower bargaining power for farmers. The volume of trade at the village level is low, and villagers depend on traders and have high levels of debt.

The fisheries sector is a key sector in Rakhine State, with 43% of the population (out of a total of 3.2 million inhabitants) relying on fisheries or a combination of aquaculture/fisheries and agriculture.

It is estimated that almost 600,000 persons are involved in capture fisheries and/or aquaculture, while 150,000 persons are involved in other stages of the value chain (processing, wholesale, export), including 489 traders registered.

The fishery sector produces 273,043 metric tons of fish, which are mostly consumed locally (55%), while 17% and 8% are exported to other states within the country and to foreign countries respectively. Aquaculture in Myanmar is a dynamic sector with an annual growth rate above 28% for the period 1990-

2008 (FAO 2010). Prawn farming has a specific value chain, with 90% of the production exported to Bangladesh. One of the main constraints of prawn farming is the lack of post-larvae (PLs). In 2011, 3 million PLs were produced by the DoF and an estimated 100 million were imported from Bangladesh. Those PLs were not PCR checked for viruses (white spot virus) and risk contaminating local prawns with the virus.

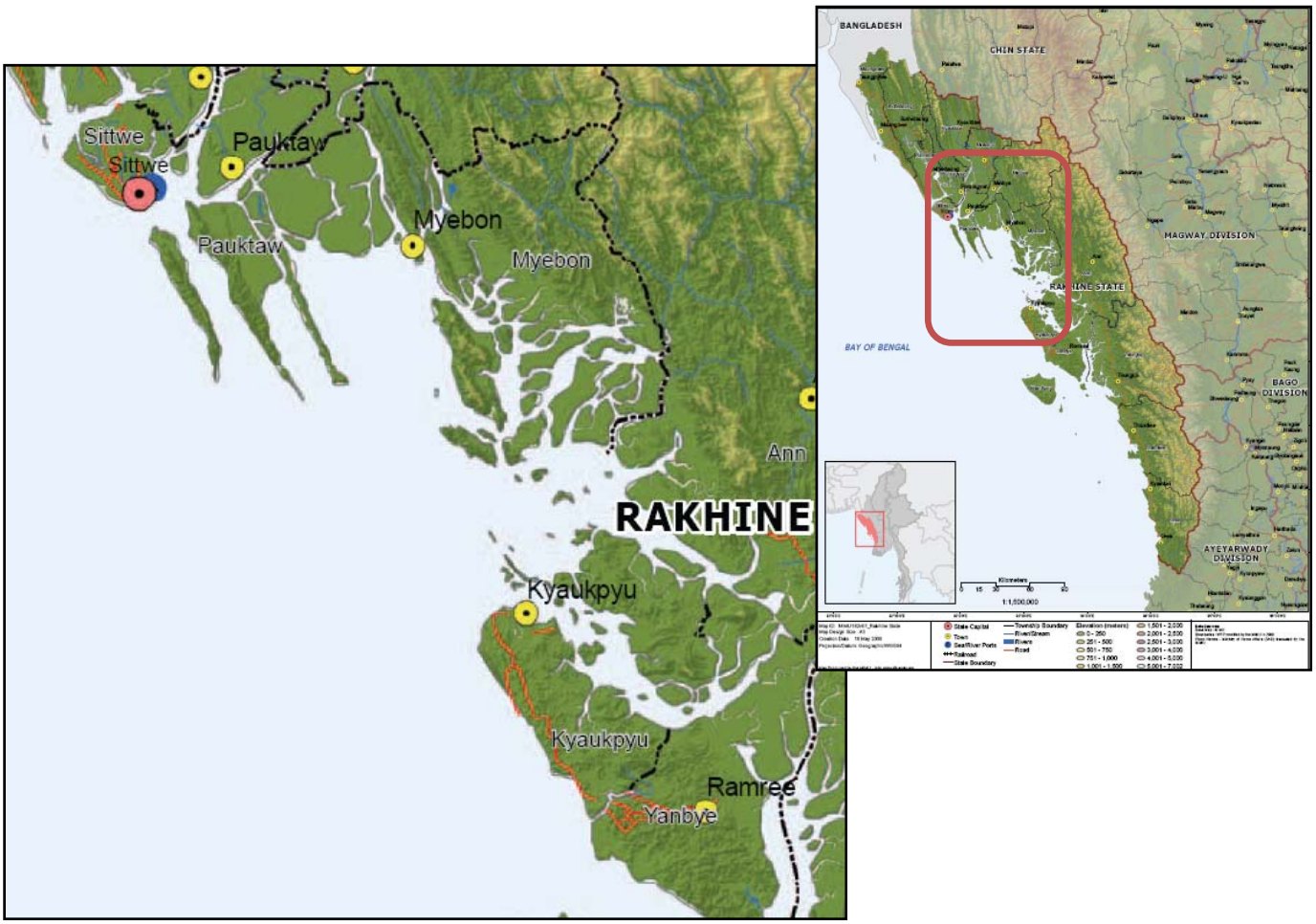


Figure 1: Rakhine State and study area (Source: World Food Program & Myanmar Information Management Unit)

1.3. PRAWN SECTOR IN RAKHINE STATE

The fishery sector is of strategic importance for Rakhine State, and the prawn sector plays an important role in providing exports to Bangladesh. Prawn farming, mostly *Penaeus monodon* (also called Giant prawns or Tiger prawns) started in early 1992, in northern Rakhine State and was gradually introduced to the rest of the state (Maungtaw, Yathitaung, Pauktaw, Myauk Oo, Minbya, Myebon, Kyaukpyu, Yan Byei, Taungok, Than Dwei, and Gwa townships). Rakhine State is the largest area of prawn farming in the country, with more than 330,000 persons involved in the sector.

In this region, prawn farms are characterised by large ponds and farmers follow traditional extensive methods based on self-recruited species. Other prawn species such as *Peaneus indicus*, *Peaneus merguiensis and Metapenaeus sp.,* mud crabs (*Scylla serrata*) and sea bass (*Latescalcarifer*) are other products harvested.

The number of farms increased under the growing influence of foreign investment in the state, mostly from Bangladesh. After a rapid increase of the prawn farming area from 33,598 ha in 2001 to almost 63,000 ha in 2005, the sector showed a decline in 2011, with only 44,425 ha of prawn farms (Appendix 3). Pauktaw is the main production area, followed by other Giri-affected townships Myebon, Kyaukpyu and Minbya[1]. The four townships represent about 24,000 ha of prawn farming, more than 50% of the farmed area in Rakhine State.

The national prawn production in 2011 was estimated at more than 19,000 metric tons, of which 3,778 tons are exported to Bangladesh and Thailand of (DoF Statistics, 2011). Most of these 3,778 tons can be considered as export of *P. monodon* from Rakhine State to Bangladesh. In 2009, prawn production was estimated to contribute 12% of the national prawn production and 18% of the volume and revenue for exportation[2].

In Kyuakpyu township, the prawn farming area declined from 7,000 ha in 2002 to about 1,600 ha in 2011. Similar trends were observed in other townships. According to the DoF, the decline in cultivated area can be explained by a decrease in pond productivity due to the lack of self-recruited species, lack of management techniques and potential disease outbreaks. Prawn farmers also abandoned their ponds because prawn farming was no longer profitable, due to the high cost of dike maintenance, the high cost of PLs on the market and low returns that could not cover the reimbursement of the informal loans contracted.

One of the main issues in the sector is the decrease in natural post-larvae trapped in the ponds. The sector needs hatchery-reared post–larvae. The need for post-larvae for Rakhine State is estimated to be

1 Other important townships for prawn farming are Maungtaw, Ann, Rathedaung and Ponnagyun.

[2] Nilar Myint Htoo. Trade Liberalization and Its Impact on Fishery Sector in Myanmar, PhD Dissertation, Institute of Economics, Yangon, May 2011.

100 million PLs per year according to the Shrimp Farmer Association, while local production is less than 10 million per year.

Prawn farmers in the townships visited were usually at the middle or higher end of the income scale in their villages. With landless households making up 40% to 60% of some villages, prawn farmers owning land are considered "non-poor". Key facts on the prawn sector in Rakhine State are summarized in Table 1.Table 1: Key facts in the prawn sector, Rakhine State

Prawn Sector in Rakhine, Key facts	
Increase of prawn-farmed area in early 2000s	33,500 ha in 2001 to 63,000 in 2005
Decline since 2005 up to now	44,000 ha in 2011
Giri-affected area	24,000 ha of prawn farms, more than 50% of Rakhine farming area
Exported product	*P. monodon*, exported to Bangladesh
Constraints and limits	Lack of access to *P. monodon* post larvae and limited local production (less than 10% of the estimated demand)
Prawn farmers	Not the most vulnerable households in villages. High level of landless households in Giri affected area.
Declining production trends	Lower yield of 50-60% compare to 2002-2005 Declining stock of wild post larvae – lower supply and higher prices on the market

1.3.1. Timeline and changes

To understand the actual trends in prawn farming in Rakhine State, we summarize in the present section the main events in the recent history of the state's prawn farming sector (Figure 2).

1995-2005/07

Prawn farming started in the 1990s. Based on wild seeds trapped in ponds and the natural productivity of the ecosystem, the production was high until mid-2004/05 and then started to decline. During this first period from 1995 to 2005, processing companies were operating in Sittwe and shared the market with processing factories in Yangon. The production systems were based on natural recruitment of post-larvae and stocking of hatchery-reared post-larvae was not common. Prawn farming expanded on the mangrove area, led both by local farmers and private investors. During that period, for newly reclaimed land, land tenure was based on a 3 year land sub-lease[3].

2005/2011

In 2007, after international sanctions on Myanmar's products, purchase prices declined and processing factories in Sittwe ceased operating. The Yangon market was not profitable anymore because of low prices, low demand and high transportation costs. The market was then oriented toward export to

[3] Farmers and private investors leased the land to the land-lease holder for a period of 3 years.

Bangladesh, but only for one product *P. monodon*. Until the export tax was reduced (10% to 2%) in September 2011, most exports flowed through informal routes to avoid the high export tax (10%).

The *P. monodon* yield started to drop due to a decline in natural post-larvae trapped in ponds and the need for hatchery-reared post-larvae or wild PLs caught by local fishermen increased beginning in 2007.

The local hatchery capacity was still very low, and starting in 2008-09 farmers began using imported post-larvae from Bangladesh, which was linked to the export of the adult prawns to Bangladesh. In 2011, 11 million PLs were imported in Pauktaw township alone. In late 2011, Bangladesh banned the export of PLs and strongly enforced the law.

Due to declining productivity and to bankruptcies, sub-land leases were shortened to one year in most cases, resulting in lower investment in pond maintenance by prawn farmers.

The succession of cyclones in 2004, 2006 and in 2010 (Giri) affected the farm economy, with prawn farmers forced to take out loans to repair embankments. These loans put farmers in a less secure situation, and bound them to collectors and traders. In addition, farmers claim (especially in Myebon) that in recent years, abnormally high tides have affected the production of ponds in the rainy season, with floods spilling over embankments and reducing the production of farms. These facts in addition to repeated cyclones have put farmers in a cycle of debts and loans, reducing their investment capacity and farm areas and affecting the entire value chain.

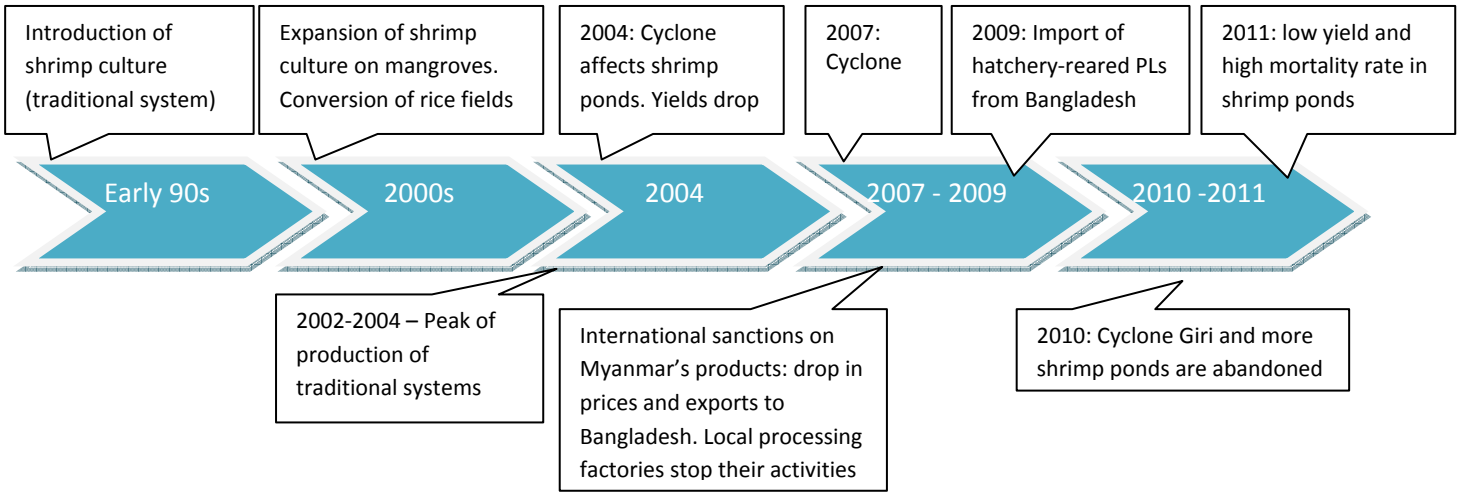


Figure 2: Recent changes in the prawn sector in Rakhine State

1.3.2. Trends

Trends in production and export were assessed through discussion with different stakeholders.

Trends in production

All the farmers and DoF representatives described declining production since the mid 2000s, with estimations varying from 50%-60% lower yields. For farmers using the traditional system, the yield in 2002 was about 80 to 100 kg/ha but in 2011 had declined to 30 to 50 kg/ha. The production had declined by 5 to 10 times compared to the early 2000s.

According to stakeholders, the drop in prawn yield could be explained by various factors:

- Decrease in recruitment of wild PLs of *P. monodon* and other species;
- Lack of investment for pond maintenance (embankments, pond dredging) resulting in shallow ponds;
- Low investment related to high risk of failure with frequent extreme high tides and tropical storms over the last decade;
- Possible prawn disease and high mortality in May (warmest month);
- Mangrove destruction (specifically mentioned in Myebon).

This trend toward lower production was especially pronounced in 2011, which was the year with the lowest recorded production. In some villages visited, 50% of the ponds were considered unsuccessful (negative economic results) that year. However, the role of viruses was not as important as expected with only 10% to 15% of the farms affected by viruses according to the DoF. Local farmers have described symptoms (prawns with red tails or swollen tails) but no virus has been formally identified.

Trends in export

The trend in export and the value chain is illustrated by one trader explaining that before 2005, village collectors reached their maximum capacity in the peak season and were unable to purchase all the farmers' production, while nowadays this situation never happens. Before 2005, during the peak season, one trader was employing 45 people (10 in 2011) and trading more than 10 metric tons in the peak period (less than 2 metric tons in 2011). Another example was given in Myebon, where a trader estimated that the current trade volume is 30% of the volume in 2004 before the decline in production.

Trends in wild post-larvae catch

In Sittwe, ten years ago, PL catchers collected around 100,000 PLs per day, while nowadays the catch is down to 5,000 to 10,000 per day. As a result, the price of PLs in the first stocking season (December and January) is higher. The price of one PL has now reached 18 to 22 MK/PL compared to 7 to 8 MK/PL in 2008-2009 and 1 Kyat/PL before that.

2. Approach and methodology

The team was composed of two researchers in value chain analysis and aquaculture during the period of field work in the area of Rakhine State affected by Cyclone Giri. We visited 4 townships along the cost, including Sittwe, Pauktaw, Myebon and Kyaukpyu to understand the prawn value chain in this coastal region, identify opportunities to improve the value chain, and provide first-hand information for the design of future interventions in the sector.

To gain a better understanding of the sector, we completed a series of focus group discussions and semi-structured interviews with the different stakeholders along the value chain (Appendix 2 & 5). We covered the full range of producers, from small-holder traditional-extensive systems to improved extensive systems used by private investors. In addition to field visits in Rakhine State, other stakeholders in the prawn value chain who are located in Yangon were also interviewed.

Data was collected from each participant or actor within the chain. These data include the costs of production as well as sale prices at the various exchange points as the prawns moved from the hatchery to farmers, collectors, traders, and ultimately export or processing companies.

The data were used to determine the average of costs of transportation; the use of inputs such as feed, lime, and fertilizer; the costs of processing; and, all labor throughout the chain.

The list of stakeholders met is presented in Table 2.

Table 2: List of the stakeholders interviewed during the study

Stakeholders	Nbr	Location
Farmers (individual interviews & group discussions)	33	Sittwe, Myebon, Pauktaw, Kyaukpyu
Post-larvae traders/importers	2	Sittwe
Hatcheries managers and Technicians	2	Sittwe and Kyaukpyu
Village collectors	6	Pauktaw, Myebon
Traders	10	Sittwe, Pauktaw, Myebon, Kyaukpyu
Processors	1	Kyaukpyu
Exporters/transporters	1	Sittwe
Central DoF (Yangon) and Association	2	
Rakhine DoF	4	Sittwe, Pauktaw, Myebon, Kyaukpyu
International organizations & NGOs	4	Sittwe, Myebon

Since the data was not derived from a statistically representative survey or from controlled experiments, they should be seen as indicative of costs and returns in the sector. We cannot calculate confidence intervals and levels of significance for these data, but they do suggest the potential for redistribution of returns throughout the value chain.

3. Prawn farming

3.1. PRODUCTION SYSTEMS

Even if the DoF recognizes 2 main production systems, namely i) the traditional system locally called "Trap and Hold" and ii) the improved extensive system, observation in the field shows that the differences between these systems are not important and that a typology based on the size and the type of landowner is more accurate. Stocking density is low in the improved extensive system; no inputs are used in the system; and there are no other major technical differences between the two systems. The decision to stock PLs depends more on the avaiablility of PLs on the market and the investment capacity of farmers than on technical choices. Even when stocking PLs, farmers will exchange water and trap wild PLs in their ponds. The technical differences between the sytems are not important and the reliance on wild PLs is still great in the improved extensive system. In addition to the two systems, an alternate rice-prawn system is found along the coastal area, in ponds where the elevation allows drainage of brackish water in the rainy season.

One common characteristic of these prawn farms is that the ponds are large (several hectares) and shallow, with more than 80% of the area between 30 and 70 cm deep and the remaining area more than 90 cm deep. These ponds are naturally flooded with the tide during the rainy season, but only part of the pond is flooded and used to raise prawns in the dry season. Farmers do not dry the pond or catch predatory fishes in most cases.

All the ponds are tidal systems (no pumping), surrounded by embankments, with one or more sluice gate connecting the pond to the river estuary. Sluice gates are made of wood and are operated so as to allow the exchange of water and recruitment of juveniles during high tide. Adult prawns are captured at the sluice with nets during spring and nip tide (every 14 days), corresponding to the lunar cycle. The harvest period occurs over 4 to 5 days before and after the full and new moons (spring and nip tide respectively). The full moon period is the most productive. *P. monodon* is the main product due to its high price on the market, but other prawn species (*P. indicus, P. merguiensis* and *Metapenaeus sp*.) are also harvested and sold at lower prices. In the case of stocking PLs, the grow-out period to achieve marketable size is between 3 to 4 months. Processing is done on the farms, where farmers remove the heads before selling the prawns to collectors or traders. There is no control of predatory fish besides fishing with cast nets and using brush parks (aggregating devices) in the ponds.

We distinguish between two main production systems, prawn monoculture and alternate rice-prawn systems:

- In *prawn monoculture*, the production period is all year long, with the peak period of production usually occurring from April to August. The dry season is used to repair the dikes and embankments, as water levels are lower in the ponds. The peak periods for natural recruitment of PLs are in November/December and March/April. Investment is limited to wage labor and

maintenance of sluice gates and embankments. Farmers limit their investment due to the high risk of cyclones and high tides.

- In an alternate *rice-prawn system*, rice culture from July to October is followed by prawn culture in the rice fields from November to June. Farmers can trap wild seeds in the pond and also stock additional PLs in the pond. Usually, only the lower part of the rice field is used for prawn culture.This system is popular in Minbya townships, where 30% of the aquaculture follows this system, and in Myebon and some villages in Pauktaw.

Since the difference in technique and input usage is not important (with no land preparation, use of lime or fertilizer in all cases and continuous exchange of water), we develop a typology of production systems based on land holding, with 3 main groups: i) small- and medium-scale farmers with farms from 5 to 50 acres (2 to 20 ha); ii) large local landowners with a farmed area between 50 and 200 acres (20 to 81 ha) and iii) large private investors with a farmed area above 200 acres (more than 81 ha).

3.1.1. Small- and medium-scale landowners

The smallholders operate ponds of 5 acres (2 ha) to 50 acres (20 ha), either prawn monoculture or rice-prawn systems (Table 3). The farms can be entirely owned by an individual or be a collective investment of 2 to 4 households.

The technical management of the pond is limited by the farmer's investment capacity and no inputs are used (no fertilizer or lime). In some case, when the land is at higher elevations, farmers can dry the pond every 2-3 years, but without dredging or sediment removal. Stocking wild post-larvae happens according to investment capacity, but at a very low density, below 1.5 PL per m^2. Such low stocking densities are partially explained by the high cost of PLs in 2011. Fifty percent of the farms did not stock any PLs in 2011. The productivity of this system is low, between 20 and 70 kg of *P. monodon* per hectare. The peak harvest is from April to July and another period from October to November in prawn monoculture systems. *Penaeus sp.*, *Metapenaeus sp.*, mud crabs and fish such as sea bass caught in the pond can make up a substantial part of the farm economy even if farmers are targeting *P. monodon* as a species of high value. Pond operation is based on family labor on smaller farms and one to three salaried workers on the largest farms.

The marketing is done through a collector at the village level, and farmers can have access to cash advances from the collector in order to invest in pond preparation.

3.1.2. Large-scale landowners

These systems are characterized by large farms of more than 20 ha owned by village-based landowners with several owners combining their investment capacity to operate large prawn monoculture ponds.

In these farms, the stocking density is between 0.5 and 2.5 PL/m^2, with multiple stockings (2 to 10 times). The stocking period varies according to the availability of PLs and the farmers' investment capacity, with a first stocking in January early in the dry season and a second stocking in May. Most of the PLs are wild PLs purchased from an agent or imported from Bangladesh. Forty percent of the farmers do not stock any PLs. The decision about whether to stock is based on the cost of PLs,

availability on the market, knowledge of stocking and the qualiy of available PLs. The productivity of these ponds is not high and varies between 15 and 50 kg per ha (*P.monodon*), with the peak harvest period from April to August during the spring tide.

These farms are operated by 2 to 4 salaried workers, paid 20,000 to 30,000 MK per month (plus meals). The workers can harvest and market by-products (crabs and fish), but all types of prawns are marketed by the pond owners. Marketing is done through village collectors or larger traders. Some large farms are not fully operational due to the owners' lack of investment capacity and the decline of prawn yields over the past few years.

3.1.3. Large-scale private investors

These farms are around 200 ha, on land that was reclaimed in the late 1990s and early 2000s. The land is leased by private investors who invest in land clearing, embankments and sluice gates. Investors purchase hatchery-reared PLs produced locally. Also, imported PLs were popular in 2009 and 2010 due to their low cost and availability. PLs can be stocked in nurseries where predatory fishes have been cleared. The stocking density is low, from 0.5 to 3 PL/$m^2$and the average yield per hectare was estimated between 11 to 200 kg per ha[4]. However, this range is based on a small sample size with extreme examples, including a successful and an unsuccessful farm. Production is directly marketed to traders but also exported to Bangladesh during the peak season, when the volume harvested is sufficiently large. These farms are operated by 8 to 20 salaried workers. In addition to their salaries, workers can harvest crabs, fish and other prawn species in the pond.

Compared to 2002/2003, the yield has declined by 50%. Since 2008-2009, farmers have had to process the prawns (remove the heads) and transport the material. Before, processing companies purchased the prawns directly from the farm and covered the transportation costs.

Table 3: Characteristic of the different prawn farm types

	Small Medium Scale	Large scale landowner	Private Investor
Farm size (ha)	0.5 to 20	20-50	50- 215
Production system	Rice-prawn Prawn monoculture	Prawn monoculture	Prawn monoculture
Water management system	Sluice gate - Tidal	Sluice gate - Tidal	Sluice gate – Tidal
Stocking density (PL/m2)	0 (50% of the farms) <1.5 PL/m2	0 (40% of the farms) 0.5- 2.5 PL/m2	0.2 – 3.5 PL/m2
Origin of the post-larvae	Natural recruitment Wild PLs & Imported	Natural recruitment Wild PLs & Imported	Natural recruitment Wild PLs, Imported & Local Hatchery
Labor force (person/ha)	0.45	0.1	0.1
Average yield (kg/ha) (2011) ***P. monodon***	20-70	15-50	66
Average yield (kg/ha) (2011) ***Other prawns***	20-100	15-70	(not estimated)
Location Specificity	All townships	All townships	Pauktaw; Sittwe

[4] Yield variation is great due to low sample size and differences in 2011 results, between a successful farm stocking PLs at a stocking density above 2.5 PL per m^2 and an unsuccessful farm with a system based on lower stocking density (<1 PL per m^2.

3.2. ECONOMIC RESULTS AND PROFITABILITY

Table 4, summarizes the economic results of the different production systems found in the study area. Data in the table indicate the average cost, revenue and net income for each farm type. However, these results are indicative only, due to the sample size.

Table 4: Economic results of the prawn production systems (in '000 MK). Standard deviation is presented in parentheses.

	Small medium scale	Large Scale landowner	Private Investor
n	11	9	3
Operating Cost per ha			
Post-larvae	38	53	91
Labor	69	48	69
Inputs	0	0	0
Transportation	0	3	47
Fixed Cost per ha			
Taxes	1	1	6
Informal costs	0.5	0.5	1
Dike maintenance	83	93	83
Equipment depreciation	4	3	14
Total cost (farm average)	*1,896*	*5,275*	*45,866*
Total cost per ha	*196 (127)*	*200 (92)*	*307 (174)*
Revenue from P. monodon per ha	239 (143)	236 (134)	706 (733)
Net income per year and per ha	38 (121)	52 (113)	399 (574)
Net income per year and per ha (including other aquatic organisms)	78 (134)	71 (104)	399 (571)

Results are based on estimated production during the peak and low season and based on the average price of the main prawn size harvested. In addition, the cost of informal fees and loans and interest rates were difficult to estimate, as well as land lease fees. Operating costs include the cost of post-larvae

(in case of stocking), labor costs (seasonal and permanent workers, excluding meal costs), the cost of other inputs (fertilizer or lime) and transportation costs.

Fixed costs include taxes. Farmers pay 300 MK per acre to the DoF annually, a land tax of 100 MK per acre and additional informal taxes. In addition to the prawn farming tax, large farmers employing permanent workers have to pay a tax of 500 MK per employee per year. Prawn farmers have to pay the Internal Revenue Tax, which varies for each farm (between 3,000 and 7,000 MK for small- and medium-scale farmers). However, we did not take into account the Internal Revenue Tax, since it was extremely variable according to farms and data was not always accessible.

Fixed costs include also the average yearly expense for dikes and sluice gate maintenance and the depreciation of other equipment (baskets, shelter). Net income per year and per hectare includes a calculation based on i) *P. monodon* only and ii) *P. monodon* with other aquatic organisms harvested in the pond.

Results presented are based on the 2011 season, which was severely affected by high mortality in May. Therefore, most of the economic results are relatively low and are highly variable for each farm type, with a very high standard deviation.

Small and medium landowners have a very low economic return from *P. monodon* due to low yields. Their operational costs are high, due to labor costs and the high cost of post-larvae, with a unit price between 8 and 15 MK (Figure 3). The amount of labor per hectare is high compared to other farm types and the labor cost represents about 35% of the total cost. Equipment and maintenance of dikes is the most significant cost, accounting for more than 40% of the total. Maintenance of the sluice gates represents 70% of that cost, due to the high price of the wood and the need for yearly maintenance. In recent years, the maintenance of sluice gates has been limited by the investment capacity of farmers. According to farmers, the maintenance of dikes and sluice gates varied from 40,000 to 125,000 MK per ha. The cost also depends greatly on the length of the dike adjacent to the river and the number of sluice gates. The number of abnormal tides and cyclones increased the maintenance cost for all farm types.

Within our sample, 66% of the farms presented positive economic results and 40% of the farms suffered from severe mortality of *P. monodon* with yields below 30 kg per ha. On those farms, other prawns, crabs and fish harvested can be crucial for the farm economy. Other aquatic animals harvested can represent up to 80% of the revenue provided by *P. monodon*, particular*ly* in Myebon or Kyaukpyu where *Metapenaeus sp.* yield was high. More than 50% of the farms were in debt to local collectors or money lenders, with amounts varying from 0.2 to 12 million MK.

Large-scale landowner farms are operated by several landowners combining their investment capacity to increase the cultivated area. The stocking density on such farms is higher than on small holder farms, with a higher cost per surface unit. Their labor cost is lower compared to smallholders due to a lower number of employees per hectare and a lower salary paid to laborers compared to private investor farms. Transportation costs are higher when marketing of prawns is done in different villages or in the

township center. However, the total cost per hectare is similar to smaller farms and these large-scale farms differ mostly by their size, with their total cost being 3.5 times higher because of the size difference. Other prawn species harvested can represent 30% to 90% of the revenue from *P. monodon*.

Within our sample, 30% of the farms were affected by severe loss in 2011 and 50% of the farms were not economically sustainable based only on *P. monodon* culture. Farmers were in debt for 3 to 12 million MK.

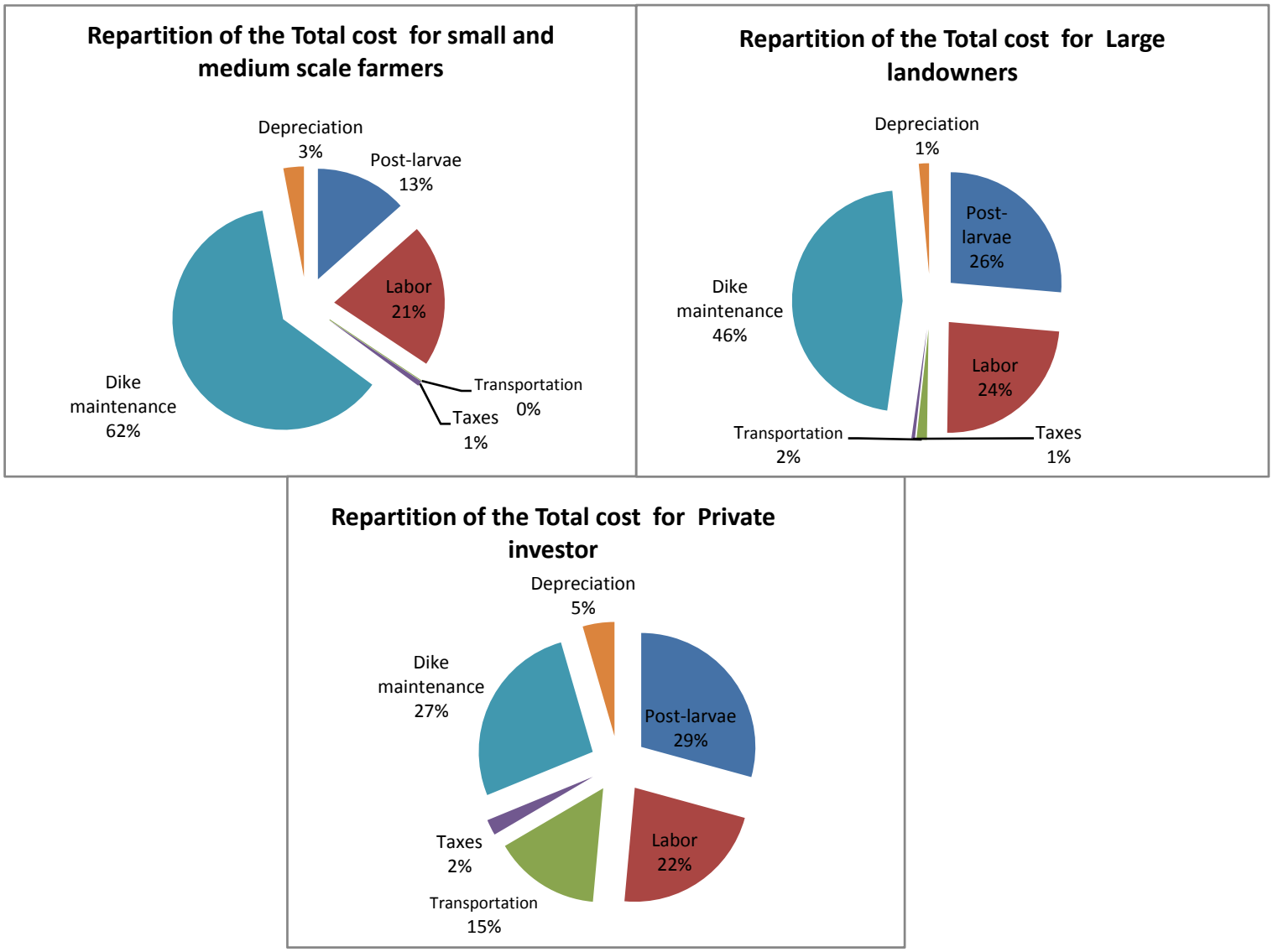


Figure 3: Repartition of the total cost for the different farm types

Private investors operating large farms receive the best economic results compared to other farm types. However, these results are based on a very small sample (3) including relatively successful farms (2) and are only indicative. One farm was successful with higher investment in pond management and stocking density, while other farms presented lower financial results. These large, private farms have higher operating costs with higher stocking densities and labor costs, counting for 29% and 22% of the total cost respectively. The cost for dike maintenance varies greatly according to the equipment used (wage labor or bulldozers), from 40,000 MK/ha to more than 135,000 MK/ha and represented 27% of the total cost on average. Compared to other farm types, the transportation cost to traders in town is estimated to be 15% of their total cost. Farm revenue from *P. monodon* is important for private investors compared to other farms due to higher production per hectare (up to 200 kg/ha), but according to our sample, variability is great and losses can be substantial given the larger area cultivated. Of the 3 farms visited, 1 presented negative economic results with reduced investment and reduced farmed area compared to the previous years, while 2 other farms were successful and showed higher investment in land preparation, dike maintenance and higher stocking densities.

The economic results related to these extensive systems show that most of their investment is for dike maintenance and wage labor and that little investment is for inputs and pond preparation. The farms also rely on other aquatic resources for their financial sustainability. Other prawns, crabs and fish act as a safety net for small- and medium-scale famers. However, most for these farms are highly in debt, which explains the high number of abandoned ponds in the study area.

Most farmers focus their investment on dike maintenance, since the dikes and sluice gates are damaged by high tides and storms. The financial capacity of the farms is limited and farmers lack the ability to invest in stocking PLs or in additional inputs to improve the pond and water quality. To maintain the dike system, farmers are forced to contract loans from local collectors.

3.3. CASH ADVANCE & LOAN SYSTEM

Farmers do not have access to formal loans from the Myanmar Livestock and Fisheries Development Bank and are forced to use informal credit. In practice, the bank does not accept prawn farm land titles or land lease contracts as collateral. Prawn farmers have to take out informal loans from the private sector. Traders and collectors are the main loan providers to prawn farmers. Loans vary from 0.2 to 12 million MK (for small- and medium-scale land holders), without interest. The loans are provided to farmers in exchange for lower sale prices and for the obligation to sell the prawn harvest to the collector or trader. The terms of the loans are based on the grow-out period, ranging from 4 to 6 months. In prawn monoculture systems, cash advances can happen several times per year, with partial or total

reimbursement before each additional advance. At the village level, farmers can take out a second loan from collectors when crops fail.

Farmers can accumulate debts to collectors, but they also need loans from local money lenders (3% with gold collateral or 10% without collateral) or they need to accept new shareholders to cover the investment needed for crops. To illustrate the amount of money owed by prawn farmers, in one village in Myebon, all prawn farmers are in debt (between 1 and 12 million) and obliged to pay up to 2% interest per month.

Larger traders also provide loans or advance payments to private investors. In these cases, the loans can be over 100 million MK. In these cases, there is no yearly reimbursement, but farmers must agree to sell their full yield to the loan provider.

3.4. LAND ACCESS

Land tenure was not investigated during this study. However, it seems to be an important factor for investment in prawn pond maintenance and operation. Small holders and village-based farmers have the use of their rights, but land tenure is more complex for private investors operating large farms. These large prawn farms were established on reclaimed mangrove land during the prawn expansion and in most cases there are no land titles.

Land tenure is not secure and investors lease[5] the land for short periods of 1 to 3 years. Therefore, farmers investing in these land leases cannot invest in improving embankments or dikes due to the short period of the leases. According to the president of the Prawn Farmer Association in Sittwe, this situation affects 90% of the ponds in the northern part of Rakhine State, including northern Rakhine State but also the Sittwe and Pauktaw areas. In southern areas, the proportion of leased land is lower and more local villagers are involved in prawn farming.

[5] Lease varies from 5,000 MK to 50,000 MK per acre and per year.

Main characteristics of production systems are summarized in Table 5.

Table 5: Key facts about prawn production systems in the study area

Prawn production systems, Key facts	
Production systems	3 main types of prawn farms differentiated by their size: *i) small medium-sized (<20 ha); ii) large landowners (20-50 ha) and iii) private investors (50-215ha)* Similar techniques used, with low inputs and stocking density High reliance on wild PLs trapped in the ponds April to August is the peak production season
Economic results	High cost of labor as well as dike and sluice gate maintenance for small- and medium-scale farms Lower labour cost for larger-scale farms due to a lower ratio of people per hectare High production cost for private investors due to higher investment in equipment, inputs and additional transportation costs Other aquatic organisms harvested in ponds (prawns, crabs, fish) can represent more than 50% of the revenue for small- and medium-scale farmers
Loans & debts	Most of the prawn farmers are in debt to traders and collectors and/or money lenders: • Prawn farmers do not have access to formal loans • Prawn farmers take cash advances from collectors and traders to finance their operational cost, sometimes with a 2% interest rate • Prawn farmers accumulate debts and need to take out loans from money lenders with interest (3%)

4. Prawn value chain

4.1. DESCRIPTION OF THE VALUE CHAIN AND THE FLOW

In the *P. monodon* value chain, the main product traded and exported is headless chilled prawns. A small percentage of the production is still processed in Kyaukpyu. The production areas are in Myebon, Mienbia, Pauktaw and Kyaukpyu. However, all production transits through either Sittwe, Minbya or Kyaukpyu. Most of the production (around 90%) is destined for Bangladesh and Yangon (Figure 4).

The peak export season takes place from May to August during the rainy season. The dry season is characterized by a lower export volume, and during that period prices are higher. Also, townships closer to Bangladesh (Sittwe, Pauktaw, Minbya) have a comparative advantage when exporting to Bangladesh.

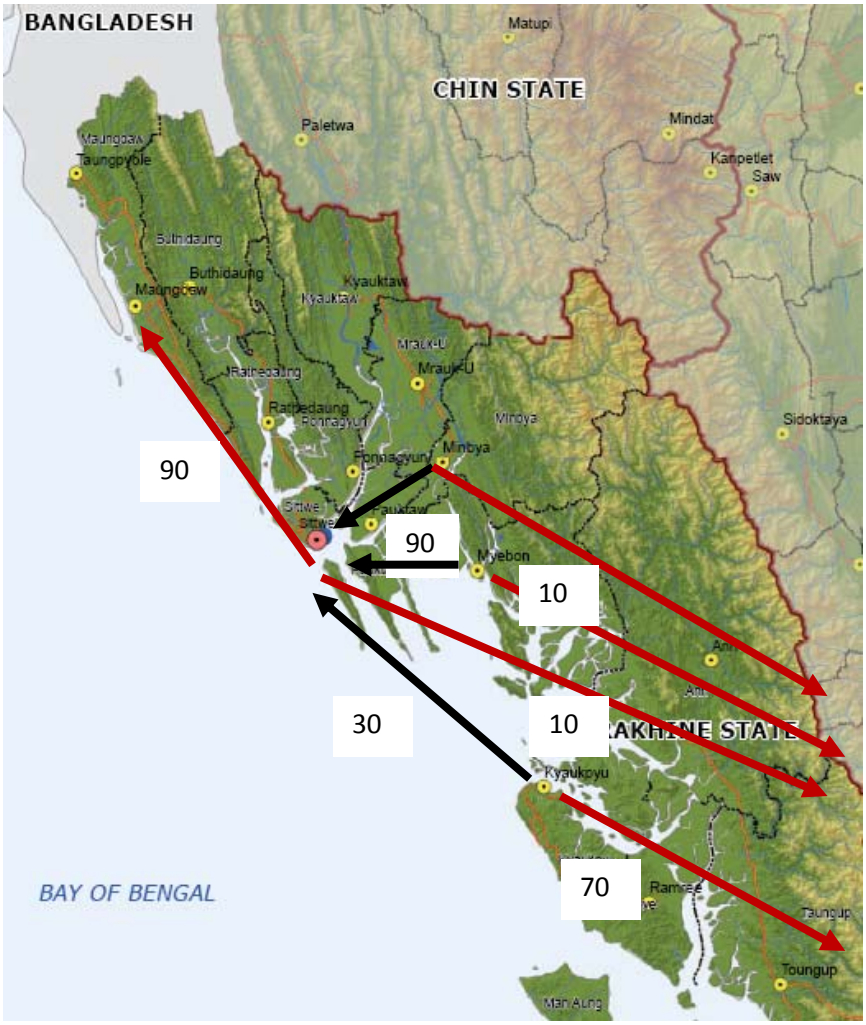
Export to Bangladesh takes different routes: sea or river and road via Maungtaw. Sittwe and Maungtaw are the official border gates.

The prawn value chain in Rakhine State is characterized by the following actors, who are classified by their geographic location: rural or urban (Figure 5).

4.1.1. Rural Stakeholders

- *Producers*: small- and medium-scale landowners, large landowners and private investors (*see section 3*).
- *Collectors*: located in villages, they provide cash advances to farmers. They are linked to larger traders in towns and offer a price lower than that of the urban market. They in some cases retail PLs at the village level.
- *Wild prawn PL collectors:* are found mostly in villages on the coast in Sittwe and Pauktaw[6], where villagers collect prawns during the spawning season and sell them to wild post-larvae depots in the villages.
- *Wild prawn PL depots* are located in villages along the coast where prawn post-larvae are abundant (Sittwe, Pauktaw); some households collect the post-larvae and store them for a few days (2-3) to sell them to agents or directly to farmers.
- *Wild prawn agents* purchase PLs from wild prawn depots and retail them at the village level to farmers.
- *DoF Hatcheries* (2 actually in operation in the study area, 3 in total in Rakhine State).

[6] In Myebon, collectors are not present due to the lack of a market and the difficulty of sorting the different species of post-larvae shrimp.



To Yangon

Figure 4: Estimated percentage of the volume flow of *P. monodon* between Sittwe, Myebon, Minbya, Kyaukpyu, Bangladesh and Yangon in 2011, based on key informant interviews. Value represents the percentage of the volume sent to Sittwe, Bangladesh (Maungtaw border gate) or Yangon for each township. Red arrows represent export outside of the state and black arrows inter-state flows.

4.1.2. Urban stakeholders:

- *Traders & exporters* operate small-scale enterprises. In Switte, there are a total of 45 traders, of different sizes, with less than 10 traders that regularly export to Bangladesh. Four are located in Myebon, trading with Sittwe or Minbya. Eighty traders operate in Kyaukpyu, but only 10 collectors from Kyaukpyu transport to Yangon or Sittwe depending on the market situation. Traders aggregate the production from different farmers and collectors at the village level. They either export directly to Yangon or to Bangladesh or sell to larger traders in Sittwe for export.
- *Export license holders.* Two companies in Sittwe hold a license for exporting prawns to Bangladesh. All other traders have to use these two licenses for exporting. These traders act as transporters (service providers), charging a transport fee for each box shipped to Bangladesh. The transporters also trade and export prawns for their own companies.
- *PL importers and agents* import the PLs from Bangladesh using the exporter's means of transportation and sell the PLs to agents and farmers directly. The importers have a direct connection with agents and/or hatcheries in Cox Bazaar in Bangladesh.

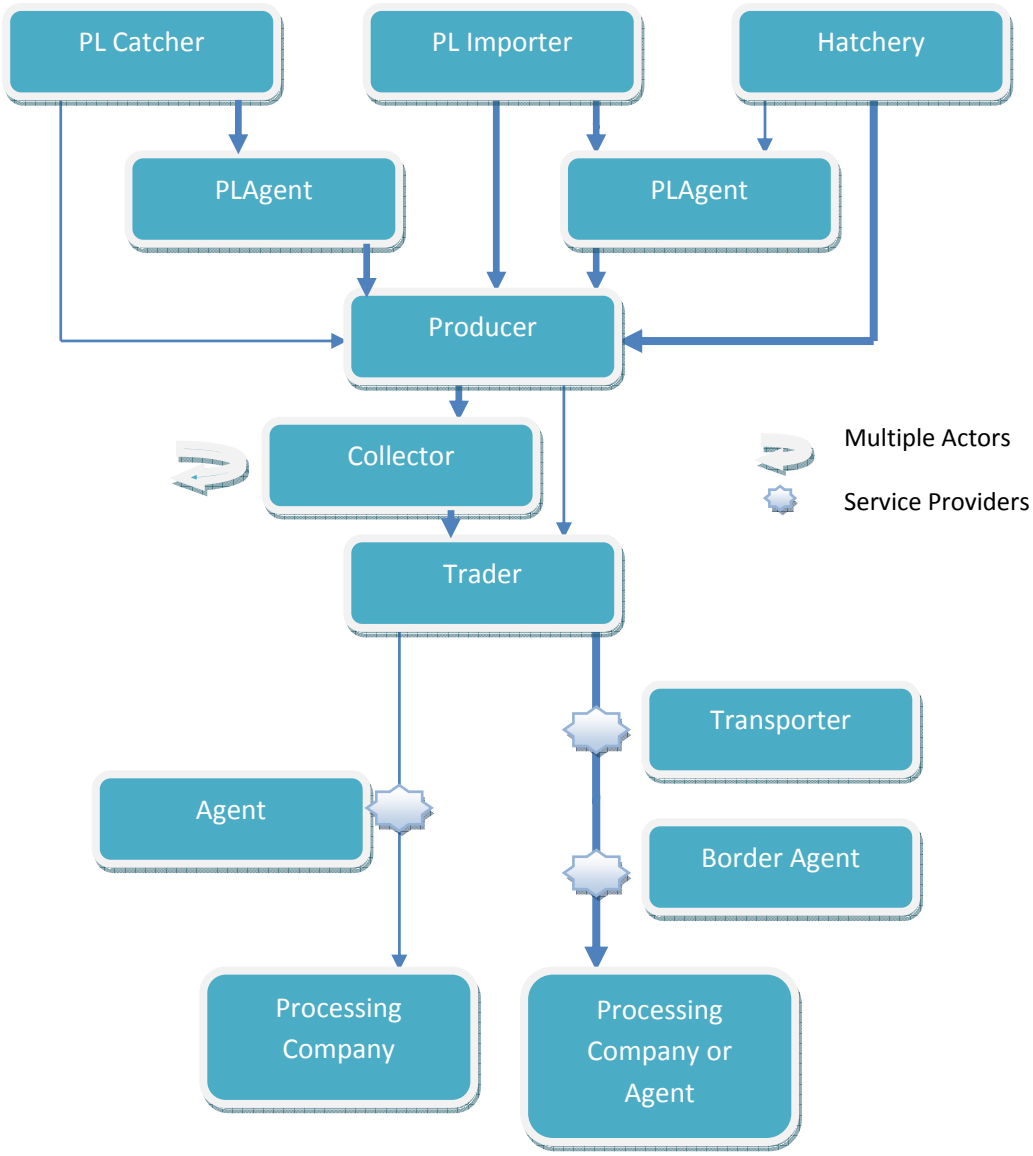


Figure 5 : Schematic description of the prawn value chain in Rakhine State

4.2. POST-LARVAE SUPPLY AND SUPPLIERS

According to the DoF, 100 million of PLs per year are needed, while the production from hatcheries in Rakhine State is estimated at 6 to 10 million PLs, covering less than 10% of the demand.

PLs stocked in production ponds are purchased from 3 main sources, with different prices and availability on the market (Table 6):

- Hatchery-reared PLs in Rakhine;
- PLs collected in river estuaries and on coastlines;
- Imported hatchery-reared PLs from Bangladesh.

Table 6: Price of the *P. monodon* post-larvae in Rakhine State (2012)

***P. monodon* post-larvae price**	**Kyat per piece**	**Availability**
Hatchery DoF (Myanmar)	4 - 7	November to March
Wild PLs	7-18 (up to 22)	Peak in September to November & March to May
Imported PLs	3- 7 (up to 14)	November to January (2010)

4.2.1. Hatcheries in Rakhine State

In 2011, there were 3 operating hatcheries in Rakhine State operated by the DoF: 1 in Sittwe, 1 in Kyaukpyu and 1 in Maug Taw townships. Another one, located in Pauktaw, was damaged by Cyclone Giri. Each of these production units can generate about 2 million PLs per year. In Rakhine State hatcheries, a PCR check for viruses is possible on hatched PLs in Yangon, but it is costly and brood stock cannot be tested.

In 2012, the hatchery in Sittwe had a target production of 5 million PLs per year, with new investment allowing production in December, which coincides with the peak demand (see Box 1). The Kyaukpyu hatchery is actually producing PLs for producers located in other townships, since the demand in Kyaukpyu is low. Only 1.5 million PLs were produced in 2011, while a production of 5 to 10 million PLs could be reached. The capacity of the hatchery is underutilized due to marketing constraints. The hatchery can produce PLs only if there is an order from buyers. The transport cost from Kyaukpyu increases the price to 9 MK per PL and buyers are wary of the risks caused by transport.

According to the DoF the main reasons for the low number of private sector hatcheries are:

- High production cost due to the cost of electric power (diesel) and concurrence of imported and wild PLs;
- Lack of disease control equipment;
- Lack of knowledge and competent technicians.

The government wanted to develop private investment for hatcheries but has been unsuccessful since the semi-private hatchery in Pauktaw stopped after Cyclone Giri. A similar attempt by private investors to hire facilities and staff was made in Maungtaw in the early 2000s without success.

Such initiatives require a basic investment of about 20 million MK and additional operational costs of 6 to 7 million MK, for a similar annual net revenue. However, investors acknowledge that maintenance is difficult due to problematic access to equipment and inputs[7]. Because of Cyclone Giri and the concurrence of imported PLs from Bangladesh, the hatchery in Pauktaw stopped operating.

Box 1: DoF Hatchery in Sittwe

The hatchery has been in operation since 1999 and produced 2.63 million PLs in 2011. The target production is 5 million PLs in 2012, since an improved heating system allows production in winter (December).

The demand for PLs starts in October/November after the rice harvest in townships and villages that follow a rice-prawn production system. The hatchery cannot produce PLs before November due to lack of brood stock and bad weather conditions. Access to brood stock is still easy but the catch has declined by 50% since early 2000. The production usually stops in April, when wild PLs are abundant.

The operating cost is about 4-5 million MK to produce 1.86 million PLs. The main cost is the artemia[8] representing more than 2 million MK and diesel which represents 1 to 1.5 million MK.

The demand for PLs is high and according to the hatchery manager, they could produce and sell 10 million PLs, because PLs from the wild are not available all the time and PLs imported from Bangladesh are of lower quality. In 20011, the hatchery had 30 regular clients (from Minbya, Myebon and Pauktaw) and most of the farmers ordered the PLs in advance.

[7]The same private investor estimated that producing 20 million PLs would require an investment of 40 to 50 million MK for a new facility and access to good quality inputs and equipment.
[8] Artemia nauplii (larvae) are used to feed *P. monodon* larvae.

4.2.2. Wild PL catchers and depots

In Myanmar there is no enforced ban on catching wild PLs. Since the demand is high, this activity has become popular is some coastal areas of Rakhine State, especially in Sittwe and Pauktaw townships.

There are two main peak seasons for wild PLs, from September to November and later from March to May. However, the catch has been declining since 2005/2007 and from September to November 2011 the number of PLs caught by local fishermen was low.

Local villagers are catching PLs on the sea shore everyday using push nets or seine nets and they sell their production to a village depot. In the peak season, these depots trade an average of 80,000 to 100,000 PLs per day. They can store the PLs for a maximum of 2-3 days in plastic tanks without any oxygen supply, just by changing the water frequently. The maximum capacity of the depot visited was about 180,000 PLs.

The depot visited worked with a maximum of 100 catchers. The depot provides the net (20,000 MK) to the PL catcher who repays the cost of the net over the course of the season. The buying price is 2.5 to 3 MK per PL and the sale price is 4 to 5 MK per PL in the peak season and reaches 18 to 22 MK per PL in the low season (December to February 2012).The depots sell the PLs to farmers and agents who provide advance payment.

According to the depot owner, the number of PL catchers is lower than before since the activity is less profitable and poor villagers prefer to be involved in wage labor activities.

4.2.3. PL importers& agents

The DoF estimates that around 20 million PLs are imported per year. The lower production cost in Bangladesh makes them very attractive on the Myanmar market, especially during the peak demand period, when the supply from hatcheries and wild PLs is insufficient.

Three different qualities of PLs are available in Bangladesh (3 MK/PL; 2 MK/PL and 0.5 MK/PL). According to importers, an agent in Bangladesh checks the quality of the PLs (by PCR). The transport cost is estimated at 0.6 MK per PL, using a transporter to move the PLs between Bangladesh and Myanmar. One importer could import 14 Million PLs in a year and sold 60% to 3 to 4 agents. The rest of the volume is purchased directly at the landing site by farmers who order PLs in advance. Later, agents retail the PLs to farmers at a higher price (up to 14 MK/PL). Agents can store the PLs in nurseries for a few days and sell small quantities to farmers including farm delivery.

In late 2011, the Bangladeshi government banned the export of PLs and the volume imported has now been reduced to a minimum, which explains the high price of wild PLs in February 2012 (up to 22 MK/PL) and the difficulties faced by farmers who want to purchase PLs for the latest crop.

In addition to importing PLs from Bangladesh, Myanmar also exports brood stock to Bangladesh to supply hatcheries.

Main characteristics of the *P. Monodon* post-larvae market and accessibility by producers are summarized in Table 7.

Table 7: Key facts about *P. monodon* post-larvae in the study area

Market	High demand (100 million PLs) and low availability, resulting in higher prices
Local hatchery	High production cost and low technical capacity Limited local production capacity, covering less than 10% of the demand No market access to local small scale farmers
Wild PLs	Declining catch High price in low season (dry season December to March)
Imported PLs	Widely used in 2009 - 2011, but not accessible on the market anymore in 2012 Low production cost and low market price No quality control and potential infection by viruses.

4.3. PRAWN FARMERS, TERMS AND CONDITIONS FOR EXCHANGES

Prawn farmers can either sell their production to collectors at the village or directly to traders in urban centers (Sittwe, Myebon or Minbya), according to their location and volume of production. Large private investors operating more than 200 ha can export their production, adding it to other shipments to Bangladesh. This requires high volume and happens only during the peak harvest season.

Small- and medium-scale farmers in villages sell their production to local collectors (see section 3.3). Farmers are usually bound to a local collector through cash advances provided at the beginning of the season to finance embankment and sluice gate maintenance, but they do not have to provide any collateral. The cash advance is usually without interest, though in some case, when the amount advanced is large, 2% interest per month is applied. Collectors fix the buying price, usually 500 to 1,500 MK per viss below the market (or 300 to 900 MK per kg). Also, collectors were reported to use different weight scale units, with an estimate loss of 5 to 10% according to farmers. In addition, in remote villages collectors employ a different grading system, using inches instead of the usual grades applied. Collectors sort the prawns by size and sell them to traders using the commonly used grades (number of pieces per 450 g, Appendix 6).

Some famers prefer to take a loan from a local money lender with a 3% interest rate instead of the cash advance from the collector. In some cases, the collectors charge the future post harvest loss to the farmer, with 3% of the weight added but not paid by the buyer.

For large-scale farmers in contract with traders, the cash advance can be substantial but without interest. In this case, the traders fix the buying price but no different weight scale system or grading system was reported.

4.4. COLLECTORS AT THE VILLAGE LEVEL, TERMS AND CONDITIONS FOR EXCHANGES

Collectors operating at the village level are usually prawn farmers or native from the village. More than one collector usually operates in each village. There are multiple layers of collectors, with a main collector covering several villages with different sub-collectors. Village collectors trade between 500 kg to 5 tons during the peak season. The necessary equipment consists of little more than 6 to 10 containers, weight scales and few seasonal hired laborers during the peak period of production.

Where communication is poor, information sparse, and transportation inadequate, these intermediaries perform a vital role getting prawns from dispersed locations to the next trading point. These marketing agents typically operate through lending. They obtain funds from a marketing agent higher up the value chain, or from some other financial source, and lend money to those below them in the chain.

A collector at the village level enters into a contract with farmers and fishermen. The contract, which is informal, includes an advance payment or loan from 0.2 to 2 million MK to finance farmers' or fishermen's crops. The investment of the collector can be up to 50 million MK per year, with cash advances to as many as 30 farmers. Terms of exchange with farmers are described above in section 4.3. Collectors purchase prawns from farmers in mixed grades (at a low purchase price) and sort them into grades before selling them to traders. In some extreme cases, the margin between the buying and selling price was more than 2,000 MK per viss (1,250 MK per kg) according to farmers.

Small collectors are mostly bound to larger collectors or traders in urban centers, as these collectors provide them with cash advances. However, with declining yields, collectors are now taking more risks when they provide cash advances. Several cases where farmers were only partially able to repay their cash advances were observed, with only 30% to 50% of the cash advance reimbursed on average. In a few cases, village collectors took out loans of about 30 million MK per season from local money lenders. These loans came with an interest rate of 5 to 10% per month for an average period of 5 months, corresponding to the duration for a prawn crop. The collectors required these loans to reimburse the cash advances they received from traders and to finance the operations of farmers.

4.5. TRADERS & EXPORTERS, SMALL SCALE

Small-scale traders trade *P. monodon* and other seafood products. The volume of trade is estimated to be less than 10 metric tons per year of *P. monodon* (for 2011) and some of these traders do not trade *P. monodon* year round, but only in the peak season from April/May to August/September. Their supply is provided by farmers (large scale) or collectors directly in contract with them. The trader provides cash advances to finance the crop. One trader can work directly with around 80 to 90 farmers.

Small-scale traders in Sittwe or Pauktaw sell their production to larger traders in the dry season when the prices are low in Bangladesh and when the volume of trade is not sufficient to export[9]. From Pauktaw, Myebon, and Minbya, the main route for prawn exports in the rainy season is to Bangladesh, via Sittwe and Maungtaw. The exporters join other shipments to Bangladesh managed by transporters holding export licenses. In addition to the transport costs and export taxes, the traders must pay the transporter for the use of the export license (8,000 MK per container or 100 MK per kg). However, this additional service charge is variable according to the exchange rate. It may happen that the transporter does not require any service charge.

At the border gate in Maungtaw, an agent is in charge of the trade with the Bangladeshi buyers, resulting in an additional cost of 5,000 MK per box or 62 MK per kg. The agent fixes the price before shipment. If the price goes down during shipment, the trader will sell at the current price, showing the low bargaining power of the trader. Traders can get cash advances from the agent at the border if the agent fixes the price (lower than the market price) before the transaction. This practice is not common among traders.

4.6. TRADERS & EXPORTER, LARGE SCALE

4.6.1. Characteristics

Large-scale traders operate all year round. Their main activity, trading *P. monodon,* occurs mainly from April to October during spring and nip tides. They also trade other prawn species for the domestic market and fishes. Traders do not process[10] the products; they purchase the headless prawns. Sorting each purchase by grade, cleaning, weighing and packaging chilled headless prawns[11] in cooler boxes are their main activities. Traders in each township use different trade routes and trade different volumes (Table 8).

[9] Selling to larger local traders is more profitable for small-scale traders since they cannot purchase enough volume to lower the transportation cost to sell in either Bangladesh or Yangon.
[10] In this report "processing" is defined as cleaning, freezing and packaging for the export market, not just sorting and chilling.
[11] All volumes and weights are expressed for headless shrimp.

Table 8: Destination and species traded in the different townships (source: key informants and trader interviews)

	Sittwe	Pauktaw	Myebon	Kyaukpyu
Collectors and small-scale traders	45[a]	60[b]	200[b]	70[a]
Trader-Exporter	10	20	4	10
Species	*P.monodon* *Metapeneaus sp.* *(P. merguiensis)* *(P. indicus)* Fish	*P.monodon* *Metapeneaus sp.* *(P. merguiensis)* *(P. indicus)* Fish	*P.monodon* *Metapeneaus sp.* *(P. merguiensis)* *(P. indicus)* Fish	*P.monodon* *Metapeneaus sp.* *P. merguiensis* *(P. indicus)* Fish
Destination of *P. monodon*	Bangladesh (90%) Yangon (10%)	Sittwe and Bangladesh	Sittwe, Minbya, Kyaukpyu or Yangon	Yangon (70%); Sittwe (30%)
Destination of other prawns	Yangon (100%)	Yangon (100%)	Yangon (100%)	Yangon (100%)
Origin of *P. monodon*	>75% Aquaculture	>80% Aquaculture	>90% Aquaculture	60% Aquaculture 40% Capture

[a]: includes only small-scale traders based in towns
[b]:includes both village collectors and small-scale traders

In Sittwe, most of the *P.monodon* is exported to Bangladesh due to the proximity of the border. There are two export license holders. Only in Kyaukpyu is the percentage of capture fisheries more important. Otherwise, most of the production comes from extensive aquaculture ponds. Several prawn species are traded, but only *P. monodon* is exported. Other species are traded for the domestic market.

There are 6 main grades for *P.monodon* trading, based on headless prawn weight (Table 9 and Appendix 6). A grade is generally determined by species, and the size and appearance of the prawn – the market price is determined by these factors.

Table 9: Different grades for prawn trading

Grade	Characteristics
Grade 0	Less than 8 prawns per 450 gr
Grade 1	8-12 prawns per 450 gr
Grade 2	13-15 prawns per 450 gr
Grade 3	16-20 prawns per 450 gr
Grade 4	21 – 30 prawns per 450 gr
Grade 5	31-50 prawns per 450 gr

In Sittwe, Myebon and Pauktaw, more than 50% of the volume is of grade 3 and 4 in the rainy season (peak season), while grades 1 and 2 represent less than 30%. In the dry season, the volume of grade 4 and 5 prawns is more important, with grade 5 prawns dominating the market (more than 50% of the volume) in some cases.

In contrast, in Kyaukpyu grade 1 and 2 prawns dominate the market, accounting for more than 50% of the volume traded. This difference might be due to market requirements. Kyaukpyu trades mostly with Yangon processing factories, which seek the largest sized prawns for the export market, while the Bangladeshi market is less demanding.

4.6.2. Operations

Sorting, weighting and packaging the product happen in a warehouse often located within the trader's house. Material is limited, with only cool boxes or containers used for transport, weight scales and baskets to sort the prawns, and an ice crushing machine. The prawns are not processed, but packaged in the boxes with ice for transport. In Myebon, some traders also operate a small-scale ice processing factory to reduce the cost of ice and avoid any shortage in the peak season.

Prawns are received already processed (headless) so that they can be kept without spoilage for a longer period. Traders employ permanent workers and additional seasonal workers during the peak period. Most of the workers for sorting the prawns are women. Their monthly salaries vary from 25,000 to 50,000 MK according to their location and their skills and responsibilities.

4.6.3. Volume and season

The peak season for trading *P. monodon* varies slightly between townships. In Sittwe, Myebon and Pauktaw, June to August is the main season, while in Kyaukpyu the season extends to September or October. The dry season from December to March is considered the low season for prawn trading and the volume trade at this time is estimated to be 4 to 5 times lower. Capture fishery production is also more important at that time of the year, especially in Kyaukpyu.

The peak of trading follows the lunar cycle with a high volume of trade during the spring tide (full moon) and a lower volume during the nip tide. The supply follows a very regular and predictable cycle and traders have to deal with a large volume of highly perishable material over a few days. The main characteristics of the traders visited are summarized in Table 10.

Other prawn species, probably *P. merguiensis*and *P. indicus* (locally called "white") or *Metapenaeus sp.* ("pink") represent a non-negligible volume. The volume of "white" prawns traded is on average 50% to 75% lower than *P. monodon*, while "pink" prawn trade is similar to that of *P. monodon* in terms of volume. However, the selling price of white and pink prawns is 1,500 to 2,500 MK per viss.The other prawn species are not exported to Bangladesh at any time of the year and all the production is sent to Yangon. However, the demand can be very low (1,500 MK per viss) in the peak season (April to August) and the prices can drop. Producers and traders are not targeting these other species.

Table 10: Characteristics of large prawn traders trader (n=9)

Traders Characteristics	Range
Volume trade per tide (viss per tide)	1,000 -6,000
Estimated volume of *P .monodon* trade per year (metric tons)	12 - 48
Number of permanent worker (person)	8 to 21
Maximum storage capacity (metric tons)	2 to 8 tons
Duration of storage (days)	2 to 4 days
Post-harvest loss	1 %to 3%
Number of collectors & farmers in contract	20 to 100 collectors 10 to 100 farmers

The volumes presented in Table 10 are based on 2011 results, which were considered to be the lowest over the previous 10 years by all the traders interviewed. The drop in trade volume was estimated to be 40% to 60% by traders.

4.6.4. Quality and post-harvest loss

The main criterion that determines the grade and price of prawns is their size. After storage and transport, the main criterion is the quality of the shell. A soft shell prawn, due to poor storage and transport conditions, will be downgraded. The weight lost and spoilage is considered to be 1% to 3% of the volume. These products are downgraded by 10% to 15% of the price.

The loss incurred because of transport is negligible in the case of direct processing in Kyaukpyu, but higher in the case of export by boat and road to Bangladesh (through Maung Taw) or Yangon, with the different distances resulting in a loss estimated at 3% from Kyaukpyu and 10% from Sittwe.

4.6.5. Supply and cash advances

Traders are dependent on their collectors and farmers for the supply of *P. monodon*. Since transport costs are high, a minimum volume per shipment is necessary[12]. In order for traders to ensure a regular supply of prawns, they provide loans to collectors and farmers (Figure 6).

The collectors and farmers involved in the loan scheme must sell their prawns exclusively to their creditors. The number of collectors and farmers who have loans with traders varies widely, depending on the investment capacity of the trader. However, in all cases, this number is now decreasing due to lack of investment capacity and a low reimbursement rate, sometimes lower than 50% (some traders reported having as little as 30% of their loan reimbursed).

[12] For example, an individual trader will ship a minimum of 20 boxes to Bangladesh (1.6 metric tons) and the total shipment will group different traders for a total of 200 boxes (16 metric tons).

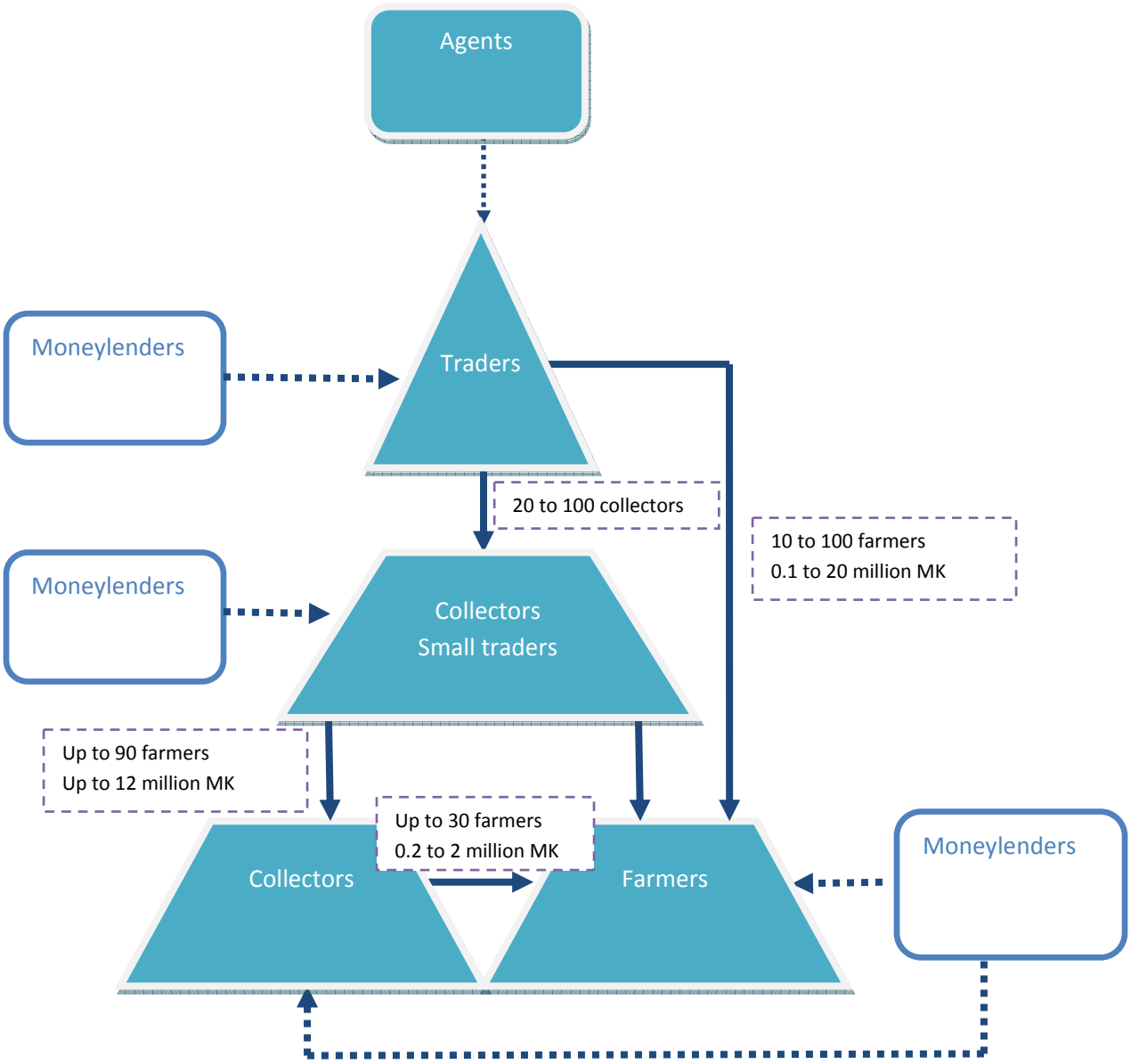


Figure 6: Informal loan system in the prawn value chain. Dashed arrows represent unusual interactions. Solid arrows represent common interactions between actors.

According to one trader, the maximum acceptable loss on a cash advance is 40%. The informal loan system can be seen as a pyramidal structure with traders and agents at the top, providing cash advances to collectors and farmers on the lower tiers.

The loans or cash advances provided are between 0.1 and 20 million MK. In exchange, the collectors agree to sell their prawns at a fixed price to the trader. The cash advance is usually provided during the dry season and reimbursed during the rainy season when most of the volume is traded. There is no interest on this cash advance, according to traders. One trader explained that if a collector sells to another trader, he will charge that collector 2% interest on his cash advance. A small percentage of the repayment is made during each transaction according to the traders. The collector has the opportunity to sell to another large trader but not often. If collectors do not sell often enough the product to trader they are in contract with, the contract is broken and the collector has to reimburse his loan. For every tide (or harvest period) the collectors have to sell their prawns at least once or twice to the trader to whom they are in debt.

For traders, cash advances to ensure the supply of their production are becoming increasingly important every year. According to traders in Kyaukpyu, cash advances provide 70% of the trade volume and without this cash advance, collectors would sell to other traders. Some traders in Sittwe or Myebon explained that they adjust their price according to the market instead of fixing a lower price. They do so to ensure collectors supply a certain volume because traders require a minimum volume to export (estimated to be 20 boxes).

However, with the drop in production in recent years, the reimbursement rate has declined and cash advances are accumulating. One trader has invested more than 50 million MK in cash advances over the past 3 years, and has no way to recover this investment and might have to scale down his operations.

This problem was exacerbated by Cyclone Giri, with farmers requiring extra loans to repair their embankments and sluice gates after the cyclone. With declining yields, farmers cannot repay their loans and prefer to abandon the ponds. According to traders, the system was functioning well until the area was hit by cyclones. When the yield was high and stable, farmers were able to reimburse their loans every year before receiving new cash advances.

4.6.6. Terms of exchanges with buyers: trust and linkages

The selling price in Yangon and Bangladesh determines the destination of the prawn harvest. If the price difference between processing factories in Bangladesh and Yangon is greater than 1,500-2,000 MK per viss (in favor of Bangladesh), the trader will sell to Bangladesh. Also, traders prefer to sell large-sized prawns (grade 0) to Yangon since this grade is does not exist in Bangladesh.

Exporting to Bangladesh or selling to Yangon requires another intermediary in most cases, with agents based at the border gate or in Yangon. These agents take a commission based on the volume (500 to 1,000 MK per viss). Some large traders have one employee negotiating the trade with the processing company either in Yangon or Bangladesh.

However, trading with Bangladesh was reported to be more difficult than with Yangon because of lower bargaining power. When demand is low, buyers in Bangladesh re-grade and control the entire shipment

rather than just a sample, which is the practice of Yangon processing companies. The re-grading of the volume results in a post-harvest value loss estimated at 2% to 10% by traders. Traders also claimed that Bangladeshi agents and processing companies used unfair practices such as using analogical weight scales, while transactions with Yangon were more transparent and digital weight scales were used. There is a lack of trust between exporters and Bangladeshi buyers. The Yangon market is seen as a more trusted and reliable market.

Traders can ask for cash advances from agents in Bangladesh (up to 10 million MK, without interest). They may request such advances during the peak season, in July-August, to secure the cash flow to pay the collectors. Otherwise traders prefer not to receive cash advances from importers in Bangladesh, since the prices for their prawn yield are then fixed in advance by the agents.

One advantage to trading with Bangladesh is the payment schedule, which is faster in Bangladesh (4 days-1 week) compared to Yangon (more than 2 weeks). Therefore, traders selling their production to Yangon prefer to use an agent who will pay immediately after the transaction rather than selling it to the company directly. Even if the agent charges a fee of 100 MK per viss, the absence of a delay in the transaction is an important factor to ensure cash flow and cash availability, especially during the peak season.

The choice to export to Bangladesh also depends on the exchange rate. A large part of the exporters' and traders' profit depends on the exchange rate between MK and USD or Bangladeshi Taka. The exchange rate is important to both the traders and transporters. One trader also explained that a large part of their profit comes from sorting the prawns by grade between purchasing them and selling them.

Information about the seasonality of production and trading routes as well as the terms of exchanges between stakeholders within the value chain are summarized in the Tables 11 and 12.

Table 11: Summary table of peak production, destination of product, demand and prices for *P. monodon* and post-larvae availability

	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
Peak production in Rakhine												
High prices & demand in Bangladesh												
High prices & demand in Yangon												
Production in Sittwe, Pauktaw and Myebon	More *P. monodon* sold to Yangon[a]		*P. monodon* exported to Bangladesh via Sittwe[b] Other prawns sold to Yangon							More *P. monodon* sold to Yangon[a]		
Production in Kyaukpyu	*More P. monodon* sold to Yangon-selling grade 1 mostly Other prawn species sold to Yangon				More *P. monodon* exported to Bangladesh via Sittwe if prices are high Other prawn species sold to Yangon				*More P. monodon* sold to Yangon-selling grade 1 mostly Other prawn species sold to Yangon			
Wild PLs availability (peak period)												
PLs availability from local hatcheries												
Imported PLs												

a: difference of market price between Yangon and Bangladesh lower than 1,500 MK per viss

b: difference of market price between Yangon and Bangladesh higher than 1,500 MK per viss (in favor of Bangladesh)

Table 12: Summary of terms of exchanges between stakeholers in the value chain

	Farmer	Collector	Small & large scale Trader
Collector	Cash advance (0.2 to 2 million Mk); fixed prices lower than market prices (500 to 1,500 Mk per viss) and interest rate (2%) Unfair weighting practices Low bargaining power for farmers		
Small- & large-scale trader	Cash advance and fixed prices lower than market prices Low bargaining power for farmers Grading system different than market in Kyaukpyu	Cash advance (0.1 – 20 million MK) without interest but collectors have to sell to the same traders from whom they received an advance Grading system different than market in Kyaukpyu	
Exporter	Interact directly only with private investor farm type. Exporter provides the export license with a service fee (100 MK per kg exported) and transports the product to an agent in Bangladesh	Exporter provides the export license with a service fee (100 MK per kg exported) and transports the product to an agent in Bangladesh	Exporter provides the export license with a service fee (100 MK per kg exported) and transport the product to an agent in Bangladesh
Agent			Agent negotiates transaction with the processing company. Agent charges service fee relative to the volume of trade (around 62 MK per kg) Agent can provide cash advance to traders (10 million MK)

4.7. TRANSPORT AND ROUTES

The main characteristics of the different routes are presented in Table 13. Sittwe is the hub for all the prawns exported to Bangladesh, while those collected in Kyaukpyu are mostly sent to Yangon.

Traders do not own any transport equipment, but pay service providers to transport their production to Bangladesh or Yangon.

Table 13: Duration and type of transportation for the main trade routes

Destination	Duration	Type of transportation
To Yangon from:		
- **Sittwe**	60 hours	By truck – road. Mostly in dry season
- **Kyaukpyu**	40 hours	By truck – road
To Bangladesh		
- **Via Maungtaw**	2 days	By boat and truck
- **By Sea**	<15 hours	By Boat
- **Informal**	8 -12 hours	By boat
To Sittwe from:		
- **Myebon**	4 -5 hours	By boat
- **Pauktaw**	2-3 hours	By boat
- **Kyaukpyu**	3-4 hours	By boat (speed boat)

4.7.1. Exporting to Yangon

Transport to Yangon from Sittwe happens mostly in the dry season when prices are high in Yangon and the demand is lower in Bangladesh. In the dry season, the price difference between Bangladesh and Yangon is lower according to traders, with similar prices or a price difference lower than 1,000 to 1,500 MK per viss (in favor of Bangladesh) and the Yangon market can appear to be a more profitable market, with fairer practices and higher bargaining power for traders. In addition, poor road conditions, loss due to road hazards (landslides) and delays in transportation limit transportation of yields from Sittwe to Yangon in the rainy season. The post-harvest loss is high; up to 5% to 10% of the volume has to be downgraded. The post-harvest loss during the dry season also higher because of the low supply and increased storage period (2 to 3 days) needed to reach the critical volume to transport to the capital. From Myebon, it is possible to send the production to Yangon, via Sittwe or Taungaut.

From Kyaukpyu, transport to Yangon takes less than 2 days (40 hours) since the road has been rehabilitated. For traders in Kyaukpyu, the choice of Yangon is due to the market structure. Residents do not have direct access to processing companies in Bangladesh. Shipments have to transit via Sittwe to reach Bangladesh, with additional fees for the different intermediaries (transporters and agents).

4.7.2. Export to Bangladesh

In the rainy season, at the peak of prawn production, traders ship their production to Bangladesh due to higher prices compared to Yangon. All production shipped to Bangladesh transits through Sittwe.

Export to Bangladesh can be done by 3 routes:

- Formal and legal route by boat until Bouthidaung and road to the border gate (Maungtaw). This route requires more effort and more time, loading and unloading the shipment from boats to trucks and time wasted at the border gate for administrative formalities;
- Formal and legal route by boat directly to Bangladesh with a stop at the export border check near Sittwe. This route is faster than the previous one and less costly in terms of labor;
- Informal route, by boat from Sittwe directly to Bangladesh.

Export to Bangladesh is done via a transporter holding an "export license" provided by the government of Myanmar. In Sittwe, 2 companies can export products to Bangladesh.

The transporter organizes the transport to the border gate and charges a transport fee in addition to a service charge, which includes the export tax. The transporter re-groups shipments from different traders (5 to 10) to reduce the transport cost. In some cases, the transporter can arrange to re-group the production of several large-scale farmers. One shipment from Sittwe to Bangladesh is a minimum of 200 boxes (16 metric tons) and a single trader will ship a minimum of 20 boxes (1.6 metric tons).

At the border or in Bangladesh, the traders either finalize transactions directly with the processing company's agent or with a free agent. The agent will be paid according to the trade volume. A few traders have their own agent based at the border to supervise the transaction and the weighing of the shipment.

4.7.3. Choice of transport routes

In Kyaukpyu, before 2009, 90% of the volume was sent to Sittwe due to a better exchange rate (USD) and higher profit. Traders redirected their shipments to Yangon due to better prices and better transportation. In the rainy season, when the price difference is significant and Bangladesh is a more profitable destination, traders ship their production to Bangladesh.

For export to Bangladesh, which represents more than 90% of the market for Sittwe traders, the choice of routes changed recently (September 2011) due to the reduction of the export tax from 10% to 2%. According to one trader, the informal route represented around 80% of the trade volume, while now 80% of the volume is going through the legal route, due to the tax reduction. Underweighing at the border gate to reduce the export tax was also reported as a common practice. However, this estimation was obtained in the dry season, when the trade volumes are low. In addition, the choice of route to

Bangladesh, via boat or boat and truck, depends on the weather. The informal route requires good weather conditions.

The decision to export or sell locally and the choice of route also depends on the exchange rate between currencies and the value of the "*export earnings*". When the value of those export earnings is high, the export license holder will not charge any additional cost, but will be willing to export and gain foreign currency that has a high value on the domestic market.

4.7.4. Transport costs

Transport costs include the cost of transportation and the formal and informal fees required for a box of 50 viss (80 kg). The different costs are summarized in Table 14.

Table 14: Transport costs for different routes (80 kg of headless prawns – 1 container)

	Bangladesh (Sea)	Bangladesh (informal)	Yangon (from Sittwe)	Yangon (from Kyaukpyu)
Transportation*	10,000 to 15,000	10,000 to 15,000	20,000 to 25,000	12,000 to 13,000
Ice	3,000 to 5,000	3,000 to 5,000	5,000 to 7,000	3,000
Export Tax (2%)	8,000	-	-	-
Trade Tax	-	-	9,900**	9,900**
Total MK/kg	262 to 350	162 to 250	436 to 524	311 to 323
Total MK/ box	21,000 to 28,000	13,000 to 20,000	34,900 to 41,900	24,900 to 25,900

* the service fee of the transporter, which varies according to the exchange rate and can be null in some cases.

** trade tax is 198 Mk/ viss, which is a tax to transport *P. monodon* outside Rakhine State.

Exporting through Maungtaw costs an additional 10,000 MK per box due to higher labor costs for loading and unloading the boat and truck. Transportation from Myebon costs an additional 10,000 to 15,000 per box and from Pauktaw 11,000 MK per box via public transportation (including the cost of returning the boxes). Shipping production from Kyaukpyu to Sittwe costs an additional 7,000 per box. Exporting to Yangon from Myebon (via Sittwe or Taungaut) costs between 30,000 to 40,000 MK per box.

Exporting to Yangon via Sittwe is not cost effective, with most of the cost due to distance. Transport to Yangon via Kyaukpyu is comparable to the export cost to Bangladesh via the formal route. Export to Bangladesh varies greatly according to the route, formal or informal, with a difference of about 8,000 MK per box. However, the cost of transport to Bangladesh was difficult to estimate since it varies according to the service fee applied by the transporter, which can be as high as 8,500 MK per box or null depending on the exchange rate.

In addition, the export tax can be reduced in the case of the formal route, since under reporting of the volume exported is a common practice.This arrangement leads to informal taxes at the border, which

we did not estimate, as well as other informal costs along the transportation routes, which can also be significant. However, informal taxes along the route are included in the transportation cost and covered by the transporter.

Informal routes to Bangladesh seem less costly, but their price does not include the informal fees that might be required (covered by the transporter), and now that the export tax has been reduced the price difference is not as important as it was before.

A similar transport cost is applicable to other prawn species. All the production is sent to Yangon and there is no export of *Metapenaeus* sp. and *Penaeus indicus* to Bangladesh. The only difference in the transport cost for species other than *P. monodon* is a lower "trade tax" (to transport outside of Rakhine State): 50 MK per viss and 100 MK per viss for "pink" and "white" prawns respectively.

4.8. PROCESSING FACTORIES

Of the three processing factories located in Sittwe, none were operating at full capacity in 2011. Only one this year was operating, and it was producing a negligible volume. Within the study area, the only processing factory still active is located in Kyaukpyu.

The Asia Golden Prawn Co. Ltd. in Kyaukpyu is a branch of a larger company based in Yangon. They target high value production such as grade 0 and grade 1 *P. monodon* for export. *P. monodon* represents more than 50% of the volume processed. Other species are *P. merguiensis* and *Metapenaeus sp.*

The collected material is sorted, cleaned, frozen, packaged (1.8 -2 kg boxes) and stored before being sent to Yangon for export. The company purchases prawns directly from traders in Kyaukpyu but does not provide any cash advances. According to the company's manager, the buying price difference between Kyaukpyu and Yangon is only 500 MK per viss. However, the prices are not that attractive to local traders since the company buys prawns following a grading system similar to the one used by traders (inches). Thus, traders cannot increase their profits by re-sorting the prawns after purchasing them from farmers or fishers compared to selling the prawns the Yangon processing factories.

The factory operates from April to November, but over the last 4 years, the volume has decreased due to competition from Bangladesh, and unfavorable climatic conditions including cyclones, and low production volumes. The volume processed each year decreased from 500 metric tons in 2008 to 302 metric tons in 2009 and 284 metric tons in 2010-2011, a 40% decrease of the trade volume over 3 years. For 2012, to the company projects that it will process 200 metric tons.

5. Prices, costs and margins along the marketing chain

5.1. PRICES ALONG THE MARKETING CHAIN

It is hard to estimate each increment in the production's changing value along the value chain. Figure 7 presents an example of this change in value for 1 kg of prawns traded from Myebon to Bangladesh. However, these price changes are subject to large fluctuations due to the exchange rate, informal rules between actors, and local and international market price.

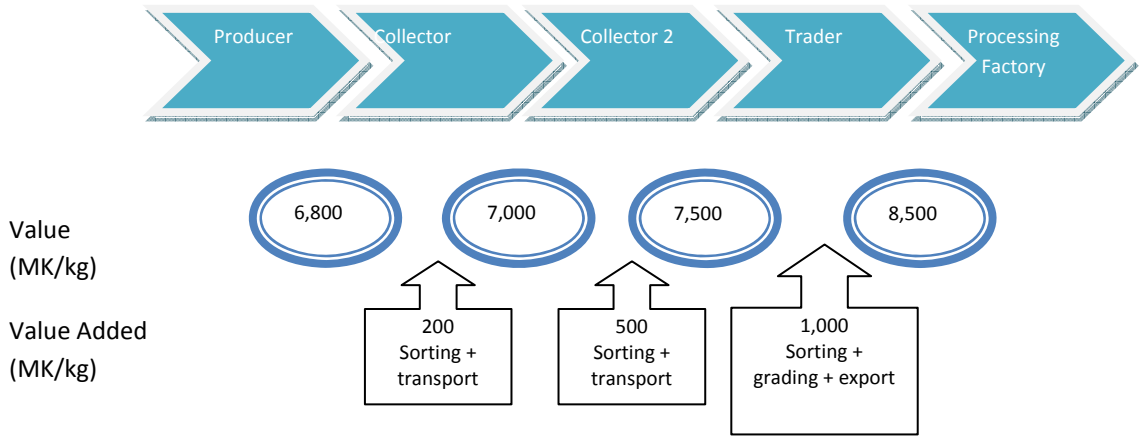


Figure 7: Example of price (MK/kg) changes along the marketing chain for 1 kg of grade 4 (21-30 prawns/450 g), from a producer in Myebon to a trader in Sittwe and a processing company in Bangladesh.

During the year, the price varies from 2,000 to 3,500 MK per viss for the same grade. The margin between the buying and selling price for the trader also varies according to the market demand and transportation cost, but can be estimated at 500 to 1,000 MK per viss.

The margin is optimized with sorting and re-grading between buying and selling transactions, downgrading the product during purchase and upgrading the product for the next transaction. In

addition, traders in Kyaukpyu buy the prawns using size classes (3 different classes) and re-sort them according to the commonly used grades (Figure 8 and Appendix 6).

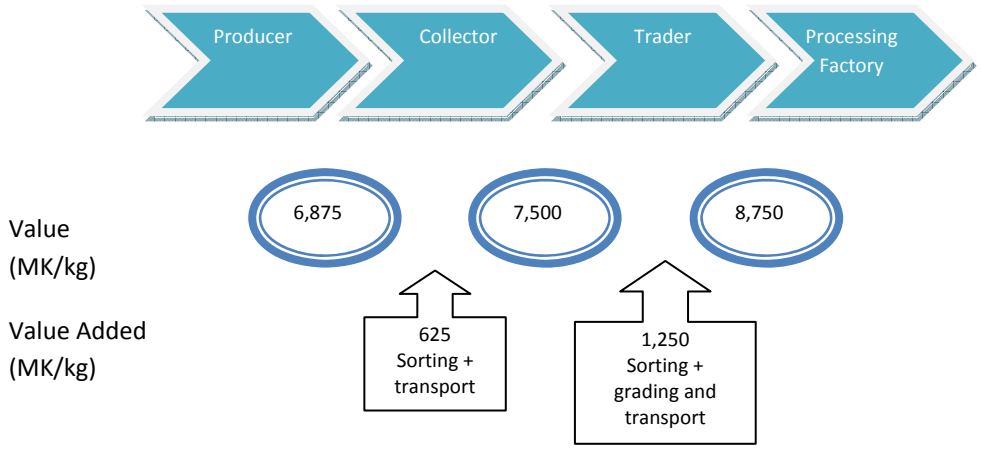


Figure 8: Example of price (MK/kg) changes along the marketing chain for 1 kg of grade 4 (21-30 prawns/450 g), from a producer in Kyaukpyu village to a trader in Kyaukpyu township and a processing company in Yangon in February 2012. Grades are based on inches for the producers and the collectors and based on weight for the transaction between trader and processing company.

With such different types of practices, margins are difficult to estimate and remain opaque. Similar constraints apply to the margins estimated by exporters to Bangladesh, which in some cases are based only on a favorable exchange rate. The following section investigates the margins along the market chain, taking into account the different costs.

5.2. COSTS AND MARGINS ALONG THE MARKET CHAIN

The intent of this section is to analyze the costs and profit margins of prawn products. Analysis is based on different scenarios for a marketable box (80 kg) of 21-30 fresh prawns/450 g (Grade 4, the most common grade in the study area) produced by a small-scale farmer (10 ha) and one scenario with a farmer based in Kyaukpyu producing a box of grade 1 *P. monodon* (8-12 pieces/450 g).

Scenario 1: a successful small-scale farmer in Myebon (50 kg per ha) selling his product at 10,000 MK per viss with 2 collectors and a trader along the marketing chain (Table 15);

Scenario 2: an unsuccesfull farm, with a low yield (20 kg per ha) and a selling price of 11,200 MK per viss, but with only one collector along the marketing chain. (Table 16);

Scenario 3: a succesfull farmer (yield of 50 kg per ha) with a loan of 2 million MK over a 5 month period (interest rate of 2%) and a selling price of 11,200 MK per viss (Table 17);

Scenario 4: Average farmer (yield of 20 kg per ha) of grade 1 *P. monodon* sold with a loan of 2 million MK over a 5 month period (interest rate of 2%) and selling at 19,000 MK per viss. The final destination of the production is Yangon (Table 18);

In scenarios 1, 2 and 3, the prawns are produced in Myebon and sold to a village collector who sells them to a second collector in scenario 1 or with only 1 collector inscenarios 2 and 3. The second local collector sells them to a trader in Sittwe, and they are later exported to Bangladesh. Only scenario 4 is based on a production site in Kyaukpyu in the low season (dry season). The production is sold to Yangon.

Costs incurred by the various prawn market actors to store, aggregate, and load the prawns onto a truck at the landing port and transport them to processing factories in Bangladesh are referred to here as "trade costs". The fees paid by each actor at the landing site, storage facilities, and transport route are presented as regulatory fees.

Costs have been divided into two major categories – operating costs (transport, ice, labor, and spoilage/weight loss), and depreciation of equipment. The later includes the depreciation in long-term assets for at least a year, such as storage boxes and other equipment and material that is necessary to operate a prawn business. However, warehouse and land assets were not taken into account because of the difficulty of estimating those costs and collecting the data. Traders and collectors do no invest in trucks or boats for the transportation of their products, keeping their capital costs to a minimum. In the case of loans contracted by farmers, we add a capital cost accounting for the interest rate.

Operating costs (transport, ice, labor, and spoilage) represent the greatest proportion of total costs (70% to 81%) along the market chain. Transport costs for local collectors are high due to the absence of economies of scale (large volume transported) and the use of public transport in most cases.

Spoilage and weight loss refers to the reduction in prawn amount/weight from the point of purchase to the point of sale. Due to the approximately 3 to 4 transactions that occur from the origin with the producer to the processing company (e.g. grading the prawns in the first transaction and loading and unloading at each transaction) and to poor icing of the prawns, weight loss and spoilage occurs along the trade route. Poor icing is partially due to regulatory fees that are calculated based on the number of boxes transported. Therefore, traders prefer to overload their boxes with prawns (80 kg per container on average instead of 60-70 kg recommended) and reduce the weight from ice. At each transaction, the weight loss is estimated at 2% to 3% of the value and an estimated 7% of the value is lost along the market chain. However, in some cases the local collector already charges the producer for the post-harvest loss, with 3% of the total weight added during the transaction. This volume added is not paid by the collector and is considered a "future" post-harvest loss. When traders move their production to Yangon via Kyaukpyu, the operating, labor, and transport costs are similar, but there is less spoilage (3%, in total).

Table 15 : Scenario 1, Cost and benefit analysis for each actor in the prawn market chain (1 container of 80 kg - Grade 4: 20 - 30 prawns/450g) in MK per container.

	Farmers	Village Collector	Village Collector 2	Trader/Exporter
Buying price or production cost	300,000	500,000	560,000	624,000
Selling price	500,000	560,000	624,000	720,000
Gross revenue	200,000	60,000	64,000	96,000
Trade cost	**3,000**	**21,100**	**29,240**	**66,600**
- **Transport cost**	0	5,000	10,000	12,500
- **Labor cost**	0	2,000	4,000	20,000
- **Ice**	3,000[a]	3,000	3,500	4,000
- **Spoilage**	0	5,600	6,240	21,600
- **Depreciation of equipment**	0	5,500	5,500	8,500
Regulatory fees	0	500	750	13,658
Profit margin	197,000	38,400	34,010	15,742
% of share profit	69	13	12	6

[a]: farmers can purchase ice or it can be provided by the collector they are contracted to work with.

Depreciation of equipment is limited (less than 30% of the cost) due to the absence of large investments in transport vehicles. Traders and collectors outsource transport, thereby avoiding large capital outlays and informal fees along trade routes. Based on the field interviews, market actors may be reluctant to invest in fixed assets such as vehicles because of uncertainties about future business prospects.

Regulatory fees are limited for small-scale collectors. This type of cost becomes important (17% of the total cost) for traders exporting to Bangladesh. It includes license fees, waste management fees[13], export taxes (2%), re-grading at the selling point and agent fees (100 MK per viss) to negotiate the transaction. Informal fees that are paid along the road or at the border have not been estimated.

P. monodon exported to Bangladesh prior to September 2011 was subject to a 10% tax on the value exported. This tax was reduced to 2% and allows a higher number of formal transactions.

Marketing *P. monodon* to Yangon via Kyaukpyu involves a similar regulatory fee. It represent 19% of the total cost, compared to 17% when the prawns are exported to Bangladesh. The difference is due to the trade cost to export *P. monodon* outside Rakhine State (198 MK per viss).

[13] The license fee paid to the DoF is 620 MK per metric ton traded. The waste management fee in urban centers is variable, from 30,000 to 70,000 MK per year.

In scenario 3 and 4, farmers have an additional **Capital cost** due to interest on their loans at a rate of 2% per month for a 5 month period. The capital cost is calculated based on a 10 ha farm that requires a cash advance of 2 million MK. In both cases the capital cost represents a significant percentage of the total cost, with 24% and 80% in scenario C and D, respectively. The capital cost does not include the reimbursement of the loan, but only the reimbursement of the interest, which shows how important the loan burden can be for the farm economy.

Table 16 : Scenario 2, Cost and benefit analysis for each actor in the prawn market chain (1 container of 80 kg - Grade 4: 20 - 30 prawns/450g) in MK per container.

	Farmers	Village Collector /Small trader	Trader/Exporter
Buying price or production cost	784,000	560,000	624,000
Selling price	560,000	624,000	720,000
Gross revenue	-224,000	64,000	96,000
Trade cost	**3,000**	**29,240**	**66,600**
- **Transport cost**	0	10,000	12,500
- **Labor cost**	0	4,000	20,000
- **Ice**	3,000	3,500	4,000
- **Spoilage**	0	6,240	21,600
- **Depreciation of equipment**	0	5,500	8,500
Regulatory fees	0	750	13,658
Profit margin	-227,000	34,010	15,742
% of share profit	0	68	32

Profits along the market chain are highest for farmers when the yield is over 30 kg/ha and when there is an absence of loans, which is not the most common scenario found in Rakhine State. Even when the production is high, with for example a yield of 50 kg per ha in Scenario 3, the share of the profit is lower for farmers due to interest payments, and economic sustainability of the farm is difficult to reach. In the scenarios we have described, we did not investigate the impact of price fluctuations and used the average selling price for grade 4 prawns at the farm gate in scenario 1, 2 and 3. Only in Scenario 4 did we use a diffferent situation, with farmers in Kyaukyu targeting grade 1 prawns, which have a higher selling price. In this case, the production cost per box is higher than in scenario 1 and 3, due to lower yield, and the profit margin is negative for the farmer due to loan reimbursement.

Table 17 : Scenario 3, Cost and benefit analysis for each actor in the prawn market chain (1 container of 80 kg - Grade 4: 20 - 30 prawns/450g) in MK per container.

	Farmers	Village Collector /Small trader	Trader/Exporter
Buying price or Production cost	392,000	524,960	624,000
Selling price	524,960	624,000	720,000
Gross revenue	132,960	99,040	96,000
Trade cost	**3,000**	**29,240**	**66,600**
- **Transport cost**	0	10,000	12,500
- **Labor cost**	0	4,000	20,000
- **Ice**	3,000	3,500	4,000
- **Spoilage**	0	6,240	21,600
- **Depreciation of equipment**	0	5,500	8,500
Regulatory fees	0	750	13,658
Capital cost (loans interest rate)	32,000		
Profit margin	65,960	69,050	15,742
% of share profit	44	46	10

The share of profit is higher for the producers if the number of intermediaries is smaller and producers sell directly to larger collectors. The share of the profit is high for intermediaries, with a high share for local collectors at the village level and for small-scale traders. The share of the profit is always high for the local intermediary between the producer and the trader exporting to Bangladesh or Yangon. However, in our scenarios, collectors do not pay any interest on the loans received from traders. Also, the profit of the trader, in the case of export to Bangladesh, does not include the profit made on the exchange rate of foreign currency. The share of the profit might be higher for the trader if this variable is taken into account.

Table 18 : Scenario 4, Cost and benefit analysis for each actor in the prawn market chain (1 container of 80 kg - Grade 1: 8-12 prawns/450g) in MK per container sent to Yangon.

	Farmers	Village Collector /Small trader	Trader/Exporter
Buying price or Production cost	784,000	880,000	1,000,000
Selling price	880,000	1,000,000	1,120,000
Gross revenue	96,000	120,000	120,000
Trade cost	**3,000**	**33,000**	**66,400**
- **Transport cost**	0	10,000	12,500
- **Labor cost**	0	4,000	20,000
- **Ice**	3,000	3,500	3,000
- **Spoilage**	0	10,000	22,400
- **Depreciation of equipment**	0	5,500	8,500
Regulatory fee	0	750	15,558
Capital cost (loans interest rate)	80,000		
Profit margin	-67,000	86,250	38,042
% of share profit	0	69	31

Following this analysis of the prawn sector looking at the different actors, costs and margins along the value chain, we develop a series of scenarios based on the main drivers of the sector.

6. Scenarios for future prawn aquaculture in Rakhine State

Prawn farming is influenced by drivers that can be classified as "*local*" or "*global*."

Local drivers include:

- Environmental drivers (extreme climate events such as cyclones and high tides);
- Value chain characteristics, including access to knowledge and information, inputs and *P. monodon* post-larvae;
- Financial links and interaction between actors of the value chain.

Global drivers include:

- International sanctions on exports from Myanmar;
- International *P. monodon* market prices;
- Exchange rates;
- Local and national political situation.

From these drivers we can create four possible scenarios, depicted in Figure 9. The horizontal axis represents the *Global Drivers* in two directions. In the positive direction, there are no international sanctions, exchange rates are more profitable for exporters, international prices and demand for *P. monodon* are high and the national situation is stable enough for stakeholders to invest in the value chain. The opposite direction represents a situation where international demand is low, international sanction are enforced and investors are unwilling to invest.

The vertical axis represents the *Local Drivers*, with positive drivers when the access to knowledge and inputs is improved, extreme climatic events occur less frequently, and the bargaining power between actors within the market chain is higher. Negative drivers represent a situation where the supply of inputs and the value chain do not improve and prawn farming is heavily affected by climatic events (cyclones, high tides).

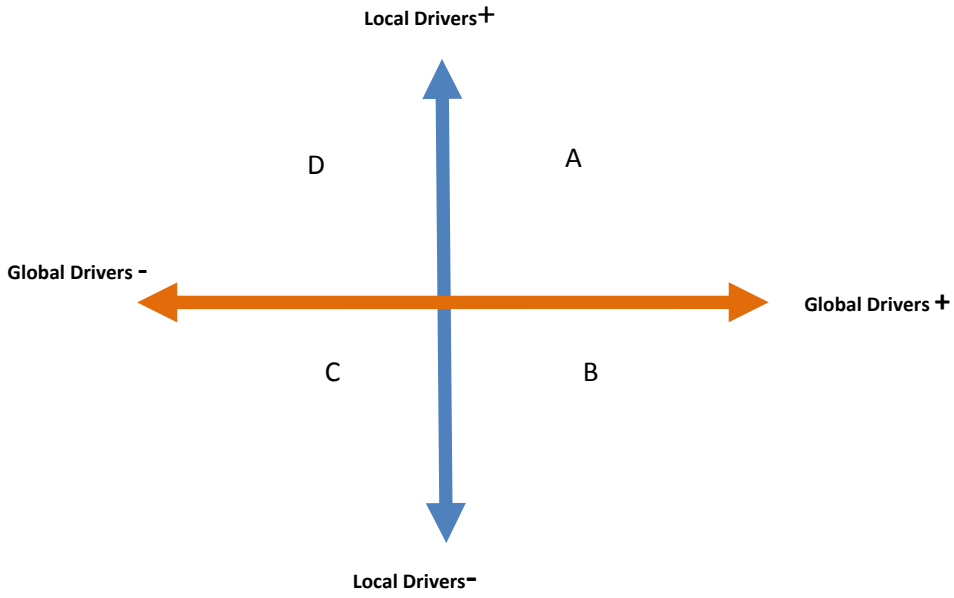


Figure 9: Scenario logic for the future of prawn farming in Rakhine State

From the Scenario Logic, 4 main scenarios can be described:

Scenario A

In this scenario, the international sanctions are lifted and more prawns can be exported via Yangon. Actors within the value chain invest in equipment and inputs. Access to inputs and PLs is improved with local retailers, private hatcheries and a network of nurseries providing PLs to farmers. Production systems move toward greater intensification, based on hatchery-reared PLs stocked in smaller production units and using inputs such as lime and fertilizers for pond and water management. Most of the production is now processed in Yangon.

This scenario also includes the impact of the Special Economic Zone in Kyaukpyu and the incentives of the government for sea food processing companies to develop their activity. Kyaukpyu will become one export point for prawns, with processing close to the production area and reduced transport costs.

Scenario B

In this scenario, the *Global Drivers* are positive, but there are no changes in the value chain. Farmers do not have access to inputs or PLs and production systems remain extensive, based on wild PLs trapped in ponds. Farmers are still affected by climatic events and high tides and have poorly maintained dikes. Even if there is high demand from traders and processing companies, the investment capacity of farmers is low and productivity remains low.

Scenario C

The *Global Drivers* are negative, with high tax rates, no profitable exchange rates and low prices for *P. monodon*on on the international market. Demand for prawns is low and the value chain does not improve, with continued poor access to inputs and knowledge. Production continues to decline, with more abandon ponds and bankruptcies along the market chain.

Scenario D

In scenario D, *Global drivers* are also negative, with demand lowered by high taxes and low prices. However, the sector is ready for change, with positive local drivers. Farmers have access to inputs and *P. monodon* post-larvae (imported and local) and farmers have better access to information and knowledge. However, the total production in Rakhine State does not grow significantly and the production is exported to Bangladesh.

The actual situation is close to *Scenario B*., where producers and traders do not want to invest in their ponds due to the low profitability. Farmers without sufficient investment capacity reduce the cultivated area or abandon their ponds. To make the Scenario A happen, several changes need to occur.

7. Constraints, needs and future options

The value chain analysis has highlighted some factors that account for the declining production in areas affected by Cyclone Giri. In this section, we attempt to summarize the different difficulties encountered by the prawn sector in the region, focusing on the producer-level, and provide some options for the future.

7.1 PRODUCTION SYSTEM AND POND MAINTENANCE

Prawn production systems are extensive, located in large scale ponds, owned by one or more households. There is no incentive to improve systems due to climatic hazards and abnormal tides in the rainy season. When these threats materialize, the dikes are too shallow and the prawns can migrate from one pond to another or even escape from the ponds, similar to when strong erosion causes damage to the embankments. Therefore, even large farmers with sufficient investment capacity do not want to invest, as they are afraid of losing their investment due to extreme climatic events such as those in recent years. The DoF estimates that 60% of the ponds have damaged embankments. Lack of investment capacity explains the increasing number of abandoned ponds. In addition, private investors with short-term sub-land leases do not want to invest in pond maintenance.

The production system requires regular exchange of water to trap wild post-larvae in the ponds. Thus, farmers are reluctant to invest in fertilizers or inputs to improve water quality.

After more than 10 years of exploitation, some ponds have silted up and the average depth is shallow (around 30 cm) with some deeper areas. There is no investment in pond maintenance other than for the dikes and sluice gates. With large production units of several hectares, maintenance of ponds increases the cost of farming.

Diversification based on other prawn products is probably not an option, since there are no hatcheries for “pink” and “white” prawns and the low market prices of these species will not support demand from the producers for hatchery reared PLs.

Potential Options

Any production systems developed should require limited investment and skills. The inputs used should be kept to a minimum, with fertilizers and lime. Ponds need to be maintained every year, including dry periods and removal of sediments and accumulated organic matter. Farmed areas have to be reduced or

production units (independent ponds) have to be limited. Actual large production units need to be divided into smaller units of 2 to 3 hectares for easier water and input management.

In this system, water exchanges will be limited and the harvest will be done after 3 to 4 months at one time, providing farmers with a production volume that is easier to trade. With a system based on hatchery-reared PLs, the number of sluice gates per pond can be reduced to one. Allocation of financial resources can be directed towards inputs and pond management.

Over the long term, ponds can be protected from erosion by planting mangroves outside of the embankments.

7.2 ACCESS TO INPUTS AND KNOWLEDGE

Post-larvae are not available when demand is high. The capacity to produce PLs in Rakhine State is low and the sector relies on illegal imports from Bangladesh and wild PLs. Over-fishing of the juveniles by local catchers, but also intensive fishing along the coast by trawlers capturing brood stock, contribute to reduce the availability of wild PLs.

Access to PLs is not easy. There is no value chain for this product, with limited production at hatcheries and a total lack of nurseries. Government hatcheries base their production on specific orders and not on overall market demand. A similar lack of market linkages and access is found for other types of inputs for pond management.

Access to knowledge is limited for farmers in remote areas. For example, stocking techniques are rudimentary and are not combined with the eradication of predatory fishes.

Potential Options

The production systems has to be developed toward improved extensive systems, with stocking of hatchery-reared PLs, proper eradication of predatory fish before stocking, use of nurseries and pond preparation for better water quality.

For example, if in the next 5 years 25% to 50% of the ponds are using hatchery-reared post-larvae produced locally in private hatcheries, the demand for PLs for the four townships would be approximately 120 to 240 million PLs (based on a single crop stocked at 2 PLs/m^2), representing an increase of 24 to 48 times of the actual production at present. Realistically such a target cannot be achieved without significant investments by the government and private sector.

More than the development of local hatcheries, the marketing systems and links between input providers and producers have to be developed and strengthened. Government hatcheries can play a role in supporting the sector's development by providing PLs to farmers. However, their managerial

operations need to be oriented toward a more commercial approach, with marketing and linkages to farmers and local collectors. Private investment in hatcheries should be promoted.

In order to ensure the quality of PLs at the state level, investment in PCR for checking brood stock and PL quality should be considered.

To facilitate access to PLs, a network of micro-nurseries can be developed at the township and village levels. This network would provide farmers with direct access to PLs and strengthen the links between hatcheries and producers.

Similarly, farmers' access to market information and technical knowledge has to be improved. This can be done through demonstration farms, but also approaches such as "farmers' field schools" should be considered in a second phase. The network of traders-collectors-farmers can be used to transfer technical knowledge.

7.3. TRADING & MARKETING CHAIN

Within the study area, market chain actors are linked by terms of exchange based on cash advances and debts. Most producers are dependent on higher-level actors in the market chain for investments in their production systems. The level of debt is high and explains why many ponds have been abandoned and why bankruptcies have occurred. The informal credit system creates too many dependencies within the prawn market chain and is detrimental to the evolution of the sector.

Farmers in remote areas do not have access to information (selling price, grading systems) and are bound to the local collectors who purchase their products. Their bargaining power is low. With traditional systems and harvests on the day of spring and nip tide, small- and medium-scale farmers have to market small numbers of prawns. Thus, they cannot market their prawn production directly to traders because transport costs for such small volumes are too high.

Traders make limited investments in equipment. Most of their investment capacity is now directed toward cash advances to ensure access to products for export. However, with yields declining recently and the impact of cyclones, traders have found it difficult to recover their cash advances, which has limited their capacity to invest in the value chain.

Export volume, prices and trade routes are strongly influence by global drivers such as international sanctions on Myanmar's products (with an additional tax of +13%) and lower exchange rates for the USD[14]. This situation favors exports to Bangladesh, which has become the main trade route for high-value fishery and aquaculture products such as *P. monodon*.

[14] In 2009-2010, the exchange rate was around 1,200 MK for 1 USD, while the actual rate was 800 MK for 1 USD.

An unreliable supply of prawns can hurt the financial health of traders, depots, and wholesalers, as their trading partners demand a reliable supply of prawn products.

Traders, collectors, and farmers have resolved this supply challenge by creating a relationship of economic inter-dependence – traders and collectors loan money to farmers with a high risk of partial or non-repayment of the loan, and farmers are required to supply prawns exclusively to these moneylenders. The moneylenders reduce their financial risk by purchasing prawn products from their farmers at a reduced price. The system benefits the moneylenders as they become the price-makers, while the farmers become the price-takers. However, the recent decline of *P. monodon* farming shows that some collectors and small traders now have more bargaining power in their dealings with large traders. The later are now adjusting their price so that it is closer to the market price to ensure their supply of *P. monodon*.

Potential Options

The marketing chain can be improved for farmers if they are not linked to buyers through cash advances. Freeing them in this way would increase farmers' bargaining power. However, access to credit is limited and micro-credit or Savings Groups for prawn farmers are not viable options because of the high risk involved in prawn production.

Collective marketing can improve farmers' bargaining power by allowing them to complete transactions directly with major collectors or traders in town. Collective marketing can help small- and medium-scale farmers to achieve a sufficient volume of prawns to trade.

To develop a more open market, it is necessary to prevent farmers and collectors from becoming dependent on traders through cash advances and loans. Due to the lower supply of prawns, the bargaining power of farmers and collectors is higher. This trend should be supported via the development of an auction market, where farmers and traders could market their products at higher prices. This could be tested at the township level, but will require the adherence of the different stakeholders in the market chain. Developing such a market might be easier in production areas close to townships where traders have large collection points. This would also reduce transport costs for producers. Such a system would provide a higher share of the profits to producers.

Changes in the national political situation and the lifting of international sanctions might improve the bargaining power of local traders with Bangladeshi processing companies. The local marketing chain might benefit from changes to the sector and flow of products. In addition, the lifting of international sanction will allow a higher trade volume of *P. monodon* to be labeled as a Myanmar product instead of being marketed as product of Bangladesh simply because processing was done in Bangladesh.

8. Conclusions

The prawn value chain analysis has shown that the prawn sector in Rakhine State is now declining, with lower yields, a high level of indebtedness of producers, and a large number of abandoned ponds in certain areas. Our analysis shows that since its development in the 1990s the sector has not evolved toward intensification and remains dependent on the natural environment.

Production systems have not changed because of a lack of knowledge and low access to inputs. The study shows that the entire sector is currently a buyer's market, with collectors and traders controlling the market and fixing prices. Traders and collectors at the lower end of the market are financing the production through loans to farmers.

The system was sustainable while export prices and production yields were high. Due to the damage to production ponds by cyclones, increasing maintenance costs, international sanctions on Myanmar's exports, and lower market prices, the financing system that sustained the prawn production sector ceased to be sustainable. The result was the steady decline seen in the area farmed in Rakhine State.

In order to increase the opportunities and benefits from trade, there is an urgent need to raise productivity and improve production methods. Additionally, efforts need to be made to reduce indebtedness lower down the value chain and to free up producers to sell in local markets without being tied to lenders. Traders and collectors perform an important function injecting informal credit into a system that faces substantial credit constraints at lower levels of the chain.

Sustainable prawn sector development is possible in Rakhine State, given the absence of soil constraints or water quality issues. To improve the production system, the government and private sector need to make substantial investments to allow farmers access to knowledge and inputs, with improved access to quality post–larvae being the most pressing objective. Terms of trade and exchange need to be improved so that farmers can capture most of the benefits of prawn farming and be able to invest in their own production systems.

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Appendix 1: Activities during the mission

S/N	Date	Brief Description of Activity	Location
1	10-Feb	Journey from Phnom Penh to Bangkok. Visa collection for Myanmar	Bangkok
2	11-Feb	Arrival in Yangon. Meeting with National Consultant and LIFT project manager	Yangon
3	12-Feb	Journey to RakhineState (Sittwetown). Visit market and prawn exporter	Sittwe
4	13-Feb	Visit prawn exporters (2)/ State DoF and market	Sittwe
5	14-Feb	Visit prawn farm and prawn hatchery (DoF). Visit 1 village of wild prawn catcher and depot	Sittwe
6	15-Feb	Visit PauktawDoF, visit one prawn farming site and one village. Interview with prawn farmers and 1 exporter	Pauktaw
7	16-Feb	Visit Pauktaw village. Group discussion with prawn farmers. Interview with smallholder prawn farmers, visit the pond. Interview with prawn collector	Pauktaw
8	17-Feb	Interview with 1 farmer; 1 trader/exporter, visit to UNDP and Save the Children. Discussion about livelihood in the townships and their activity. Interview with 1 holder of export license	Sittwe
9	18-Feb	Journey to Myebon. Interview with DoF in Myebon and 1 prawn trader	Myebon
10	19-Feb	Visit 2 villages in Myebon, groups discussion with prawn farmers and interview of collectors (2) and meeting with DRC	Myebon
11	20-Feb	Visit 2 villages in Myebon. Group discussion with prawn farmers and interview of collectors (2).	Myebon

12	21-Feb	Visit 1 village in Myebon. Interview 2 farmers. Visit 1 trader in Myebontown.	Myebon
13	22-Feb	Journey from Myebon to Kyaukpyu. Meeting with DoF	Kyaukpyu
14	23-Feb	Interview traders (3); processing factory (1) and hatchery (1)	Kyaukpyu
15	24-Feb	Visit 2 prawn farms in 2 different villages in Giri-affected area	Kyaukpyu
16	25-Feb	Flight to Yangon and meeting with DoF	Yangon
17	26-Feb	Data Analysis	Yangon
18	27-Feb	Meeting with the Shrimp Farming Association. Meeting with Fisheries Expert of SolidaritésInternational	Yangon
19	28-Feb	Data analysis and report writing	Yangon
20	29-Feb	Data analysis and report writing	Yangon
21	1-Mar	Data analysis and report writing and meeting with Prawn and Fisheries exprt of the FAO Design Mission	Yangon
22	2-Mar	Data analysis and report writing	Yangon
23	3- Mar	Journey back to Phnom Penh	

Appendix 2: List of meetings and person met

	Name	Contact	Meeting place	Date of Meeting	Remark
1	U Win Zaw - manager (U Thein Khin) Wholesaler/exporter	098500993	Sittwe Township	12/2/2012 13/2/2012	
2	U Soe Myine State Officer, DoF, Rakhine	098502998	Sittwe Township	13/2/2012	
3	U Maung Hla Asst: Staff Officer, DoF, Rakhine				
4	U Lin Lin-manager (U Kyaw Zan Hla) Wholesaler/exporter	04323701	Sittwe Township	13/2/2012	
5	U Aung Naing Oo Liaison Officer CARE Myanmar	098502127	Sittwe Township	13/2/2012	
6	U Kyaw Soe Moe Prawn Farmers	098501858 0949245493	Ye Chan Pyin Village Sittwe Township	14/2/2012	
7	U Saw Thein Prawn Farmers				
8	Daw Than Than Aye Officer In Charge Hatchery, DoF	098520250	Ye Chan Pyin Village Sittwe Township	14/2/2012	
9	U Shwe Kyaw Aung Technician Hatchery, DoF				
10	Daw Aye Than (U Kan Gyi Aung) Fry collectors		Pin Le Pyin Village Sittwe Township	14/2/2012	
12	U Sit Aye Paing Fry Importer	095680687	Sittwe Township	14/2/2012	
13	U Aung Kyaw Tun Township Officer DoF, Pauktaw	098523282	Pauktaw Township	15/2/2012	
14	U ThaSein Prawn Farmer		YwaChaung Gyi Village Pauktaw Township	15/2/2012	
15	U San Kyaw Phyu Prawn Farmer				
16	U Thein Tun Shwenaadi	098501815 0949640248	Pauktaw Township	15/2/2012	

	Fishery Wholesaler / farmers				
17	U Than Win Maung Collector/farmers		Thit Poke Village Pauktaw Township	16/2/2012	
18	U Ye Baw Than Prawn Farmers	0949640935	Thit Poke Village Pauktaw Township	16/2/2012	Village Administrator
19	U Khin Maung Win U Thein Nyuing U San Nyunt U None Sein U Pho Khin U Thein Nu		Thit Poke Village Pauktaw Township	16/2/2012	FGD with Prawn Farmers
20	U Hla Sein Maung Prawn Farmer	098500998	Sittwe Township	17/2/2012	Extensive plus with machine
21	U Sein Tun Hla Collector/exporter	095009596	Sittwe Township	17/2/2012	
22	DawNawNawHtoo Township Manager UNDP, Pauktaw	0949281292	Sittwe Township	17/2/2012	
24	U Phlip Mya Thein Township Manager Save the Children		Sittwe Township	17/2/2012	Working at Pauktaw Township
25	DawNwwetNwet Win Regional Officer Save the Children				
26	U Aung Naing Win Export licensed holder Exporter	04323558	Sittwe Township	17/2/2012	Chairman State Shrimp Association
27	U San Aung Kyaw Township Officer DoF		Myebon Township	18/2/2012	
28	U Saw Lwin U Than Tun Collector/exporter	098510230 0949662010 01704199	Myebon Township	18/2/2012	One of the licensed holding company, Sittwe
29	Daw Soe Tin Oo Village collector		Thinganet village Myebon Township	19/2/2012	
30	Prawn Farmers		Thinganet village Myebon Township	19/2/2012	FGD
31	U Maung Ni Shwe Prawn Farmer/collector		Ahlegyun village Myebon Township	19/2/2012	Village Administrator
32	Prawn Farmers		Ahlegyun village Myebon Township	19/2/2012	FGD
33	U Than Tun (Manager) Collector/fry distributor		Ahlegyun village Myebon Township	19/2/2012	
34	DRC		Myebon Township	19/2/2012	

35	Prawn Farmers		SayMyitSwe village Myebon township	20/2/2012	FGD
36	Prawn Farmers		KyeeGaungTaung Myebon township	20/2/2012	FGD
37	U Aung Naing Tun Collector	0949331489	KyeeGaungTaung Myebon township	20/2/2012	Invest just after Giri by request of relative
38	U Aung Thein Tun	C/o 0949662008	WetGaung Village Myebon township	21/2/2012	Village Administrator
39	U Maung Tin Aye Prawn farmer		WetGaung Village Myebon township	21/2/2012	Prawn/rice
40	U Hla Maung Tha Prawn farmer		WetGaung Village Myebon township	21/2/2012	Prawn/rice
41	U Tin Htay (TTT trading) Collector/exporter	098524089	Myebon Township	21/2/2012	
42	U Waikza Tun Farmer/Collector	0949662034	Myebon Township	21/2/2012	Move to Myebon 2010
43	U Tun Tin District Officer, DOF Kyaukphyu	04346186	Kyaukphyu Township	22/2/2012	
44	U Tin Maung Shwe Township Officer DoF, Kyaukphyu	098524073	Kyaukphyu Township	22/2/2012	
45	U Aung San Myint Collector/Trader	098510086	Kyaukphyu Township	22/2/2012	Chairman District Prawn Association
46	U Aung Than Zaw Collector/Trader	098510056	Kyaukphyu Township	23/2/2012	Sold direct to Yangon/Sittwe
47	U Hla Myint Aung Collector/Trader	098510080	Kyaukphyu Township	23/2/2012	Sold direct to Yangon/Sittwe
48	U Aung Kyaw Lin Collector/Trader	0949650579	Kyaukphyu Township	23/2/2012	Sold direct to Yangon/Sittwe
49	U Zaw Aung Manager Asia Golden Prawn Co. Ltd.,	04346212 098510108	Kyaukphyu Township	23/2/2012	Processing factory
50	U Khin Maung Yee Officer in charge Hatchery, DoF		Kyaukphyu Township	23/2/2012	
51	U Maung Ba Officer, DoF Kyaukphyu	0949650604	Kyaukphyu Township	24/2/2012	Responsible for prawn sector
52	U Ba Shin Prawn farmer		Mingan village Kyaukphyu	24/2/2012	Medium size farmer

53	U san Shwe Win Prawn farmer		Wadaung village Kyaukphyu	24/2/2012	Large scale farmer
54	U Hla Win Dy. DG (Rtd), DOF	095025572	Yangon	25/2/2012	Technician
55	Daw Wai Wai Lin Solidarités International	0949341323	Yangon	26/2/2012	Technician
56	U Soe Tun Myanmar Shrimp Association	095015251 01683651	Yangon	27/2/2012	

Appendix 3: Statistics of prawn farming in Rakhine State 2011. (Source DoF)

Township	District	Area (acre)	
		Extensive	Extensive plus*
Sittwe	Sittwe	1023	3866
Ponnagyun		5370	2110
Mrauk-U		207	
Minbya		1354.	4552
Myebon		11012	2862
Pauktaw		24546	7106
Rathedaung			8674
Maungdaw	Maungdaw	8243	7109
Kyaukpyu	Kyaukpyu	7690	355
Munaung		578	
Ramree		1222	90
Ann		10538	
Thandwe	Thandwe	205	373
Toungup		589	
Gwa		30	20
Total		72,609	37,120

*according to DoF, Extensive Plus is a production system inclduigna stocking density around 2 PL/m2 and additional feeding.

Appendix 4: Mapping and village profiles in the different townships visited

PAUKTAW

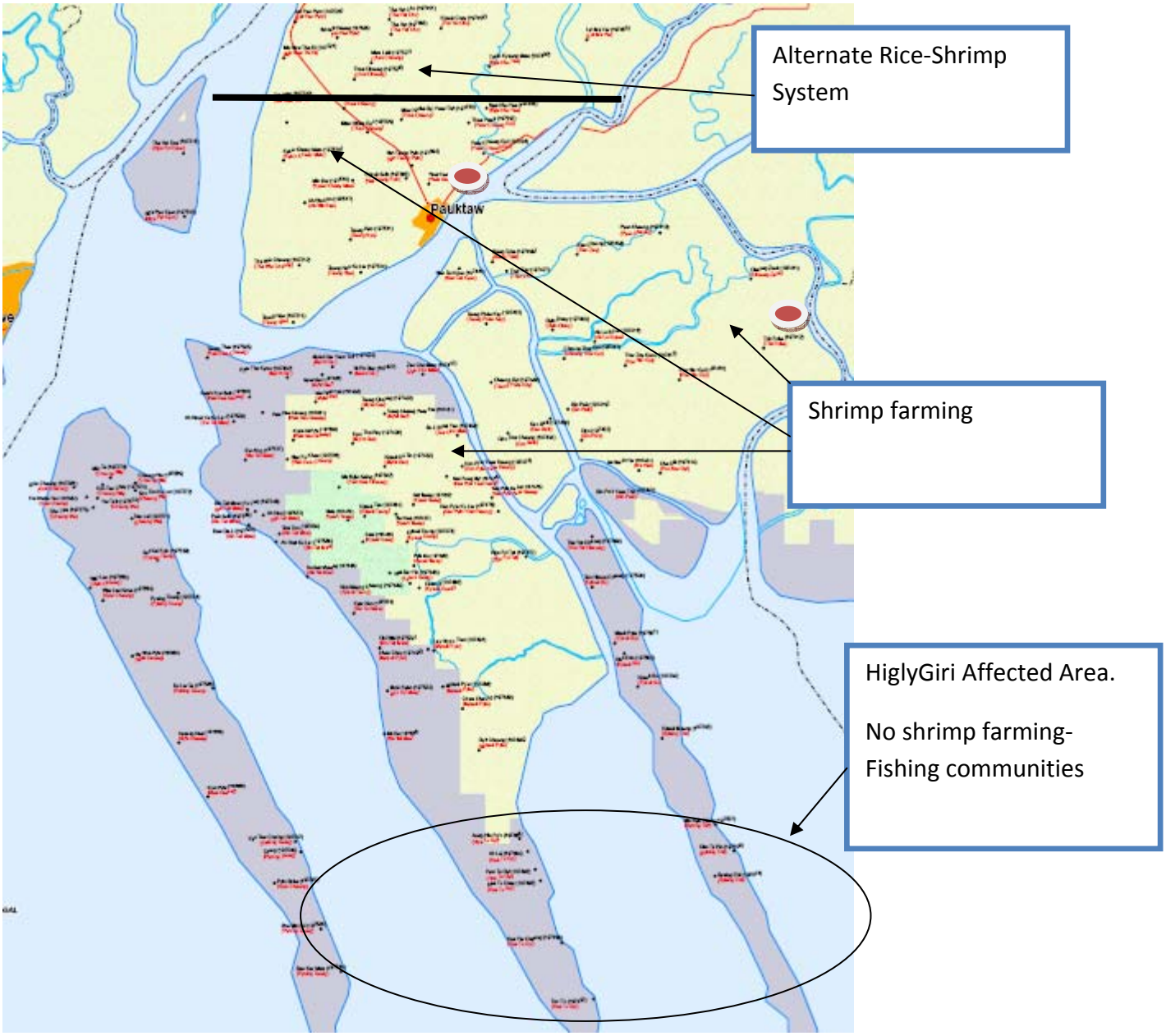

Figure 10:Zoning of prawn farming in Pauktaw Twonship. Location of village visited

Pauktaw township can be divided into 3 main agro-ecological zones.

- The southern part with hills, where farmers cannot raise prawns and where the population relies on fishing;
- The northern area with higher ground and longer freshwater period where farmers follows a rice-prawn alternate system;
- The southern part, where traditional and improved extensive prawn monoculture is the main system.

In Pauktaw township, more than 1,000 farmers raise prawns in ponds of 2 to 12 ha, while only 200 farmers do it on larger ponds. The landowners in the latter case are usually located in Pauktaw or Sittwe town with employees managing the pond. In villages, large landowners (2 to 4) combine their investment capacity to operate ponds larger than 40 ha.

Thit Poke village, Pauktaw Township

The village is considered a prawn farming village, with 50 ponds operated by 150 farmers for a total of 400households. Less than 40% of the households farm prawns; the rest of the households cultivate rice or engage in fishing. Landowners investment jointly to operate ponds, usually 2 to 4 landowners, relatives or friends, who combine their effort and land to raise prawns in large units of 20 to 50 ha. Prawn farming started 15 years ago and the technique has not changed. Stocking post-larvae started in the mid-2000, due to decline prawn yields. Around 10% of the farmers have a “double” loan contracted to the prawn collector and 1% of the farmers are bankrupt and had to sell their property according to other villagers.

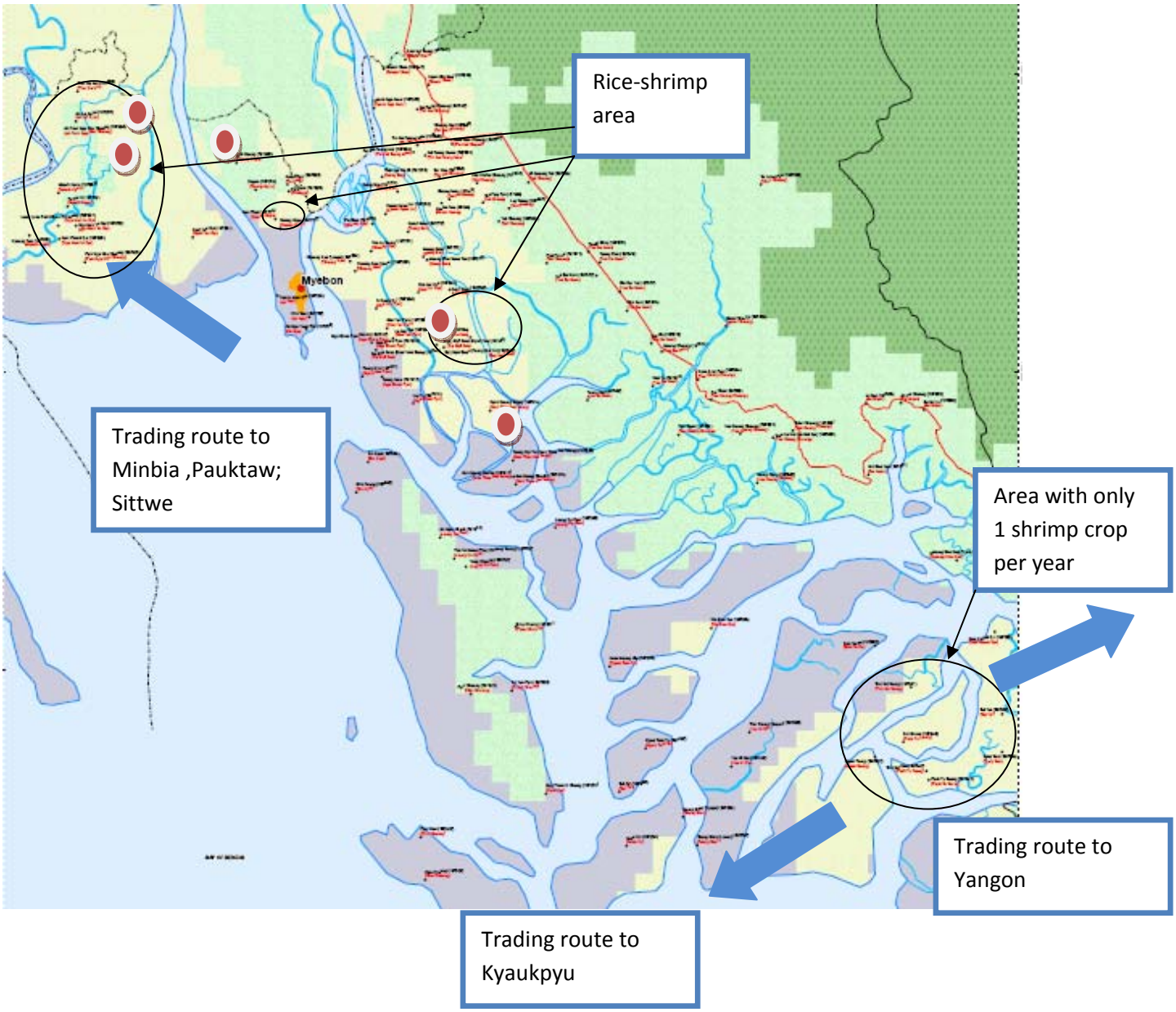

Figure 11: Zoning of prawn farming in Myebon township. Location of village visited

Prawn culture in Myebon is characterized by extensive systems based on natural PLs trapped in the pond. Around 10% of the ponds are stocked with PLs in addition to natural recruitment. Around 35% of the farms cannot raise prawns all year long because they are located on high ground (southeastern part) and/or because they have enough fresh water in the rainy season to cultivate rice. Part of Myebon is located next to an estuary and the fresh water influence is more important than in other townships. When heavy rainfall occurs, the water is loaded with sediment and the salinity level can drop quickly.

In Myebon township, prawn farming was developed in rice farming areas. Rice fields were converted into alternate rice-prawn or prawn monoculture fields. These changes created brackish water intrusion into rice field and are the source of some local conflicts.

According to the DoF, around 25% to 30% of the farms are larger than 50 acres (20 ha), 45% between 50 and 10 acres (4 to 20 ha), while 25% are small-holders with prawn farms smaller than 4 ha. The township has different trade routes and farmers can trade their products to Kyaukpyu, Sittwe or Minbya and purchase their PLs from Pauktaw or Kyaukpyu.

After Cyclone Giri 50% of the ponds were damaged.Since 2004, 3 cyclones have hit the township, with severe damage to pond embankmentseach time. In addition, around 40% of the ponds suffered from losses in the recent years due to “disease outbreaks”(but no proof) and pollution from upstream water, with run-off water loaded with sediments. In response, farmers have reduced the farming area due to limited investment capacity. The township counts 200 collectors and 4 main traders. Prawn farms market not only *P. Monodon*, but also *P.indicus* and *Metapaneaus sp.,* which represent 20% to 40% of the value of the traditional extensive ponds. In Myebon there are fewer collectors of wild PLs compared to Pauktaw or Sittwe and access to PLs is mainly through collectors and traders, the same people who are buying the adult prawns.. In remote areas, in southeastern part of Myebon, farmers still practice an extensive system without stocking. In this area the yield is not too low but farmers have difficultyaccessing PLs for stocking. Also, famers have limited investment capacity and cannot afford PLs.

Thinganet and Ahlegyun villages, Myebon township

Thinganet village consists of 157 households, of which only 12 raise prawns (80% following the rice-prawn system). 53 households from neighboring villages cultivateprawns on village territory. In those villages around 50% of the households are landless and do wage laboron rice and prawn farms as the main livelihood activity. Most of the ponds are paddy fields converted into prawn ponds in the late 90s or early 2000s. Cohabitation ofprawn ponds and rice fields creates some conflict with saline water intrusion into rice fields or conflict for access to fresh water for rice irrigation through the prawn ponds. Prawn yields have declined since 2005-2007, and now stocking of PLs is necessary. In 2011, most farmers’ prawn crops failed and they were forced to accumulate loans from local prawn collectors. Only 3 to 5 households sold their land to large landowners due to crop failures.

Saymyt Swe and KyeeGaundaung villages, Myebon township

In both villages the dominant farming system is rice–prawn. Only lowland and mangroves reclaimed in the 2000s are used for prawn monoculture. The prawn culture system is a traditional extensive system without additional stocking of PLs. Rice-prawn farmers represent 30% of the households in SaymitSwee and 12% in KyeeGaundaung, with landholdingsfrom 2 to 20 acres in SaymitSwee and 20 to 100 acres in KyeeGaundaung. The proportion of prawn farmers with landholding from 30 to 100 acres is lower, less than 10% in each village. Prawn farmers are local villagers. Large ponds reclaimed on mangrove areas started in 2002-2004. Now the entire mangrove has been converted into prawn ponds. Rice farmers started to raise prawns in their paddy fields in the dry season after embankments were damaged. In villages, according to the DoF, some ponds have been abandoned due to lack of investment capacity following several failures.

Wet Gaung Village, Myebon township

The village consists of 600 households, of which 100 follow the alternate rice-prawn system. In this village, the rice-prawn system was introducedrecently (2007) following damage to the salt water intrusion protection system (embankments). Farmers mostly use traditional systems based only on seeds trapped in the pond. The cultivated area is from 6 acres to 50 acres. There are no large outside investors cultivating prawns in the village. There is one prawn collector in the village, but farmers can also trade directly in Myebon due to the short distance (20-30 min drive).In this village the yield has decreased by 50% to 70% since 2007 and farmers have been affected by high tides flooding the ponds and embankments almost every year.

KYAUKPYU

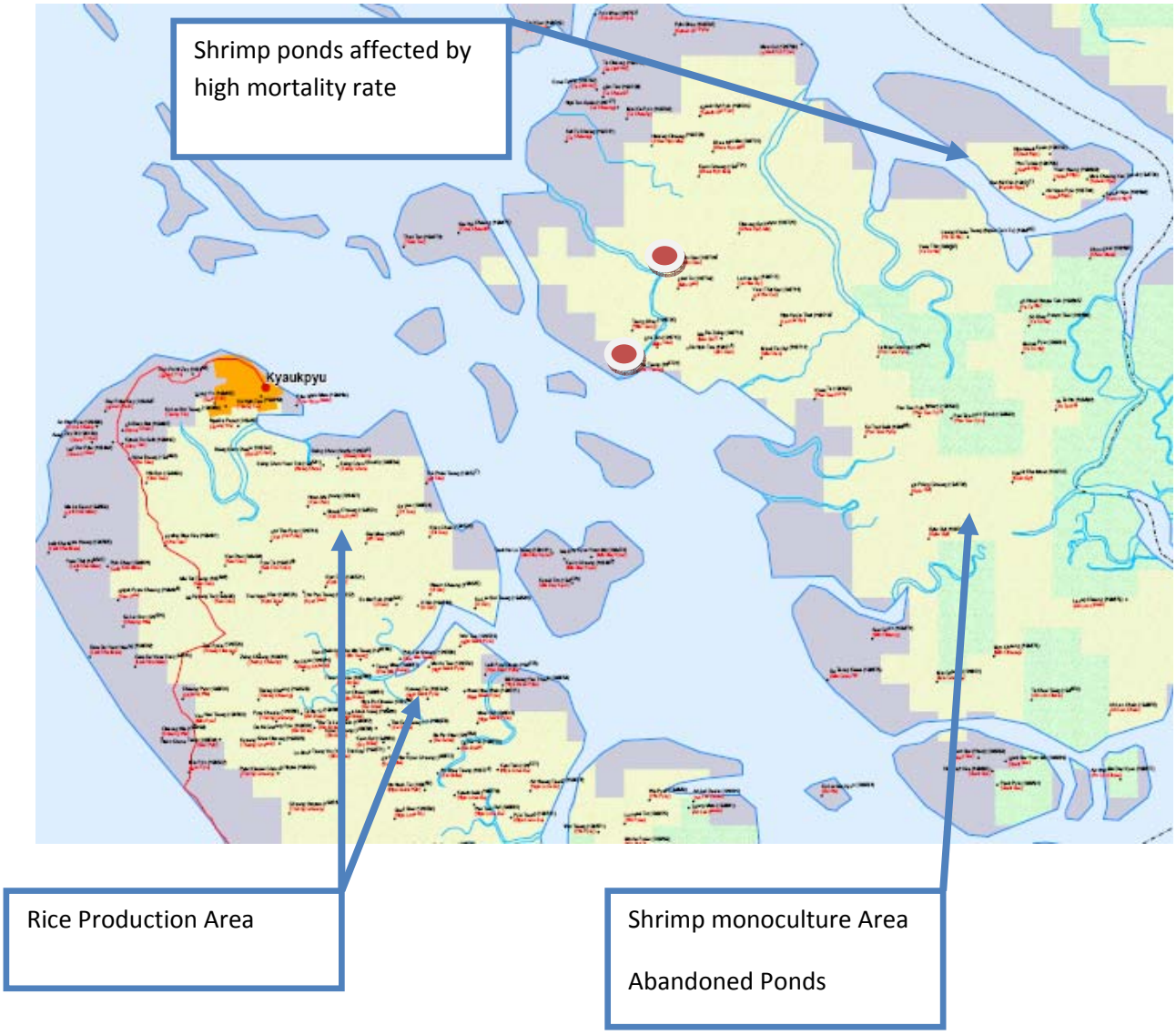

Figure 12: Zoning of prawn farming in Kyaukpyu township. Location of village visited

Only one part of Kyaukpyu is producing prawns. Compared to Myebon and Pauktaw, the area is less influenced by fresh water in the rainy season and the salinity is never too low according to DoF staff. All the ponds follow traditional systems, based on wild PLs trapped in the pond. The prawn ponds were

reclaimed starting in the late 90s on mangrove areas and designated “waste land” for more than 70% of the area (5,200 ha of the 73,000 ha of prawn farming). The rest of the prawn farms were developed on converted rice land. Seventy percent of the farms are between 20 and 30 acres and the remaining 30% between 30 and 50 acres. The average yield is now under 16.6 kg per acre (41 kg per ha).

For the last 5 years and especially after Cyclone Giri, the prawn ponds have been abandoned by farmers due to declining prawn yields and lack of investment capacity. Sixty-six percent of the ponds were abandoned in 2011 compare to 2002, and an updated estimate gives a figure closer to 80%. Better-off farmers who could raise the dikes converted their prawn ponds back into rice fields. Most of the prawn ponds are operated by several shareholders, most of whom are from the same village. There are only few private investors from urban centers who have invested in prawn ponds.

Appendix 5: Interview Topic list

FGD with farmers at the village level

Marketing

- Can you map the value chain?
- What are your relations with the different actors of the value chain? Including other farmers?

For each of the stakeholders involved, ask:
Where and to whom you sell your products?

- What is the level of formality? Informal / verbal arrangement/ formal written contract
- When and how are the prices are set?
- Is there contract or oral arrangement?
- What is the level of trust? How much do you trust these individuals? :
    - distrust/ no trust/ a little trust/ some trust/ full trust

- How long have those linkages existed? How have they evolved? How long has the trading relationship lasted?

Rules and regulations

Do you pay any fees associated with your business?

- Formal fees:
    Licenses
    Transport permits
    Land taxes
- Informal fees?

Prawn prices and quality

Are you aware of the quality grading standards for prawns?
What are the most important qualities for marketing prawns?
Describe the different classes

Pricing evolution:Prawns quality	Price in dry season (/kg)	Price in rainy season (/kg)	Others
Prawn No. 1			
Prawn No.2			
Prawn No.3			

Why does the price at which you sell prawns to the trader/wholesaler fluctuate (change) during the course of the year?

-Change in transport costs □ decrease □ the same □ increase
-Quality of prawn change □ decrease □ the same □ increase
-Change in demand (such as more demand by consumers at different times of the year)
□ decrease □ the same □ increase
-Change in supply (such as greater prawn production at different times of the year)
□ decrease □ the same □ increase
-Other reasons (please specify) □ decrease □ the same □ increase

- What post-harvest activities are you doing on prawns? Describe and quantify the added value
- How much of the harvest is lost and cannot be sold?
    - Why?
    - What percentage is lost?
    - Do buyers reject prawn because of post-harvest problems?
    - Have buyers offered lower prices due to post harvest problems?

Diversification

What else do you harvest from the pond? How is it important for your households in terms of:

- Food security? (rank as : Very important/important/ not really important)
- HH income? (rank as : Very important/important/ not really important)

Trend & perspectives

What is the trend for prawn production over the past five years?
Are you as a prawn farmer providing more or less prawns?
Are there more or less traders in the prawn business?
Is the prawn price higher or lower?
What do you think about the future of prawn farming in your village?
What is the next step and evolution and why?

- What are the main constraints in the future (technical, economic, market, access to inputs etc.)
- What are the opportunities for farmers?
- What are the main reasons for failure and bankruptcy?
- Do you receive any support from the government?

Producers

Township:

Village name Farmer's Name:

A- General information

- Function in the farm (manger, worker, farmer)
- How many years in the village?
- How many years cultivating prawns?

B- Farm size and farming system

Farm area: Farmed area: Production system:

Pond shape and depth: Access to water (type/direct/indirect) :

How many crops per year ? All year long or only part of the year? Other culture on the farm?

B1-Inputs

Stocking post-larvae (prawns) or other aquatic animal:

- If yes , where are they bought from?
- At what price? Pay cash or loan/ pay after harvest?
- Where did they come from?
- Is it always available or can some shortage happen?
- How can the quality be assessed?

What input is used in the pond?

- Fertilizers (how many kg/bags and what price/where do you buy and easy availability/access?)
- Lime (how many kg/bags and what price /where do you buy and easy availability/access?)
- Feed (how many kg/bags and what price /where do you buy and easy availability/access?)

How many people are working on the farm?

- Permanent workers: how many months per year and what salary? Where do they come from?
- Wage labor: how many days per year or crop, for what particular purpose and what salary? Where do they come from?

What type of equipment is needed on the farm?

- Land preparation & pond design? And how much does it cost?
- Harvesting technique and equipment? And how muchdoes it cost?
- Processing/packaging? And how much does it cost?
- Ice? *How much and what price?*
- Pumping machine? For what and how muchdoes it cost?
- Fuel consumption per year or per crop?
- Transportation equipment? And how muchdoes it cost?
- Sluice gate (concrete)?
- Motor Pump?

B-2 Outputs

- When do you harvest?
- What do you harvest, only prawns or other aquatic animals?
- In the recent years how much did you produce on your farm? If harvest every month (or twice a month) ask the details.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Kg prawn harvested												
Price sold (Unit)												
Other product harvested												

- How much of the harvest is lost and cannot be sold?
    - Why ?
    - What percentage is lost?
    - Does buyer reject prawns because of post-harvest problems?
    - Have buyers offered lower prices due to post-harvest problems

Virus

- How many times a year do you have disease outbreaks?
- How much of your harvest do you lose?
- What do you do to prevent that?
- What do you do to cure that?

C-Access to loans

What are the main sources to finance your business?

- Self-financing
- Borrowing from traders
- Borrowing form financing structure (Bank/micro-finance)
- Relatives/friends
- Other (specify)

For each, ask the amount, the relative % of the crop it represents, interest rate and terms of repayment (number of days)

D- Marketing

Where to whom you sell your products?

- What is the level of formality? Informal / verbal arrangement/ formal written contract
- When and how are the prices set?
- Is there contract or oral arrangement?
- What is the level of trust? How much do you trust these individuals? :
    - distrust/ no trust/ a little trust/ some trust/ full trust

- How long have those linkages existed? How have they evolved? How long has the trading relationship lasted?
-

D- Rules and regulation

Do you pay any fees associated with your business?

- Formal fees:
    Licenses
    Transport permits
    Land taxes
- Informal fees?

Prawn Traders / Processors and Exporters

Township:

Village name: Manager Name:

General information

- Main Occupation:
- How many years in the village?
- How many years trading prawns?
- Number of workers(permanent)
- Number of worker (seasonal)

Buying

Who and where do you buy prawnsfrom?

Dry season

- Producers: Nbr - Kg/season – Average buying price -distance
- Traders Village : Nbr - Kg/season – Average buying price-distance
- Larger traders : Nbr - Kg/season – Average buying price-distance

% of each grade of prawn (estimation)

Rainy Season

- Producers: Nbr - Kg/season – Average buying price-distance
- Traders Village : Nbr - Kg/season – Average buying price-distance
- Larger traders : Nbr - Kg/season – Average buying price-distance

What do you do after purchasing prawns?

- Sell fresh
- Packaged
- Processed (describe)
- Others
- If No Post-Harvest Activities Done, Why Not?

Selling

Who and where do you sell prawns to?

Dry season

- Traders Village : Nbr - Kg/season – Average selling price -distance
- Traders/depot in town : Nbr - Kg/season – Average selling price -distance
- Wholesaler in town: Nbr - Kg/season – Average selling price-distance

- Retailer in town: Nbr - Kg/season – Average selling price-distance
- Processor in town: Nbr - Kg/season – Average selling price-distance
- Exporter Processor in town: Nbr - Kg/season –Average selling price-distance
- Export Outside province Nbr - Kg/season – Average selling price-distance

Rainy Season

- Traders Village : Nbr - Kg/season – Average selling price-distance
- Traders/depot in town : Nbr - Kg/season – Average selling price -distance
- Wholesaler in town: Nbr - Kg/season – Average selling price-distance
- Retailer in town: Nbr - Kg/season – Average selling price-distance
- Processor in town: Nbr - Kg/season – Average selling price-distance
- Exporter Processor in town: Nbr - Kg/season – – Average selling price-distance
- Export Outside province Nbr - Kg/season – – Average selling price-distance

For Exporters Only (Yangon or BGD)

Where do you export and who are the buyers?
What do you export ? What type of products?
Why do you choose to export to that destination (price/facilities)?
What are the constraints for export?
How are the prices set for export?

What are the formal fees?

- Border fees
- Transportation fees

Do you pay informal fees?

Post harvest

Did post harvest problems cause loss of quality or prawn destruction?

- What caused post-harvest losses?
- Have buyers rejected prawn because of post-harvest problems?
- Percentage of total prawnvalue lost because of post-harvest losses?
- Percentage of total prawnvolume lost because of post-harvest losses?

Do you store prawns?

- What is your average storage period for prawns?
- What was the average quantity of prawns stored ?
- Do you have a limited storage capacity? And why?

- What proportion of prawn products was spoiled during storage? (%)
- What kind of transportation do you use for prawns?

Economic Aspects

Operating cost

- Gasoline cost per season
- Labor cost per season
- Ice per season
- Packaging per season

Do you pay any fee associated with business?

- Formal fee:
  - License
  - Transport permit
- Informal fee?

Loan arrangement

Do you offer loans to producers/other traders as part of your prawn business?
If yes please specify:

- Nbr of producers/other traders who you have lent cash
- Loans range from XXXX to XXX per producer
- Loans range from XXXX to XXX per trader

Do you charge interest and how much?
Do producers/other traders who borrow money sell to you exclusively? And at what price (current market/lower market price)?
How many producers/other traders who borrow money run away with loans?

Borrowing

What are the main sources for financing your business?

- Self-financing
- Borrowing from traders
- Borrowing form financing structures (Bank/micro-finance)
- Relatives/friends
- Other (specify)

Trend of prawn production and prices

What is the trend for prawn production over the past five years?

Are producers providing more or less prawns?
Are there more or less traders in the prawn business?
Is the prawn selling price higher or lower?

Why does the price that you offer to sellers (producers/smaller traders) fluctuate (change) during the course of the year?

Change in transport costs
Quality of prawn change
Change in demand (such as more demand by consumers at different times of the year)
Change in supply (such as greater prawn production at different times of the year)
Other reason (please specify)

Why does the price at which you sell prawns to the buyers fluctuate (change) during the course of the year?

-Change in transport costs
- Quality of prawns change
- Change in demand (such as more demand by consumers at different times of the year)
-Change in supply (such as greater prawn production at different times of the year)
-Other (please specify)

Constraints and Opportunities

Which are the biggest constraints /challenges you face in running your business?

How do you overcome them?

What are the main reasons for failure and bankruptcy?

In the next 2 years do you plan to:

- Maintain current business/ Reduce activity/ Expand
- Explain why

What type of changes would you like to see in your prawn business in the future?

What are the opportunities?

Appendix 6: Price and grading of *P. monodon* in February 2012

Table 19: Buying and selling price of the different *P. monodon* classes for large traders and exporters (Sittwe) in February 2012. Average low and high price for each class

Grade (headless)	Buying Price (MK/viss)	Selling price (MK/viss)
Grade 1- 8-12 pieces. Per 450g	20,500 – 22,500	23,000-23,500
Grade 2- 13-15 pieces. Per 450g	17,500 – 19,500	20,000 – 20,500
Grade 3- 16-20 pieces. Per 450g	14,500 – 16,500	17,000 – 17,500
Grade 4- 21-30 pieces. Per 450g	11,500 - 13,500	13,000 -14,500
Grade 5- >31 pieces. Per 450g	7,500 - 9,500	10,000 -10,500

Table 20: Buying and selling price of the different *P. monodon* classes for large traders and exporters (Kyaukpyu) in February 2012. Average low and high price for each class. Buying grades are in inches and selling grades are based on weight. Grades are used when sorting the product.

Grade (headless)	Buying Price (MK/viss)	Selling price (MK/viss)
4 inches per 450g	20,000 – 22,000	23,000- grade 0 22,000 – grade 1 18,000 – grade 2
3 inches per 450 g	12,000 – 14,000	15,000 – grade 3 14,000 – grade 4
<3 inches per 450 g	7,000 – 9,000	12,000 – grade 5