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INLAND MYSAP

MYSAP
Myanmar Sustainable Aquaculture Programme
မြန်မာရေသတ္တဝါမွေးမြူရေးကဏ္ဍရေရှည် ဖွံ့ဖြိုးတိုးတက်ရေးစီမံကိန်း

Value Chain Report – Kyaing Tong

DEPARTMENT OF FISHERIES MYANMAR

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

WorldFish

The Myanmar Sustainable Aquaculture Programme (MYSAP) which is funded by the European Union (EU) and the German Federal Ministry of Economic Development and Cooperation (BMZ) and implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH has the following objective:

Support the sustainable intensification of the aquaculture sector, thereby realizing its potential for food security, nutrition and sustainable livelihoods

MYSAP is promoting small-scale aquaculture and improved human nutrition in five townships in the Shan State and the Sagaing and Mandalay Regions of Myanmar in its component INLAND MYSAP. WorldFish Myanmar is implementing INLAND MYSAP under a GIZ grant agreement. The INLAND MYSAP townships are:

i) Kale (ကလေး - MMR005027) Township, Sagaing Region
ii) Shwebo (ရွှေဘို - MMR005004) Township, Sagaing Region
iii) Kengtung (ကျိုင်းတုံ - MMR016001) Township, Eastern Shan State
iv) Pinlaung (ပင်လောင်း - MMR014009) Township, Southern Shan State
v) Amarapura (အမရပူရ - MMR010006) Township, Mandalay Region

Mekong Economics Limited, a commercial company was contracted under a service agreement with WorldFish Myanmar to conduct the INLAND MYSAP baseline survey after a tendering process.

The findings of the INLAND MYSAP baseline survey were presented by Mekong Economics Limited at a workshop held in Nay Pyi Taw on 26 June 2018 which was attended by 70 key stakeholder participants including government, NGOs, farmers and donors.

Feedback from key stakeholders has been incorporated into this final version of the INLAND MYSAP baseline survey report for release into the public domain.

The findings of the INLAND MYSAP baseline survey report will be used by the Government of Myanmar, the EU and BMZ, MYSAP and collaborating implementing partners to assess progress towards both programme level and project level objectives and results and programme and project level impact.

For further information on MYSAP please contact the Head of Project Mr Peter Buri (peter.buri@giz.de) and for further information on INLAND MYSAP and/or the baseline survey report please contact: inlandmysap@cgiar.org.

Value Chain Report – Kyaing Tong Township

1. Introduction

In this section, we briefly introduce the intervention and its objectives, and the value chain research that was conducted as part of a baseline study of the INLAND MYSAP project.

Project Description

WorldFish Myanmar in collaboration with the Department of Fisheries (DoF) R&D Division, under the Ministry of Agriculture, Livestock and Irrigation (MoALI), will implement the project 'Improving the production, nutrition and market values of small-scale aquaculture in Myanmar's Shan State, and Sagaing Region' (INLAND MYSAP). INLAND MYSAP will run from 06 April 2017 to 05 May 2020.

The development goal of INLAND MYSAP is to increase the availability and access of fresh water aquaculture products sustainably produced by small-scale aquaculture producers, and to provide nutritious, affordable food and incomes for the poor and vulnerable in Shan State and Sagaing Region. Amarapura Township in Mandalay Region was recently added to the project area.

Value Chain Study

As part of the baseline research conducted for this project, a value chain study was commissioned to understand the constraints facing selected aquaculture value chains and the opportunities for value-chain upgrading and increasing fish consumption. Mekong Economics (MKE), a leading socioeconomic development consultancy in the Mekong region, was contracted following a limited tender process to implement the baseline research, including the value chain study.

The following themes are touched upon, to varying degrees, in the value chain study: (1) production; (2) markets; (3) nutrition; (4) climate resilience; (5) gender equality; and (6) governance. Opportunities for the following are highlighted: (1) livelihoods improvement; (2) product development; (3) processing; and (4) service provision. These will serve to inform the specific contents of the intervention and to steer the project's overall direction.

2. Methodology

The methodology adopted for the value chain research combines quantitative and qualitative tools to answer specific research questions. Concurrently with the value chain study, a survey of households was conducted to obtain baseline values of indicators. Some of the value chain research was able to "piggyback" on the household survey, but mostly relied on separate data collection tools. These consist of: (1) a market survey; (2) key informant interviews; and (3) focus group discussions.

Research Questions

The research questions of this study comprise a single lead question in addition to five sub-questions. They were as follows.

Lead Question: Can aquaculture help to replace fish previously supplied from the wild and if so what is the best way of doing this to improve low-income people's fish consumption?

Sub-question 1: Are we experiencing an increase in the proportional supply of farmed fish? If so, what are the resulting changes in local fish trade and consumption practices?

Sub-question 2: If there has been an increase in fish from aquaculture in the area, has the price of fish at local markets remained stable, lowered or increased?

Sub-question 3: Are local fish farmers and collectors facing important logistical challenges to supply their products to the market? What are they and how do they address these?

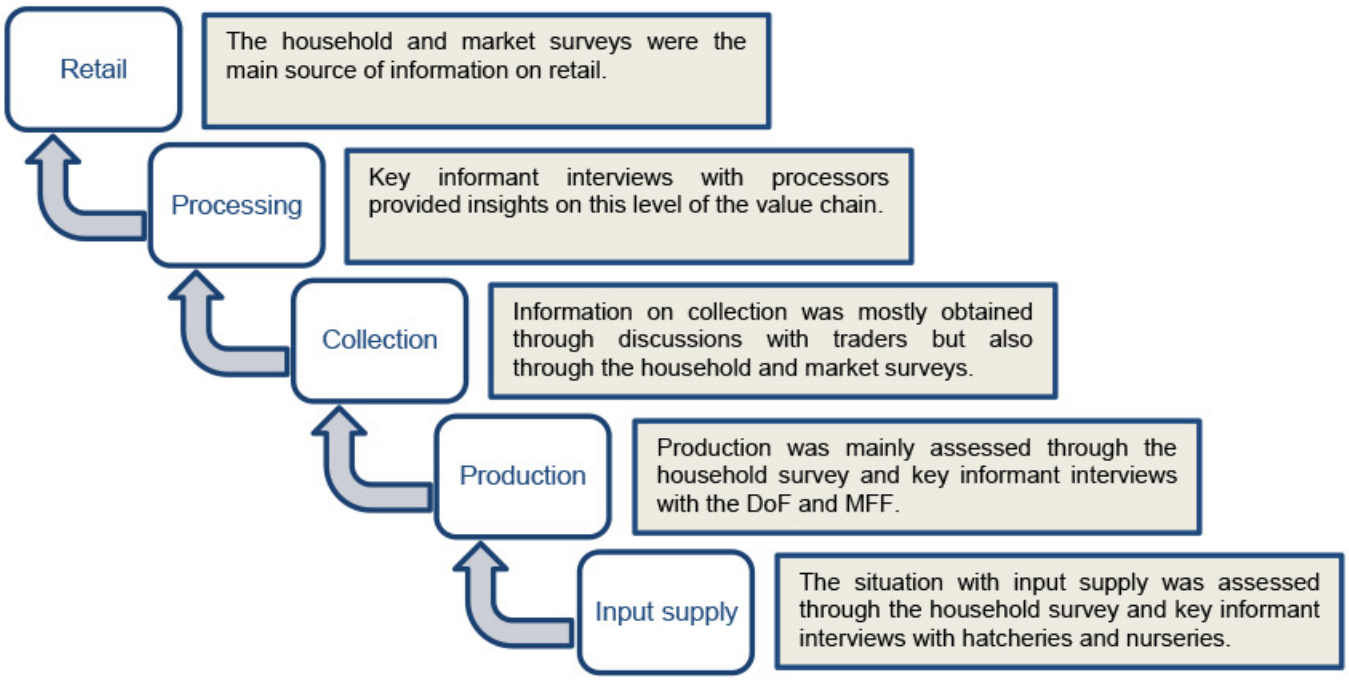
Sub-question 4: How is local fish farming positioned compared to the wild-caught and Yangon-farmed fish supply? What are the main interrelations between these three supply chains?

Sub-question 5: What is the prevalence of fish processing practices and related consumption? Are there interesting prospects for the project to support these?

Research Strategy

The research strategy was to employ mixed (quantitative and qualitative) methods to obtain information along the value chain. The various tools deployed were: (1) a household survey; (2) a market survey; and (3) qualitative interviews with the DoF, the Myanmar Fisheries Federation (MFF), hatcheries, nurseries, processors and traders. For the purpose of this value chain study, a 'trader' was defined as someone who purchases fish from a fish farmer or another trader. While a 'vendor' was defined as someone who sells fish to consumers. Note that traders can also be vendors.

Value chains were evaluated at the following five levels:



The value chain analysis drew a distinction between the following three types of fish species: (1) carp species – namely Indian major carps, being rohu, catla, and mrigal, and Chinese carps, being common carp, silver carp, big head carp and grass carp; (2) tilapia; and (3) small indigenous species (SIS). The following three supply chains were considered, although the focus was on the first of these: (1) locally farmed fish; (2) Yangon-farmed fish; and (3) wild-caught fish. The value chain study was conducted in five townships, with separate reports for each: (1) Kalay (Sagaing Region); (2) Amarapura (Mandalay Region); (3) Kyaing Tong (Shan State); (4) Pinlaung (Shan State); and (5) Shwebo (Sagaing Region).

Where possible, a triangulation approach was used with multiple sources of information to corroborate data.

Quantitative Tools

The quantitative tools consisted of a baseline household survey and a market survey in the five townships.

Household Survey

The household survey employed a quantitative questionnaire to collect data from 847 households, of which 156 were sampled from Kyaing Tong Township. These were split roughly equally between three sets of locations: (1) four wards of the township capital; (2) four production hubs (wards/villages with above-average aquaculture involvement); and (3) four rural villages (those in village tracts).

Market Survey

A market survey was conducted with fish vendors in each township. The sample consisted of randomly-selected vendors in each market, with one major market and two or three minor markets surveyed in each township.

Qualitative Tools

As can be seen in Table 1, the qualitative tools used for the Kyaing Tong value chain study consisted solely of key informant interviews (KIIs). A KII is a conversation with a relevant individual conducted by trained staff that usually collects specific information about one person. Semi-structured questionnaires were developed for all qualitative interviews. These are included in the Annexes.

Table 1

Interview format	Stakeholder(s)	Interview date	Interview location
KII	DoF	24/04/2018	Kyaing Tong
KII	Private hatchery	27/04/2018	Kyaing Tong
KII	Private nursery	28/04/2018	Kyaing Tong
KII	Trader (male)	28/04/2018	Kyaing Tong
KII	Trader (female)	28/04/2018	Kyaing Tong
KII	Trader (female)	29/04/2018	Kyaing Tong
KII	Processor-vendor (male)	27/04/2018	Ka Htike
KII	Processor-vendor (female)	27/04/2018	Ka Htike

3. Value Chain Map

See Annex A for a value chain map of the fish sector in Kyaing Tong Township.

4. Market Information

Market information was collected from the following three market locations: Myoma (major market), Ah Khar (minor market) and Ka Htike (minor market). The following map marks these locations. Randomly selected vendors accounted for roughly 60%, 70% and 40% of traded volumes at Myoma, Ah Khar and Ka Htike Markets, respectively, on the day of

visit. 92.3% of vendors randomly selected for interview were female, suggesting that Kyaing Tong vendors were mostly female.

Fish Sales

Figure 1 compares sales volumes for wild-caught fish and different types of farmed fish across the three markets surveyed. The township total was calculated by summing volumes at the three markets.

The main wild-caught fish species in Kyaing Tong were: (1) swamp eel; (2) striped snakehead; (3) spotted snakehead; (4) climbing perch; and (5) spotted barb. These were reported be mostly available from June to September, during the wet season. In terms of wild-caught small indigenous species, only spotted barb was found being sold in Ah Khar. No farmed small indigenous species were observed in the markets. According to the household survey, only three fish farmers deliberately stocked small indigenous species.

Farmed fish species found in the township included: (1) tilapia; (2) common carp; (3) rohu; and (4) grass carp. Producers of mrigal and big head carp were found as well. Tilapia and common carp were the most abundant in markets. These were reported be found throughout the year, originating in ponds located in villages throughout the township. In addition to these species, both locally and Yangon-farmed hilsa were sold by vendors in the township, though these were less common. Thai-imported aquatic products were also prevalent in Kyaing Tong markets. These typically included giant freshwater prawn, freshwater shrimp and walking catfish, which pass through the border town of Tachileik.

Seasonal Variation

Figure 2 depicts the extent of seasonal variability in sales of different kinds of fish in Kyaing Tong using a four-point Likert-type scale (very much, quite a lot, a little bit, not at all). The township average was a simple average of observations from all three markets.

It was reported that sales volumes are at their highest during festival periods (Chinese New Year, Christmas, etc.).

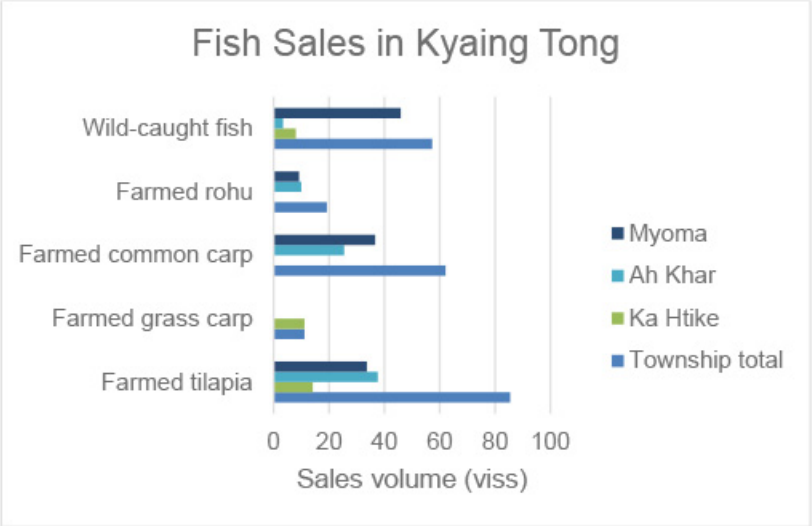


Figure 1

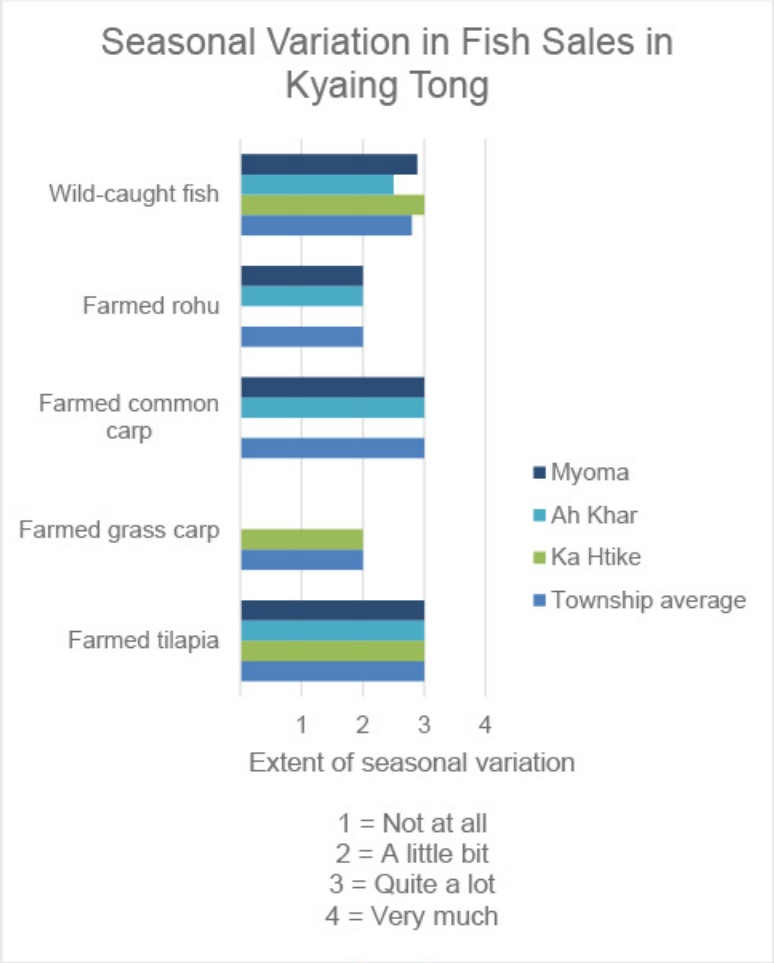


Figure 2

Fish Prices

Figure 3 displays the price of different kinds of fish in each of the three markets surveyed. The price for each market is the simple average across vendors, whereas the township average is the average of observations from all three markets.

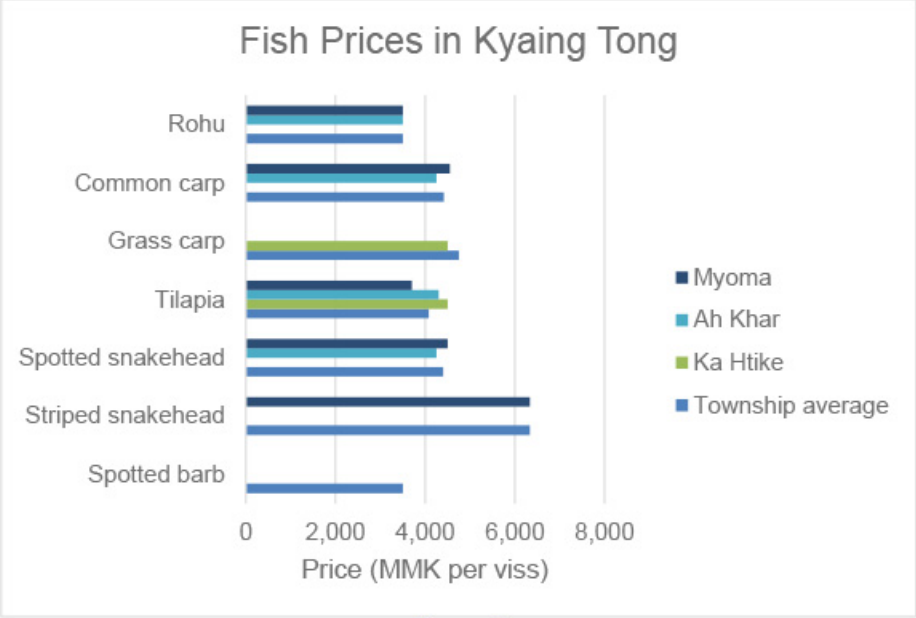


Figure 3

Seasonal Variation

When asked about the extent of seasonal price variation of different kinds of fish, vendors in Kyaing Tong consistently responded with "a little bit", regardless of whether the fish was farmed or wild-caught. However, oral reports indicated a more pronounced price differential for wild-caught fish, with the increased supply in the wet season resulting in prices that were between MMK 500 to 1,000 lower than during the dry season. The difference was even more pronounced for swamp eel, which was around MMK 2,000 cheaper in the wet season. In contrast, it was reported by some that the price of tilapia, common carp and Thai-imported aquatic products were fairly consistent throughout the year.

5. Answers to Research Questions

In this section, we seek to answer the research questions underpinning this study.

Lead Question: Replacing Wild-Caught Fish and Improving Fish Consumption

Traders reported that wild-caught fish consumption was highly seasonal, serving as a replacement for farmed fish consumption during the rainy season when wild-caught fish was abundant and therefore cheaper than their farmed counterparts. Farmed fish also becomes more expensive in the rainy season due to higher water levels in farms, which make it more difficult to harvest fish, reported one fish farmer and wholesaler. The reverse was found in the dry months, when farmed fish are in greater supply. Thus, efforts to expand the aquaculture sector and consumption of farmed fishes in Kyaing Tong should look at improving their year-round availability and affordability.

The main challenge may in fact be promoting fish consumption in the township. The DoF pointed out that, despite the fact that aquaculture production has increased in the township, the volume of fish sales has not increased in tandem. The household data suggests that fish consumption is not particularly high, with the average household member

consuming 2.99 meals containing fish per week, in comparison with 3.43 and 4.56 in Shwebo and Amarapura, respectively. The DoF suggest a strategy of publicising the nutritional value of fish, since at present many Kyaing Tong inhabitants consume fish out of personal preference rather than because of perceived dietary benefits.

On the production side, the household data revealed that fish farmers perceive proximity to water resources, better market access and better access to fish seed as most helpful for expanding aquaculture (see Figure 4).

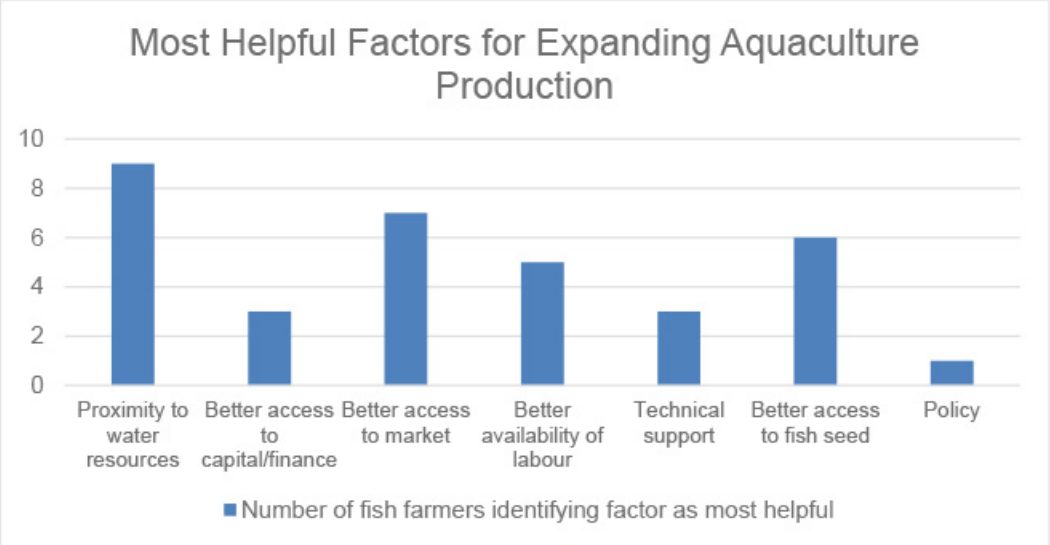


Figure 4

Sub-question 1: Changes in Supply of Farmed Fish

According to the DoF and some traders and vendors, there has been an increase in the number of fish farms in the township over the past few years, with a corresponding but not substantial increase in the total supply of fish. Yangon-farmed fish was reported to have decreased but was not widely consumed in Kyaing Tong in the first place. They also suggested that the supply of wild-caught fish has decreased, such that there is likely to have been a proportional increase in farmed fish.

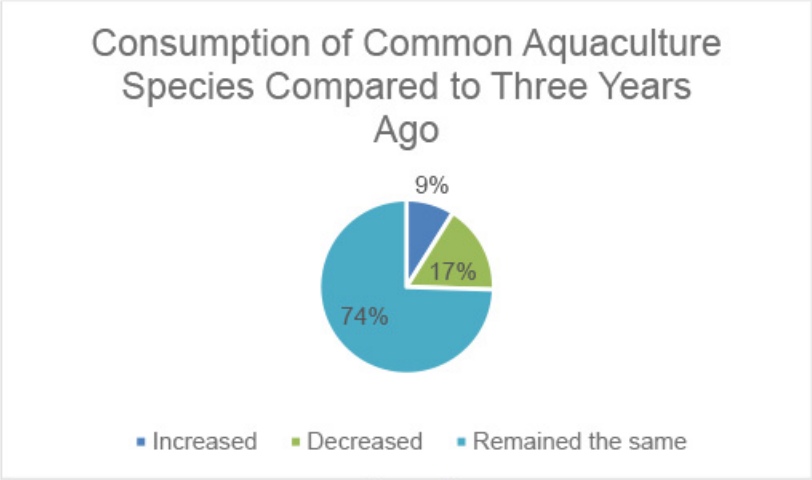


Figure 5

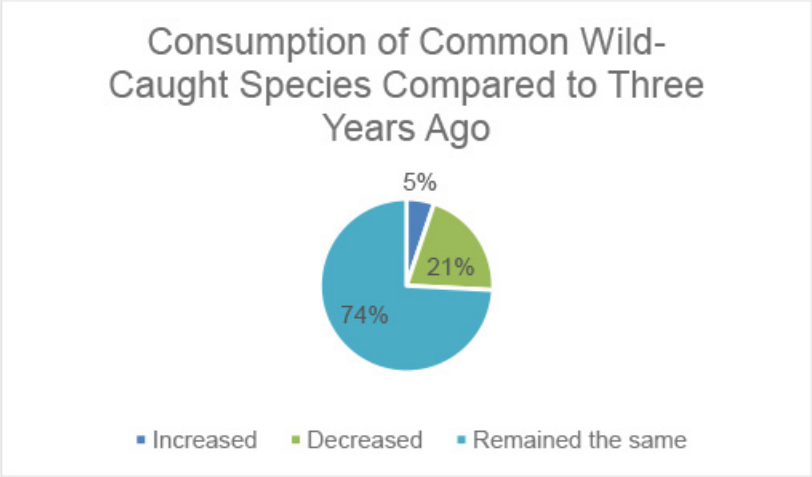


Figure 6

Table 2

Change in production compared to three years ago (% of responses)	Aquaculture	Fish						
		Rohu	Mrigal	Common carp	Big head carp	Grass carp	Tilapia	Small indigenous species
Increased	14%	8.3%	0%	22%	0%	14%	0%	5.9%
Decreased	31%	8.3%	0%	11%	0%	14%	0%	41%
Remained the same	19	83%	100% (single producer)	67%	100% (single producer)	71%	100% (single producer)	53%

As mentioned, it was reported by the DoF that these changes have not translated into more fish trade and consumption. 100% of responses to the market survey indicated no change in individual sales volumes over the past three years, although there may be more vendors than before. The household survey found that 74.5% and 72.6% of respondents believe their consumption of common farmed and common wild-caught species, respectively, has remained the same over the past three years. However, in both cases more respondents said their consumption has decreased than increased (see Figures 5 and 6). This is not actually surprising given that there was a consensus in the market survey that fish prices have increased over the past three years.

At the level of individual fish farmers in Kyaing Tong, the results for change in aquaculture production were somewhat mixed (see Table 1). Although most fish farmers reported that aquaculture production has remained the same for them over the past three years, more fish farmers said aquaculture production and production of small indigenous species had decreased than increased. At the same time, substantially more fish farmers indicated that tilapia production had increased than decreased.

Sub-question 2: Changes in Market Price of Fish

100% of responses to the market survey agreed that fish prices at local markets had increased over the past three years. This was the case for rohu, common carp, grass carp, tilapia, snakehead species and small indigenous species. This is somewhat surprising since there was also agreement that the supply of fish had increased in the township and there were more traders and vendors than before, which may have eroded mark-ups to a degree. According to some of those interviewed, the increase in price was driven by rising production costs. The household data on factors most helpful for expanding aquaculture production (Figure 4) may offer some clues as to the source of these rising costs, but further investigation is needed for a more complete picture.

Sub-question 3: Logistical Supply Challenges

Qualitative interviews did not reveal significant logistical challenges on the part of vendors or traders. One fish farmer and wholesaler explained that past restrictions on entering the urban wards of Kyaing Tong in the early morning were problematic for many traders, but these restrictions have since been removed. The household data revealed that fish farmers did not face significant logistical difficulties either; all fish farmers for whom the question was applicable indicated "quite easy" or "very easy" in response to questions on challenges posed in the transportation of fish to the point of sale or the use of ice before sale.

Sub-question 4: Comparisons Between Supply Chains

Wild-caught fish was preferred to locally farmed fish because they were perceived as fresher. However, according to the DoF, farmed fish were generally more abundant in Kyaing Tong markets than wild-caught fish, which were mainly available during the wet season. The estimation given by the DoF was that 60% of fish supplied to Kyaing Tong markets in a year was locally farmed. There was generally very little Yangon-farmed fish in Kyaing Tong due to high transport costs and the fact that they were no longer fresh when they reached Kyaing Tong and were therefore less appealing to consumers. Only a single vendor was found selling Yangon-sourced hilsa. That Yangon-sourced fish has by far the least appeal to consumers was evident in the household data, in which only 0.03% said they preferred Yangon-sourced fish to locally-sourced and wild-caught fish varieties.

Figure 7: Pounded Snakehead in Ka Htike

Sub-question 5: Prevalence of Fish Processing

According to the DoF, Kyaing Tong households do not consume much processed fish because they have a strong preference for fresh fish. This was corroborated by the household survey, which found that Kyaing Tong households consumed, on average, 1.11 meals containing processed fish per week – the lowest among studied townships except for Pinlaung, where the amount was 1.06. The value chain research was unable to identify any businesses that concentrated on processing.

Nevertheless, the household survey did find six Kyaing Tong fish farmers out of 35 (17.1%) that engage in fish processing. Of these, four did drying and one did fermenting of fish. Indeed, it was reported by the DoF that dried fish is prevalent in urban markets in Kyaing Tong, due to the large number of Bamar residents in the town (Bamar cuisine makes extensive use of dried fish). It was noted that most of the dried fish in Kyaing Tong originates from outside the township. The market survey found processed fish being sold only by two vendors in Ka Htike – a small rural market

with only three vendors in total. Processing in Ka Htike was done only occasionally after market hours and consisted of pounding snakehead together with chilli and salt (see Figure 7).

6. Additional Findings

In this section, we report additional findings from the field mission to Kyaing Tong. We include estimates of price mark-ups as well as some profit margins along the value chain.

Mark-ups and Margins

Through assessing price and cost data from fish farmers in the household survey, we can roughly estimate[1] the average profits that producers received for different species. Table 3 summarises this data for Kyaing Tong. It can be seen that the most profitable species was rohu by a significant margin. While common carp and tilapia were still profitable, they received noticeably lower margins.

Table 3

Fish species	Average selling price (MMK per viss)	Average profit (MMK per viss)
Rohu	5,222	4,438
Common carp	1,875	1,202
Tilapia	1,438	1,009

For traders in Kyaing Tong, the mark-ups were relatively similar across species (see Table 4). Transport costs for traders varied significantly depending on the mode of transport and the distance. The highest transport cost was reported by a trader who transported fish from the Thai border to the market, while traders who reported lower transport costs had their own motorised tricycle.

Table 4

Fish species	Average markup (MMK per viss)	Transport cost (MMK per day)	Ice cost (MMK per day)
Rohu	680	2,000-11,400	4,000-5,000
Common carp	500		
Tilapia	583		

Municipality costs incurred by traders who were also vendors were comparatively high at Kyaing Tong Myoma Market, at MMK 1,000 per day. Other markets in the township only charged trader-vendors MMK 100-130 per day. Additional costs mainly took the form of equipment used in sales such as baskets, weighing scales and tables.

For vendors, we present price mark-ups based on the market survey (see Table 5). The largest mark-ups were in the case of grass carp and common carp. Ice and transport costs varied mildly. Interestingly, the mark-up for tilapia in urban markets was MMK 143 per viss more than in the rural market of Ka Htike.

Additional fees for vendors included municipal fees which ranged from MMK 100-300 per day. Selling place rental fees ranged from MMK 3,000 to 10,000 per month. Myoma Market also charged an overall selling place fee of MMK 3,000 per month and MMK 200 per day for a selling shelf.

[1] Average profit was calculated by dividing average total fish cost by average total fish production, giving average unit cost. Average unit cost was then subtracted from selling price in order to arrive at a crude estimate of average profit.

Table 5

Fish species	Average markup (MMK per viss)	Transport cost (MMK per day)	Ice cost (MMK per day)
Rohu	750	200-1,000	1,000-2,000
Common carp	821		
Grass carp	1,000		
Tilapia	778		

Hatcheries and Nurseries

The private hatchery that was interviewed was the largest in the township and was formerly a DoF hatchery, which ran into financial problems before being bought by the current owner. The DoF are negotiating to repurchase the hatchery. It was recorded that, at the time of interview, there were no DoF hatcheries or nurseries in Kyaing Tong.

This hatchery was found to breed rohu, common carp, tilapia and hilly hilsa[2] (*Prochilodus lineatus*) using traditional methods. The hatchery owner raises his fish seed to the fingerling stage and sells these to fish farmers, because fish farmers in Kyaing Tong tend to not be able to successfully raise fry to fingerlings. In the case of tilapia, they purchase fingerlings from China and sell these to fish farmers.

The private hatchery reported selling fingerlings to fish farmers from Kyaing Tong Township as well as to buyers from further afield (e.g. Mong Ping Township, Tachileik Township). The most popular species in terms of fingerling sales has been tilapia, followed by rohu, common carp and hilsa. However, the owner believed that rohu was actually most in demand from fish farmers. He estimated that demand for all fish seed was on the increase in the township, which is in line with reports of an increased number of fish farms in the township.

A nursery owner who was interviewed purchases mono sex fry from Thailand and raises them to a marketable size. These are then sold to traders and vendors. He explained that nursery owners in Kyaing Tong currently rely on manuals from Thailand for their technical knowledge.

With regard to challenges faced, the nursery owner complained about bad-smelling fish after using feed imported from Thailand and fish death under unfavourable weather conditions. However, both the hatchery owner and the nursery owner considered their main constraint to be a lack of water during the dry season.

Other Observations

- According to DoF official statistics, there were 509 acres of fish farms in the township and 224 registered fish farm owners. In reality, however, it is believed that the actual number of fish farmers was in excess of 300. The number of fish farmers with the correct land use documentation (La Ya 30) was only 75. Fish farms ranged in size from 0.2 acres to 13.4 acres. The DoF in Kyaing Tong recently embarked on efforts to collect better data and this is likely to become available from next year onwards.
- One fish farmer and wholesaler explained that there were about seven local markets in Kyaing Tong Township that sell fish, with about 15 traders and 40 vendors. Some vendors sell at multiple markets.
- According to one trader, the typical scenario is for fish farmers and traders who purchase fish from local fish farms to bring their goods to an early-morning wholesale market in Kyaing Tong, where the fish is sold to vendors who sell at other markets (see Figure 8). About 15 fish farmers and traders operate at this market. Those who are unable to sell their fish move on to Myoma Market later in the day, where they sell their fish directly to consumers.
- Most vendors did not bear the cost of transporting fish to the point of sale.
- Eight out of 13 vendors (61.5%) reported using ice at their market stalls.
- When probed regarding how much vendors, traders and processors spend on chemical preservatives, all said they did not use any.

[2] This is a South American fish species that has been imported into Myanmar via China.

- According to the DoF, there are shops in Kyaing Tong which sell pelleted fish feed imported from Thailand and local fish products, as well as fishing gear. This may suggest the presence of more progressive fish farmers in the township.
- No concerns were voiced about gender-specific challenges faced by traders or processors.
- No concerns were voiced about the climate resilience of fish in Kyaing Tong.

Figure 8: Early-Morning Wholesale Market in Kyaing Tong

7. Recommendations

In this section, we present recommendations coming out of the value chain study in Kyaing Tong. These are aimed at different levels of the fish value chain in Kyaing Tong.

Input Supply

Recommendation: Provide Regular Water Supply
It was noted that perhaps the biggest challenge for hatcheries and nurseries located in Kyaing Tong Township is a lack of water during the dry season. A lack of proximity to natural water sources and the fact that those sources were shared with other users contribute to this problem.

Recommendation: Provide Training in Modern Hybridisation Techniques
Hatchery owners in Kyaing Tong reportedly use outdated hybridisation techniques and are looking to improve their knowledge. It was noted that practical demonstrations would be most helpful for them.

Recommendation: Provide Training in Nursery Management
Specific challenges relating to bad-smelling fish and fish death can be addressed through advanced training in nursery management techniques. Classroom-type training combined with practical demonstration could go beyond existing sources of information used by nurseries in Kyaing Tong.

Production

Recommendation: Provide Scientific Instruments to District DoF
The DoF in Kyaing Tong are restricted by the amount of scientific instruments (e.g. thermometers, refractometers) they have when conducting practical demonstrations to local fish farmers. It was requested that the project supply the Kyaing Tong DoF with the required equipment.

Recommendation: Promote Backyard Fish Farms
Currently, fish farms smaller than 25 by 50 feet do not need to obtain permission or require a licence to operate and thus are not constrained by the land use policy in Myanmar. Small backyard fish farms could thus be promoted by the project. These fish farmers should receive training from INLAND MYSAP as well as support with access to inputs (seed, feed, etc.).

Recommendation: Promote Farming of Giant Freshwater Prawn
Giant freshwater prawn (*Macrobrachium rosenbergii*) should be promoted among local fish farmers. Giant freshwater prawn has strong commercial potential overseas, which could allow local fish farmers to tap lucrative export markets. To begin with, seed could be sourced from Yangon. Eventually, once a market is established, local hatcheries could begin producing giant freshwater prawn seed as well. There are, however, constraints to be overcome in giant freshwater prawn hatcheries in Myanmar, which have biosecurity issues and high losses due to disease.

Processing

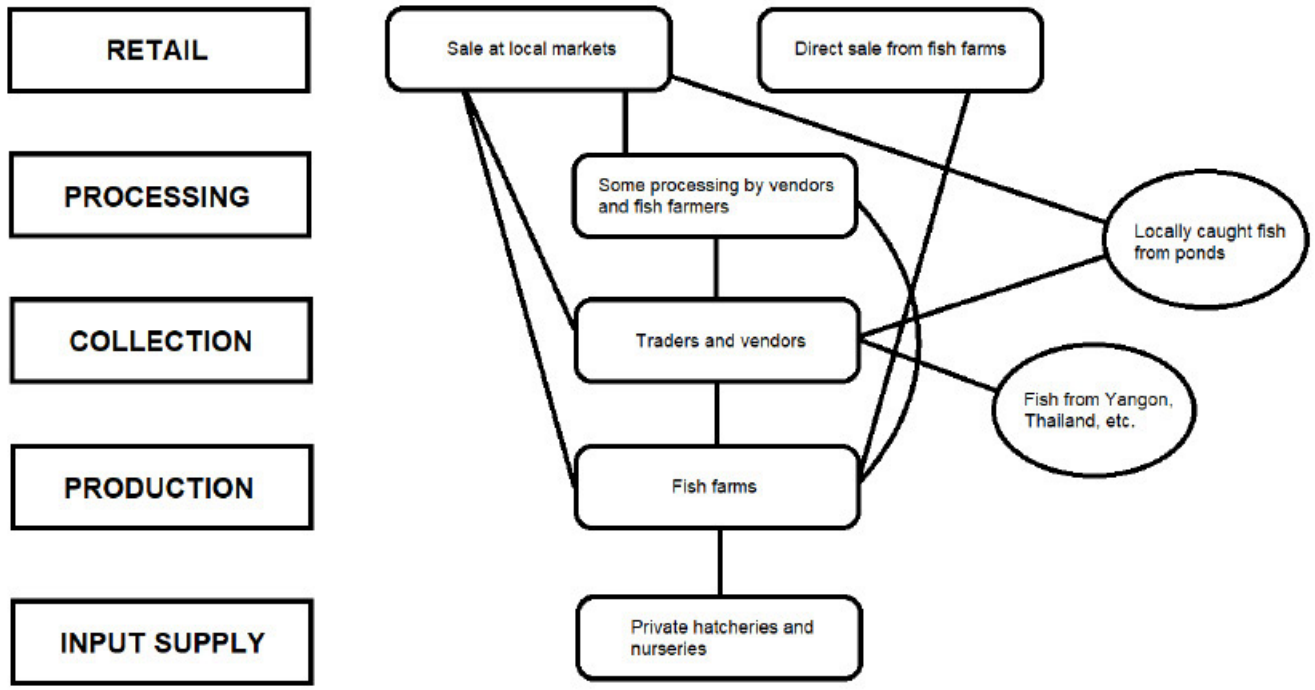
Recommendation: Encourage Production of Fish Snacks Using Locally Farmed Fish
The production of processed snacks made with locally farmed fish could boost both fish consumption as well as create demand for local fish farmers to expand their business. Local processors would need to be trained in the methods of production, and the products should be advertised as well.

8. Conclusions

Kyaing Tong has a growing fish farming sector, with relatively little dependence on fish brought in from outside the township. Farmed fish species found in the township included: (1) tilapia; (2) common carp; (3) rohu; and (4) grass carp. Producers of mrigal and big head carp were found as well. The main wild-caught fish species in Kyaing Tong were: (1) swamp eel; (2) striped snakehead; (3) spotted snakehead; (4) climbing perch; and (5) spotted barb. In terms of small indigenous species, only spotted barb was found being sold in Ah Khar, which suggests that promotion activities should seek to encourage consumption of small indigenous species in the township.

Rising fish prices mean that strategies to expand and improve the efficiency of fish production are imperative if poorer households are to be able to afford fish consumption. Beyond technical assistance to fish farmers themselves, these strategies could involve promotion of processed fish products, such as fish snacks. Currently, organised fish processing is inhibited in part by dietary preferences for fresh fish. Other challenges include dealing with irregular water supply, in the case of hatcheries and nurseries, and the country's restrictive land use policy, as it relates to fish farmers.

Annex A: Fish Value Chain Map for Kyaing Tong



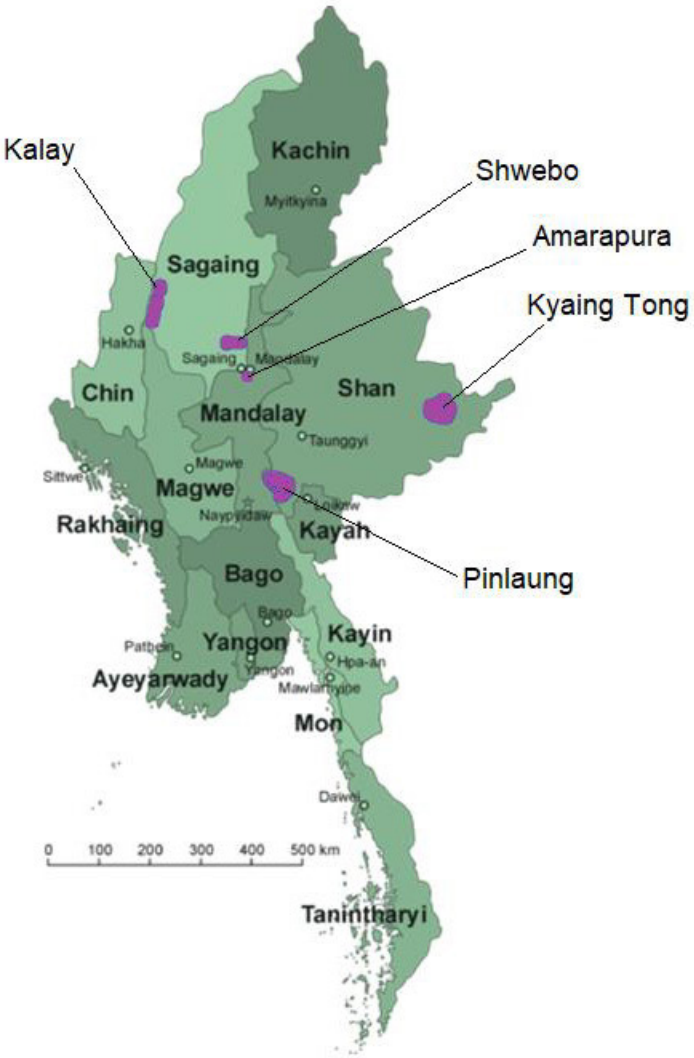
Annex B: Photos from Field Mission

Figure 9: Fish Vendors at Ah Khar Market

Figure 10: Fish Vendor at Ka Htike Market

Figure 11: Interview with Vendor at Myoma Market

Annex C: Map of Project Areas



Annex D: Value Chain Questionnaires

MARKET QUESTIONNAIRE

Section A: Basic Information

Date of interview: __/__/____

Name of interviewer: _____

Name of respondent: _____

Gender of respondent: _____

Phone number of respondent: _____

Respondent identification number: __-__

Location of market: _____

Township of market (select one): Kalay / Amarapura / Kyaing Tong / Pin Laung / Shwebo

Frequency of market (select one): daily / weekly / every two weeks / monthly / other (specify: _____)

Section B: Sales

Product	1. On a typical day in the last month, how much [product] did you sell?	2. What was the unit used for the previous question?	3. Has this amount increased, decreased or remained the same compared to three years ago?	4. To what extent does this amount vary depending on the season?
Wild-caught fish		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Aquaculture products CHECK AMOUNT AGAINST SUM OF AMOUNTS BELOW		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Farmed rohu		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Farmed catla		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all

Product	1. On a typical day in the last month, how much [product] did you sell?	2. What was the unit used for the previous question?	3. Has this amount increased, decreased or remained the same compared to three years ago?	4. To what extent does this amount vary depending on the season?
Farmed mrigal		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Farmed common carp		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Farmed silver carp		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Farmed big head carp		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all

Product	1. On a typical day in the last month, how much [product] did you sell?	2. What was the unit used for the previous question?	3. Has this amount increased, decreased or remained the same compared to three years ago?	4. To what extent does this amount vary depending on the season?
Farmed grass carp		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Farmed tilapia		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Farmed small indigenous species		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all

5. Has the amount of farmed fish that you sell increased, decreased or remained the same compared with wild-caught fish in the past three years? Select one.

a) Increased
b) Decreased
c) Remained the same

6. What do you do with the fish that you are unable to sell at the end of the day? Select all that apply.

a) Try to sell it another day
b) Consume it
c) Throw it away
d) Other (specify: _____)

Section C: Price

Product	7. On a typical day in the last month, what was the average price, in MMK, at which you sold your [product] (per preferred unit)?	8. What was your "preferred unit" in the previous question?	9. Has this amount increased, decreased or remained the same compared to three years ago?	10. To what extent does this amount vary depending on the season?
Rohu		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Catla		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Mrigal		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all

Product	7. On a typical day in the last month, what was the average price, in MMK, at which you sold your [product] (per preferred unit)?	8. What was your "preferred unit" in the previous question?	9. Has this amount increased, decreased or remained the same compared to three years ago?	10. To what extent does this amount vary depending on the season?
Common carp		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Silver carp		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Big head carp		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Grass carp		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all

Product	7. On a typical day in the last month, what was the average price, in MMK, at which you sold your [product] (per preferred unit)?	8. What was your "preferred unit" in the previous question?	9. Has this amount increased, decreased or remained the same compared to three years ago?	10. To what extent does this amount vary depending on the season?
Tilapia		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Snakeheads		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Small indigenous species		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all

Section D: Supply

11. In the past month, from where did you obtain your fish? Select all that apply.

a) Self-farmed
b) Self-caught
c) Trader
d) Fish farmer
e) Fisher
f) Other (specify: _____)

12. Has the supply of farmed fish in your area increased, decreased or remained the same compared with wild-caught fish in the past three years? Select one.

a) Increased
b) Decreased
c) Remained the same

Section E: Costs

Product	13. If you purchase fish to sell, what was the average price, in MMK, that you paid on a typical day in the last month for [product] (per preferred unit) that you intended to sell?	14. What was your "preferred unit" in the previous question?	15. Has this amount increased, decreased or remained the same compared to three years ago?	16. To what extent does this amount vary depending on the season?
Rohu		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Catla		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Mrigal		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all

Product	13. If you purchase fish to sell, what was the average price, in MMK, that you paid on a typical day in the last month for [product] (per preferred unit) that you intended to sell?	14. What was your "preferred unit" in the previous question?	15. Has this amount increased, decreased or remained the same compared to three years ago?	16. To what extent does this amount vary depending on the season?
Common carp		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Silver carp		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Big head carp		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all

Product	13. If you purchase fish to sell, what was the average price, in MMK, that you paid on a typical day in the last month for [product] (per preferred unit) that you intended to sell?	14. What was your "preferred unit" in the previous question?	15. Has this amount increased, decreased or remained the same compared to three years ago?	16. To what extent does this amount vary depending on the season?
Grass carp		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Tilapia		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all
Small indigenous species		a) Kg b) Viss c) Single piece d) Bunch e) Can f) Other (specify: _____)		a) Very much b) Quite a lot c) A little bit d) Not at all

17. Do you transport your fish to the market? Select one.

a) Yes
b) No

18. If you answered 'Yes' to the previous question, how much do you spend, in MMK, on transporting your fish to the market (per preferred timeframe)?

Answer: _____

19. What was your "preferred timeframe" in the previous question? Select one.

a) Day
b) Week
c) Month
d) Other (specify: _____)

20. How much ice (in preferred units) do you use to keep your fish cold at the market (per preferred timeframe)?

Answer: _____

21. What was your "preferred unit" in the previous question?

Answer: _____

22. What was your "preferred timeframe" in **20**? Select one.

a) Day
b) Week
c) Month

23. How much do you spend, in MMK, on ice supplies to keep your fish cold at the market (per preferred timeframe)?

Answer: _____

24. What was your "preferred timeframe" in the previous question? Select one.

a) Day
b) Week
c) Month
d) Other (specify: _____)

25. How much do you spend, in MMK, on chemical preservatives to use on the fish that you sell (per preferred timeframe)?

Answer: _____

26. What was your "preferred timeframe" in the previous question? Select one.

a) Day
b) Week
c) Month
d) Other (specify: _____)

27. How much do you spend, in MMK, on labour in order to sell fish (per preferred timeframe)?

Answer: _____

28. What was your "preferred timeframe" in the previous question? Select one.

a) Day
b) Week
c) Month
d) Other (specify: _____)

29. Can you estimate, in MMK, any other short or long-term costs (e.g. market fees) that you incur in order to sell your fish at the market (per preferred timeframe)?

Answer: _____

30. What was your "preferred timeframe" in the previous question? Select one.

a) Day
b) Week
c) Month
d) Year
e) Other (specify: _____)

QUESTIONNAIRE FOR KII WITH PROCESSOR (MALE)

Date of interview: __/__/____

Name of interviewer: _____

Name of respondent: _____

Position of respondent: _____

Gender of respondent: _____

Phone number of respondent: _____

1. How prevalent is processing of fish in the area?

2.
   - i) What kind of processing do you do (e.g. fish balls, dried fish)?
   - ii) What species of fish does this use?
   - iii) What is most common in the area?

3.
   - i) From where do you source your fish for processing (e.g. self-caught, purchased from fish farmer)?
   - ii) What is usually the case in the area?

4.
   - i) To whom do you sell your processed fish products – to traders, vendors or consumers?
   - ii) What is usually the case in the area?

5.
   - i) How prevalent is consumption of processed fish products compared with unprocessed (fresh) fish in the area?
   - ii) Has it increased, decreased or stayed the same compared with three years ago?

6.
   - i) How profitable are processed fish products compared with unprocessed (fresh) fish?
   - ii) Can you give us a sense of your typical profit margin on different types of processed fish products?

7. How much do you spend on chemicals to preserve fish during processing?

8.
   - i) How can MYSAP Inland support processors in your area in increasing the sale of processed fish products?
   - ii) How about in terms of increasing the consumption of processed fish products?

9. Are there particular challenges faced by male processors that female processors do not face?

QUESTIONNAIRE FOR KII WITH PROCESSOR (FEMALE)

Date of interview: __/__/____

Name of interviewer: _____

Name of respondent: _____

Position of respondent: _____

Gender of respondent: _____

Phone number of respondent: _____

1. How prevalent is processing of fish in the area?

2.
   iv) What kind of processing do you do (e.g. fish balls, dried fish)?
   v) What species of fish does this use?
   vi) What is most common in the area?

3.
   iii) From where do you source your fish for processing (e.g. self-caught, purchased from fish farmer)?
   iv) What is usually the case in the area?

4.
   iii) To whom do you sell your processed fish products – to traders, vendors or consumers?
   iv) What is usually the case in the area?

5.
   iii) How prevalent is consumption of processed fish products compared with unprocessed (fresh) fish in the area?
   iv) Has it increased, decreased or stayed the same compared with three years ago?

6.
   iii) How profitable are processed fish products compared with unprocessed (fresh) fish?
   iv) Can you give us a sense of your typical profit margin on different types of processed fish products?

7. How much do you spend on chemicals to preserve fish during processing?

8.
   iii) How can MYSAP Inland support processors in your area in increasing the sale of processed fish products?
   iv) How about in terms of increasing the consumption of processed fish products?

9. Are there particular challenges faced by female processors that male processors do not face?

QUESTIONNAIRE FOR KII WITH TRADER (MALE)

Date of interview: __/__/____

Name of interviewer: _____

If not already identified, ask to identify [minor market 1] and [minor market 2].

1.
   i) Are traders common in your area, or do most fish farmers and fishers sell their fish at the markets themselves?
   ii) How common is it in your area for traders to also be vendors?

2.
   i) How common is farmed fish compared with wild-caught fish in your area?
   ii) Can you give us an estimate of the total number of aquaculture producers in the township?

3.
   i) Are there any wholesalers in your area that trade in Yangon-farmed fish and fish products? What species of fish and kinds of fish products (e.g. fish balls) are these?
   ii) How common are these compared with locally farmed versions of the same?

4.
   i) Has there been an increase in the supply of fish in your area in the past three years?
   ii) Has there been an increase in the supply of farmed fish compared with wild-caught fish?
   iii) How have these trends influenced trade and consumption patterns in your area?

5.
   i) To what extent does the supply of farmed fish in your area vary depending on the season?
   ii) To what extent does the supply of wild-caught fish in your area vary depending on the season?

6.
   i) What is the general price at which you buy (1) rohu, (2) mrigal, (3) catla, (4) common carp, (5) big head carp, (6) silver carp, (7) grass carp, (8) tilapia and (9) small indigenous species from fish farmers/fishers?
   ii) Have these prices increased, decreased or remained stable over the past three years?
   iii) Do these prices vary depending on the season?

7.
   i) What is the general price at which you sell (1) rohu, (2) mrigal, (3) catla, (4) common carp, (5) big head carp, (6) silver carp, (7) grass carp, (8) tilapia and (9) small indigenous species to vendors (if you sell to vendors)?
   ii) Have these prices increased, decreased or remained stable over the past three years?
   iii) Do these prices vary depending on the season?

8.
   i) How prevalent is the supply of processed fish products in your area? What kind of products (e.g. fish balls, dried fish) are these?
   ii) Can you give us a sense of the typical profit margin on different types of processed fish products?

9.
   i) How much fish do you transport on a “good” day? How much on a “bad” day?

ii) How much does this cost? Does the cost vary depending on the season?
iii) What are the individual costs involved in transporting aquatic products?

10.
i) Do you use ice to cool your fish? If so, how much do you use on a typical day?
ii) How much does this cost?

11. How much do you spend on chemical preservatives to use on fish?

12. Can you give us an indication of your total labour cost per month?

13. Can you estimate the main investment costs in establishing yourself as a fish trader? What are they?

14.
i) Do traders in your area face important logistical challenges?
ii) What are they and how do you address these?
iii) Are there particular challenges faced by male traders that female traders do not face?

QUESTIONNAIRE FOR KII WITH TRADER (FEMALE)

Date of interview: __/__/____

Name of interviewer: _____

If not already identified, ask to identify [minor market 1] and [minor market 2].

1.
   iii) Are traders common in your area, or do most fish farmers and fishers sell their fish at the markets themselves?
   iv) How common is it in your area for traders to also be vendors?

2.
   iii) How common is farmed fish compared with wild-caught fish in your area?
   iv) Can you give us an estimate of the total number of aquaculture producers in the township?

3.
   iii) Are there any wholesalers in your area that trade in Yangon-farmed fish and fish products? What species of fish and kinds of fish products (e.g. fish balls) are these?
   iv) How common are these compared with locally farmed versions of the same?

4.
   iv) Has there been an increase in the supply of fish in your area in the past three years?
   v) Has there been an increase in the supply of farmed fish compared with wild-caught fish?
   vi) How have these trends influenced trade and consumption patterns in your area?

5.
   iii) To what extent does the supply of farmed fish in your area vary depending on the season?
   iv) To what extent does the supply of wild-caught fish in your area vary depending on the season?

6.
   iv) What is the general price at which you buy (1) rohu, (2) mrigal, (3) catla, (4) common carp, (5) big head carp, (6) silver carp, (7) grass carp, (8) tilapia and (9) small indigenous species from fish farmers/fishers?
   v) Have these prices increased, decreased or remained stable over the past three years?
   vi) Do these prices vary depending on the season?

7.
   iv) What is the general price at which you sell (1) rohu, (2) mrigal, (3) catla, (4) common carp, (5) big head carp, (6) silver carp, (7) grass carp, (8) tilapia and (9) small indigenous species to vendors (if you sell to vendors)?
   v) Have these prices increased, decreased or remained stable over the past three years?
   vi) Do these prices vary depending on the season?

8.
   iii) How prevalent is the supply of processed fish products in your area? What kind of products (e.g. fish balls, dried fish) are these?
   iv) Can you give us a sense of the typical profit margin on different types of processed fish products?

9.
   iv) How much fish do you transport on a “good” day? How much on a “bad” day?

v) How much does this cost? Does the cost vary depending on the season?
vi) What are the individual costs involved in transporting aquatic products?

10.
iii) Do you use ice to cool your fish? If so, how much do you use on a typical day?
iv) How much does this cost?

11. How much do you spend on chemical preservatives to use on fish?

12. Can you give us an indication of your total labour cost per month?

13. Can you estimate the main investment costs in establishing yourself as a fish trader? What are they?

14.
iv) Do traders in your area face important logistical challenges?
v) What are they and how do you address these?
vi) Are there particular challenges faced by female traders that male traders do not face?

QUESTIONNAIRE FOR KII WITH HATCHERY

Date of interview: __/__/____

Name of interviewer: _____

Name of respondent: _____

Position of respondent: _____

Gender of respondent: _____

Phone number of respondent: _____

Ask to share data on main costs of breeding/seed production (including different kinds of costs, e.g. feed, water, energy) as well as data on sales price and volume. Ask for separate price and volume data for carp (rohu, mrigal, catla, common carp, big head carp, silver carp, grass carp), tilapia and small indigenous species.

1.
   i) What are the top three fish species that you breed? (Number 1, 2, 3.)
   ii) Do you breed/sell seed of carp (rohu, mrigal, catla, common carp, big head carp, silver carp, grass carp), tilapia and/or any small indigenous (local) fish species?
   iii) What kind of fish seed do you sell (swim-up fry, fry, fingerlings)?

2.
   i) To how many people did you sell fish seed in this township in the last year?
   ii) Do you supply farmers outside the township? If yes, where?

3.
   i) Approximately how many fry did you sell in the last year?
   ii) What are your top three species in terms of fry sales? (Number 1, 2, 3.)

4.
   i) Approximately how many fingerlings did you sell in the last year?
   ii) What are your top three species in terms of fingerling sales? (Number 1, 2, 3.)

5.
   i) Are there many other hatcheries in the township supplying fish seed?
   ii) What percentage of the township demand for seed do you think is supplied from hatcheries within the township? What percentage do you think is supplied from outside?

6.
   i) In the last three years, have you noticed any increase in the demand for fish seed by farmers for stocking?
   ii) Are there any species that are becoming more popular in your township?

7.
   i) How often do you replace your broodstock (parent fish)? Differentiate between species.
   ii) Where do you get replacement broodstock from (e.g. another farm, DoF)? Differentiate between species.
   iii) What is the country of origin of your broodstock? Differentiate between species.

8. What is your main source of technical advice?

9.
   i) Have you heard of anyone producing/selling genetically improved fish seed of any kind? How about specifically carp (rohu, mrigal, catla, common carp, big head carp, silver carp, grass carp), tilapia and/or small indigenous species?
   ii) If yes, is demand strong?

10. What do you think are the main constraints for hatcheries, nurseries and grow-out farms in your township?

QUESTIONNAIRE FOR KII WITH NURSERY

Date of interview: __/__/____

Name of interviewer: _____

Name of respondent: _____

Position of respondent: _____

Gender of respondent: _____

Phone number of respondent: _____

Ask to share data on main costs of nursing (including different kinds of costs, e.g. seed and feed, water, energy) as well as data on sales price and volume. Ask for separate price and volume data for carp (rohu, mrigal, catla, common carp, big head carp, silver carp, grass carp), tilapia and small indigenous species.

1.
   iv) What are the top three fish species that you nurse? (Number 1, 2, 3.)
   v) Do you nurse/sell seed of carp (rohu, mrigal, catla, common carp, big head carp, silver carp, grass carp), tilapia and/or any small indigenous (local) fish species?
   vi) What kind of fish seed do you sell (swim-up fry, fry, fingerlings)?

2.
   iii) To how many people did you sell fish seed in this township in the last year?
   iv) Do you supply farmers outside the township? If yes, where?

3.
   iii) Approximately how many fry did you sell in the last year?
   iv) What are your top three species in terms of fry sales? (Number 1, 2, 3.)

4.
   iii) Approximately how many fingerlings did you sell in the last year?
   iv) What are your top three species in terms of fingerling sales? (Number 1, 2, 3.)

5.
   iii) Are there many other nurseries in the township supplying fish seed?
   iv) What percentage of the township demand for seed do you think is supplied from nurseries within the township? What percentage do you think is supplied from outside?

6.
   iii) In the last three years, have you noticed any increase in the demand for fish seed by farmers for stocking?
   iv) Are there any species that are becoming more popular in your township?

7.
   i) Which hatchery/ies do you buy the fish seed that you nurse from? Differentiate between species.
   ii) Is any of the seed from outside the township or even from another country?

8. What is your main source of technical advice?

9.

iii) Have you heard of anyone producing/selling genetically improved fish seed of any kind? How about specifically carp (rohu, mrigal, catla, common carp, big head carp, silver carp, grass carp), tilapia and/or small indigenous species?
iv) If yes, is demand strong?

10. What do you think are the main constraints for nurseries and grow-out farms in your township?

QUESTIONNAIRE FOR KII WITH DOF

Date of interview: __/__/____

Name of interviewer: _____

Name of respondent: _____

Position of respondent: _____

Gender of respondent: _____

Phone number of respondent: _____

If not already identified, ask to identify [minor market 1] and [minor market 2].
Ask for a list of any private hatcheries and nurseries and DoF hatcheries and nurseries in the area, together with their contact details.
Ask to share any data on production, sales volume and price of fish in the area. If possible, data should differentiate between carp (rohu, mrigal, catla, common carp, big head carp, silver carp, grass carp), tilapia and small indigenous species and between farmed (locally farmed, Yangon-farmed) and wild-caught fish.

1. Can you give us an estimate of the total number of aquaculture producers in the township?

2.
   i) Do you think the amount of wild fish being caught in the township is going up or down?
   ii) Do you think the total amount of farmed fish and the proportion of farmed fish in the market is increasing in the township?
   iii) How have these trends influenced trade and consumption patterns in your area?

3. If there has been an increase in fish from aquaculture in the area, has the price of fish at local markets remained stable, lowered or increased?

4.
   i) Are local fish farmers and traders facing important logistical challenges to supply their products to the market?
   ii) What are they and how do they address these?

5.
   i) How is local fish farming positioned compared to the wild-caught and Yangon-farmed fish supply in your area?
   ii) What are the main interrelations between these three supply chains?

6.
   i) What are the main types of fish processing conducted in this township and how do they impact on fish consumption patterns in your area?
   ii) Are there potential processing activities that MYSAP Inland could support?

7.
   i) Are there any shops in the area that sell livestock and fish feed and fish-farming products like medicine, fertiliser, etc.? What products do they sell?
   ii) Are there any specialist shops in the area that sell imported fish-farming products from India, China and/or Thailand? What products do they sell?

8.

i) What would you say are the main constraints to expanding fish production/sales in the area (e.g. low technology, high price)?
ii) What would you say are the main opportunities for expanding fish production/sales in the area (e.g. upcoming policies, extension services)?

9. To what extent do local markets in the township function as redistribution points for regional fish trade and what is their geographical reach?

10.
i) Do you think if people were more aware of the nutritional benefits of eating fish that they would eat more fish?
ii) Do you think if people were more aware of the nutritional benefits of eating small indigenous species that they would eat more of these?

11.
i) Are there particular concerns regarding the climate resilience of fish in the area?
ii) Do you have suggestions for how MYSAP Inland can contribute to sustainable fish production and consumption in the area?

12. Are there particular challenges faced by female fish farmers/fishers, traders, processors and/or vendors in the area that their male counterparts do not face?

13. Are there particular governance challenges (e.g. land use rights) that hamper aquaculture production and/or fish consumption by low-income people in the area?

QUESTIONNAIRE FOR KII WITH MFF

Date of interview: __/__/____

Name of interviewer: _____

Name of respondent: _____

Position of respondent: _____

Gender of respondent: _____

Phone number of respondent: _____

If not already identified, ask to identify [minor market 1] and [minor market 2].
Ask for a list of any MFF hatcheries and nurseries, other private hatcheries and nurseries and DoF hatcheries and nurseries in the area, together with their contact details.
Ask to share any data on production, sales volume and price of fish in the area. If possible, data should differentiate between carp (rohu, mrigal, catla, common carp, big head carp, silver carp, grass carp), tilapia and small indigenous species and between farmed (locally farmed, Yangon-farmed) and wild-caught fish.

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   iv) Do you think the amount of wild fish being caught in the township is going up or down?
   v) Do you think the total amount of farmed fish and the proportion of farmed fish in the market is increasing in the township?
   vi) How have these trends influenced trade and consumption patterns in your area?

3. If there has been an increase in fish from aquaculture in the area, has the price of fish at local markets remained stable, lowered or increased?

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   iii) Are there any shops in the area that sell livestock and fish feed and fish-farming products like medicine, fertiliser, etc.? What products do they sell?
   iv) Are there any specialist shops in the area that sell imported fish-farming products from India, China and/or Thailand? What products do they sell?

8.

i) What would you say are the main constraints to expanding fish production/sales in the area (e.g. low technology, high price)?
ii) What would you say are the main opportunities for expanding fish production/sales in the area (e.g. better technologies, improved access to finance)?

9. To what extent do local markets in the township function as redistribution points for regional fish trade and what is their geographical reach?

10.
iii) Do you think if people were more aware of the nutritional benefits of eating fish that they would eat more fish?
iv) Do you think if people were more aware of the nutritional benefits of eating small indigenous species that they would eat more of these?

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