



# Fish for Livelihoods

## Better management practices: Small-scale aquaculture farmers survey



In partnership with



# Fish for Livelihoods

## Better management practices: Small-scale fisheries farmers survey

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## Fish for Livelihoods

Capture fisheries are declining in Myanmar, yet 60% of their animal sourced food is fish. To meet the growing demand for fish, aquaculture production is increasing. It is essential that Myanmar develops a sustainable aquaculture industry that minimizes potential environmental impacts and ensures aquaculture practices are socially acceptable and economically sound. The United States Agency for International Development (USAID) funded Fish for Livelihoods project aims increase fish production, labor productivity, food availability, and fish consumption especially for women and children from vulnerable households. It will provide opportunities for entrepreneurial activities in small-scale aquaculture systems, and promote social behavioral change messages that direct home production and market purchases towards nutritious-conscious household decisions.

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# 1. Introduction

## 1.1. Project introduction and implementing areas

Capture fisheries are declining in Myanmar. Yet 60 percent of the animal-source food in the country is still fish. To meet the growing demand for fish, aquaculture production has been increasing. In doing so, it is essential that Myanmar develops a sustainable aquaculture industry that minimizes potential environmental impacts and ensures aquaculture practices are socially acceptable and economically sound.

To this end, in October 2019, the United States Agency for International Development (USAID) awarded funding to the *Fish for Livelihoods project* for 2019–2024. The purpose of the project is to improve the nutrition status in central and northern Myanmar by promoting inclusive and sustainable aquaculture growth that focuses on small-scale farmers. It provides opportunities for entrepreneurial activities in small-scale aquaculture systems and promotes social behavioral change messages that direct home production and market purchases toward nutritious-conscious household decisions. More specifically, it aims to increase fish production, labor productivity, food availability, and fish consumption in Myanmar, especially for women and children from vulnerable households.

Part of WorldFish’s mission in Myanmar focuses on small-scale aquaculture (SSA) to promote the resilience of the small-scale fishers and the sustainability of the aquaculture sector. WorldFish provides technical backstopping to the main field-based implementers: the Myanmar Fisheries Federation, Karuna Social Services Association, PACT, BRAC, the Pekon Lake Committee and the Inle Lake Committee.

The project focuses on five inland states and regions in central and northern Myanmar: The Central Dry Zone regions of (1) Mandalay, (2) Magway and (3) Sagaing, (4) the north and eastern parts in Shan State, and (5) all of Kachin State. From these five areas, the scoping study focuses on 33 townships: Bamaw, Mogaung, Myitkyina, Waingmaw, Mansi, Mohnyin, Salin, Ngaphe, Myo Thit, Seik Phyu, Sinbaungwe, Taungdwingyi, Pwintphyu, Shwe Bo, Khin-U, Wetlet, Tigyaing, Kale, Madaya, Sintgaing, Patheingyi, Myittha, Sintgu, Tachileik (Tar Lay), Monghpyak, Keng Tung, Mong Kart, Mongton, Taunggyi, Pekon, Nansang, Loilen, Nyaung Shwe. In the scoping study, that was conducted in late 2019 and early 2020, the number of townships were 33.

These areas present challenges concerning aquaculture development and livelihood opportunities. Aquaculture growth can play an important role in changing this scenario by increasing production and income opportunities.

Figure 1 shows the regions selected for the project.



**Figure 1.** Project areas.

## 1.2. Objectives of the survey

The survey has two main objectives:

1. To verify and observe that SSA farmers from the project area are using better management practices (BMPs) in an aquaculture system.
2. To promote BMPs among SSA farmers and check for any difficulties in applying them.

## 1.3. Respondents

To ensure that farmers in each study area were represented proportionally, approximately 30 percent of the overall number of farmers in each region or state were interviewed for the BMP survey questionnaires, as shown in Table 1. This proportional representation was also attempted for most of the study townships.

Region/Township	Farmers/HH	30%	# of Enumerator
Magway	219	64	0
Ngape	33	10	0
Salin	186	54	0
Kachin	100	30	4
Bamaw	11	4	1
Myitkyina	20	6	1
Moe Kaung	10	4	1
Waing Maw	50	16	1
Man Si	4		
Moe Mauk	5		
Mandalay	200	60	3
Madaya	200	60	3
Sagaing	200	60	3
Khin-U	200	60	3
Eastern Shan	82	26	3
Tar Lay	82	26	3
Southern Shan	357	110	7
			3
Pekhon	80	25	3
Pin Laung	13	4	0
			1
Pindaya	64	21	1
			3
Taunggyi	200	60	3
Grand Total	1158	350	20

**Table 1.** Number of participants who received fingerlings.

### Geographical focus

The BMP survey focuses on Year 1 for all of the farmers and townships covered in the implementation areas of the project. The “Fish for Livelihoods” project initiated activities in 13 townships in Year-1. All together 13 townships were considered for the survey: Madaya, Salin, Ngape, Khin U, Tarchileik, Taunggyi, Pekon, Pin Laung, Pindaya, Myitkyina, Bahmo, Mogaung, Waingmaw.

## 2. Methodology

### 2.1. Systematic random sampling

A systematic random sampling technique was used to select 30 percent of the project farmers as respondents for the survey. Respondents were selected from the project's list of participating farmers who received fingerlings, and the interval was set at every third respondent.

### 2.2. Selecting enumerators

The enumerators were selected following due process. Positions were advertised and standard criteria were set. In selecting enumerators, a top priority was to choose local people who know the local context and possess a basic knowledge about aquaculture and/or fisheries management. Enumerators were selected upon the recommendation of implementing partners, and nearly all of them were familiar with the aquaculture sector. Data for the BMP survey was collected using the KoBo toolbox, except in Salin and Ngaphe. These two townships had already collected data on BMPs using the BMP checklist administered internally by the field team from the project's implementing partner.

### 2.3. Survey method

Most of the respondents were interviewed face to face, except for some villages in Kachin State. Enumerators interviewed farmers and observed their ponds to determine if they were using BMPs. While interviewing the farmers, they inputted the data using the KoBo toolbox software program.

### 2.4. Training sessions and collecting data

Initially, one-day training sessions were held with the enumerators on how to administer the BMP survey, collect data, and enter the data into the Kobo toolbox. Collecting data took 1–3 days, depending on the sample size for each township. An M&E Coordinator and two Field Coordinators from eastern and southern Shan trained total of 23 enumerators on the technical aspects of how to collect data and the BMP criteria used for the survey.

Township	Enumerators		WF staff		Implementing Partners		Training Days	Training Methods	Data collection days	Data Collection Methods
	M	F	M	F	M	F				
Taunggyi	–	3	1	–	–	–	5-May	Virtual	10th to 12 May	Field Visit to Ponds site
Pindaya	1	–	–	–	–	–	3-May	Virtual	10th to 12 May	Field Visit to Ponds site
Pekon	2	1	–	–	1	–	3-May	Virtual	10-May	Field Visit to Ponds site
Tachileik	3	–	1	–	1	–	3-May	Virtual	10th to 11 May	Field Visit to Ponds site
Kachin	3	1	1	–	–	–	4-May	Virtual	10-May	Field Visit to Ponds site & Telephone interview
Khin U	3	–	1	–	–	1	5-May	Virtual	10th to 12 May	Field Visit to Ponds site
Madaya	3	–	–	–	–	1	5-May	Virtual	10th to 12 May	Field Visit to Ponds site
	15	5	4	0	2	2				

**Table 2.** Training sessions and data collection.



## 2.5. Limitations

The survey was administered in difficult times of political turmoil and the risks posed by the COVID-19 pandemic. Enumerators from Kachin were unable to go physically to the field to observe ponds in Bahmo and Mogaung, because both townships were marred with conflict at the time of data collection, which took place from the end of April and the start of May 2021.

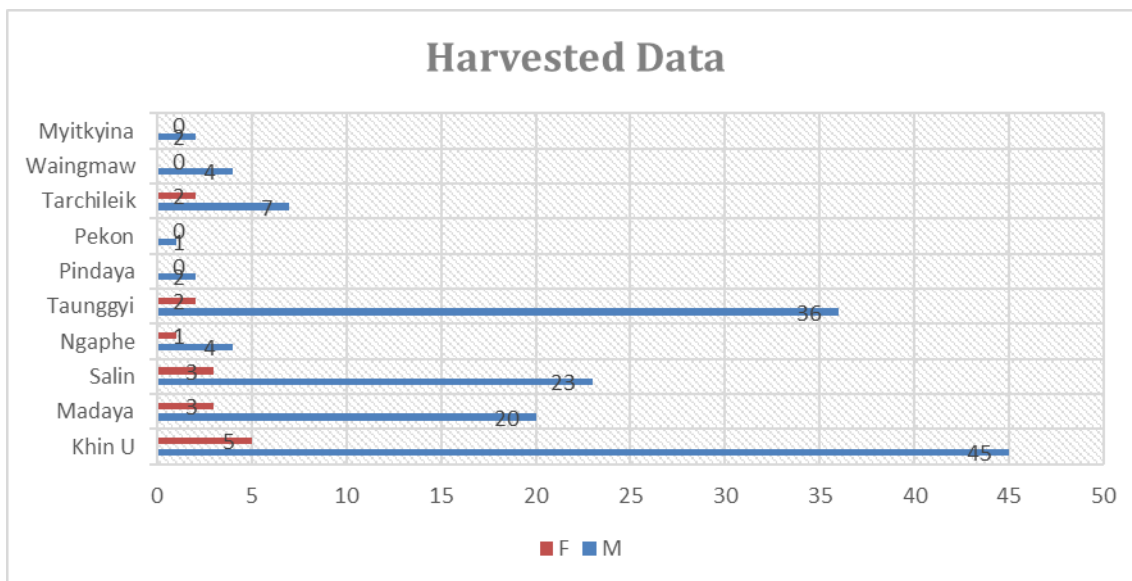
In addition, physical data on BMPs was not collected from either Salin or Ngaphe. Data from respondents in these two townships has been collected by staff from implementing partners earlier, in February 2021 by an IP, PACT.



Natural food adequacy in water.

### 3. Analysis

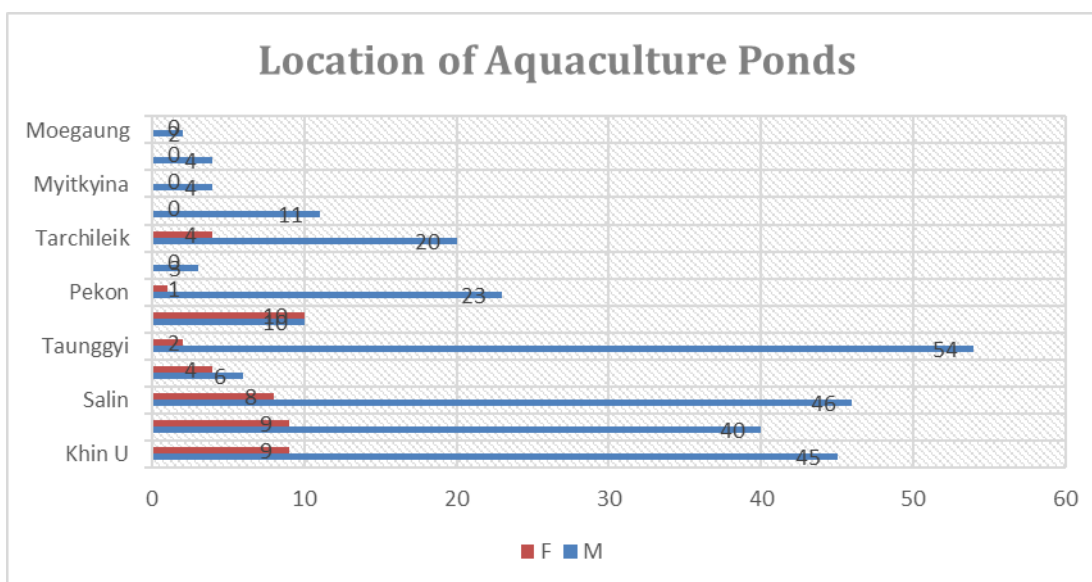
#### 3.1. Participation of farmers who harvested ponds



**Figure 2.** Participation of farmers who harvested ponds.

Among the 350 respondents, nearly half (46 percent) had already harvested their ponds, as shown in Figure 2. Respondents from Khin U had harvested the most and Pekon the least. Farmers from Pin Laung, Bahmo and Moe Kaung townships had not harvested their ponds at the time of survey. Forty-three respondents (12 percent) were demo farmers, though none was from the townships of Salin or Ngaphe.

#### 3.2. Location of aquaculture ponds

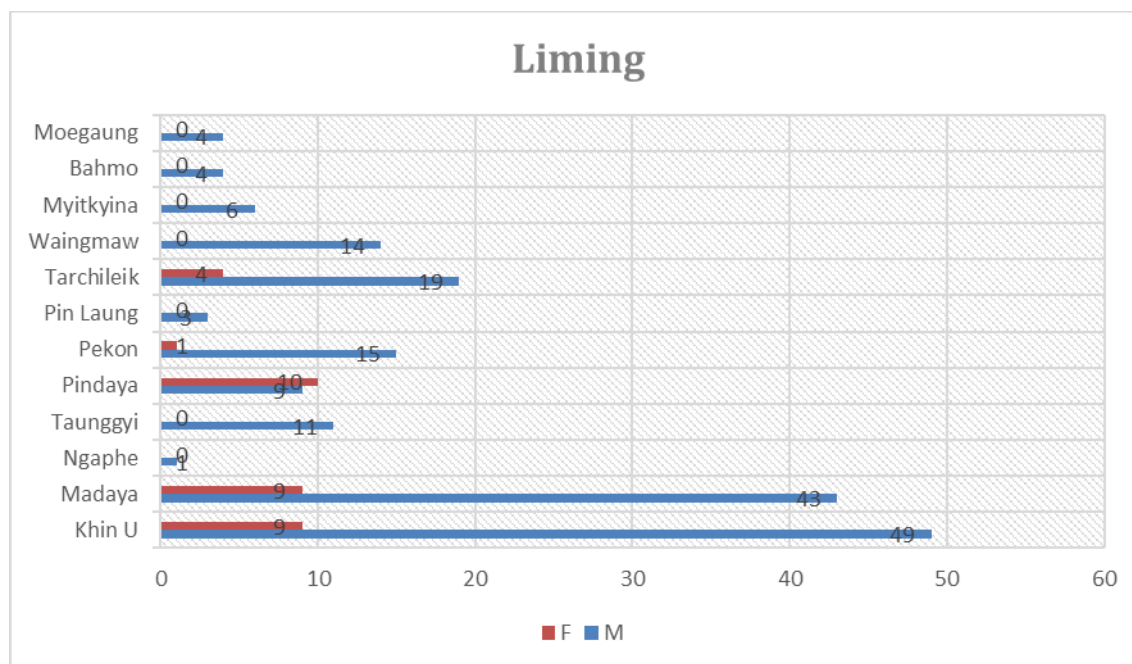


**Figure 3.** Number of farmers whose ponds are in a proper location.

As shown in Figure 3, 90 percent of the farmers (315) were aware that their ponds were in good condition and not polluted. The remaining 10 percent (35) did not meet this criterion

because their ponds are near their toilets or poultry systems. Half of the ponds are shaded by trees and do not get enough sunlight.

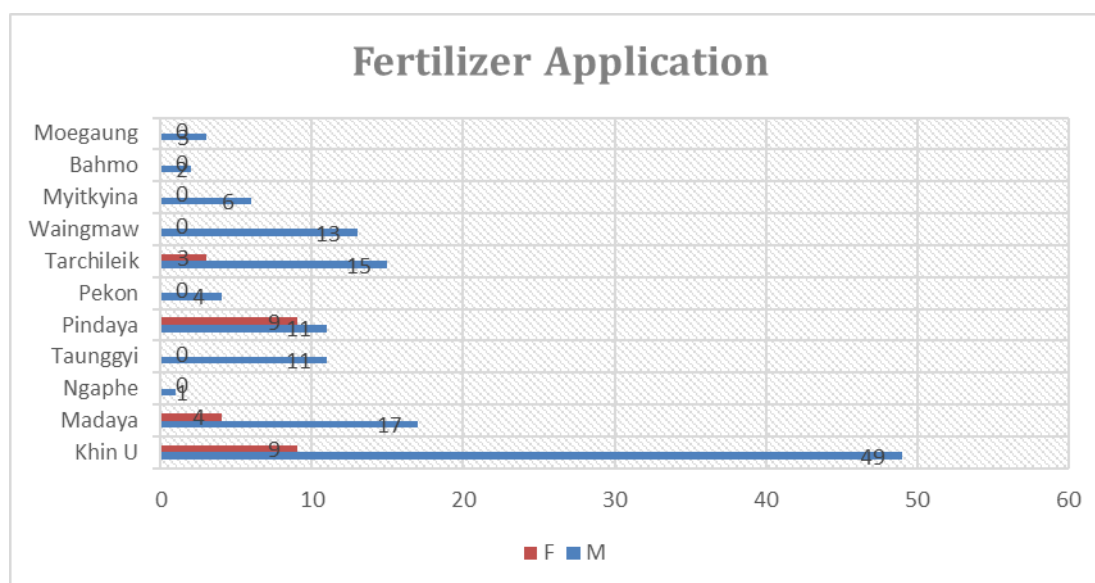
### 3.3. Liming



**Figure 4.** Number of farmers that lime their ponds before stocking.

As shown in Figure 4, 60 percent of the respondents apply lime before pond preparation and during grow-out. Farmers in Salin Township, however, do not. According to the respondents, they only apply lime before pond preparation. This is because the water quality of their ponds is good, so they do not need lime during the grow-out period.

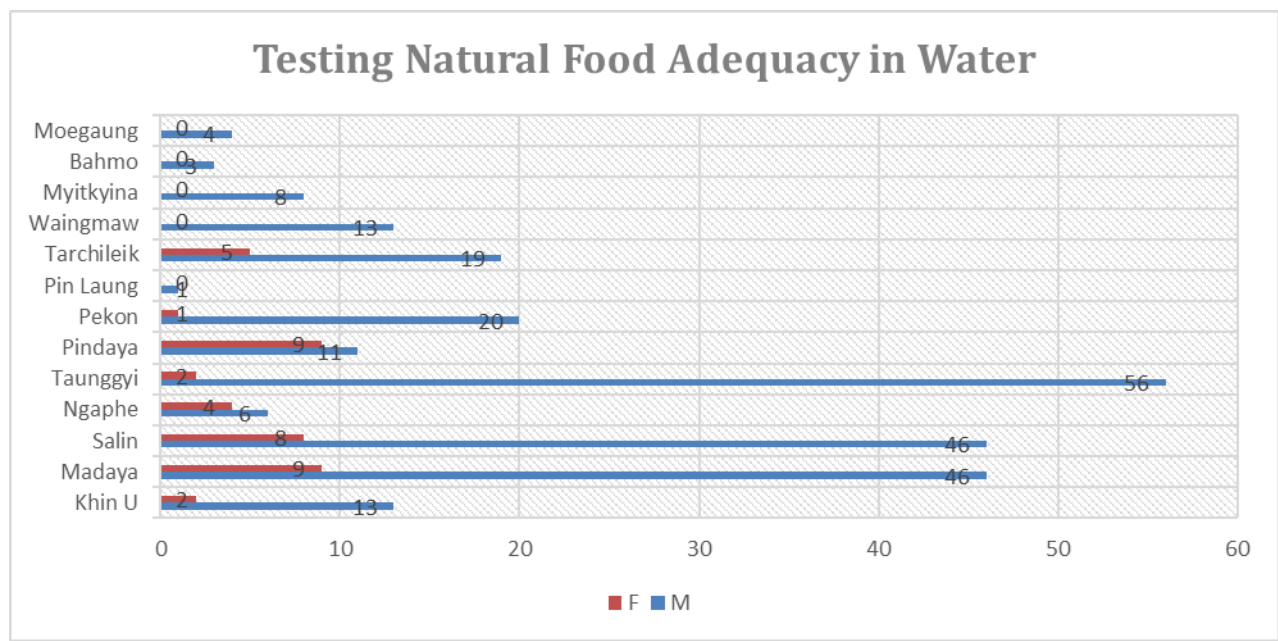
### 3.4. Fertilizer application



**Figure 5.** Number of farmers that use fertilizer.

As shown in Figure 5, 45 percent of the respondents add fertilizer (Urea, T-super, compost or cattle dung) to their ponds monthly, while the rest do not. The data suggests that a vast majority of the farmers do not know about using fertilizer or how to apply it properly in their ponds. Only a few farmers apply fertilizer before stocking, while some reported that they have enough natural fertilizer in their ponds. In Pin Laung and Salin townships, none of the farmers uses fertilizer.

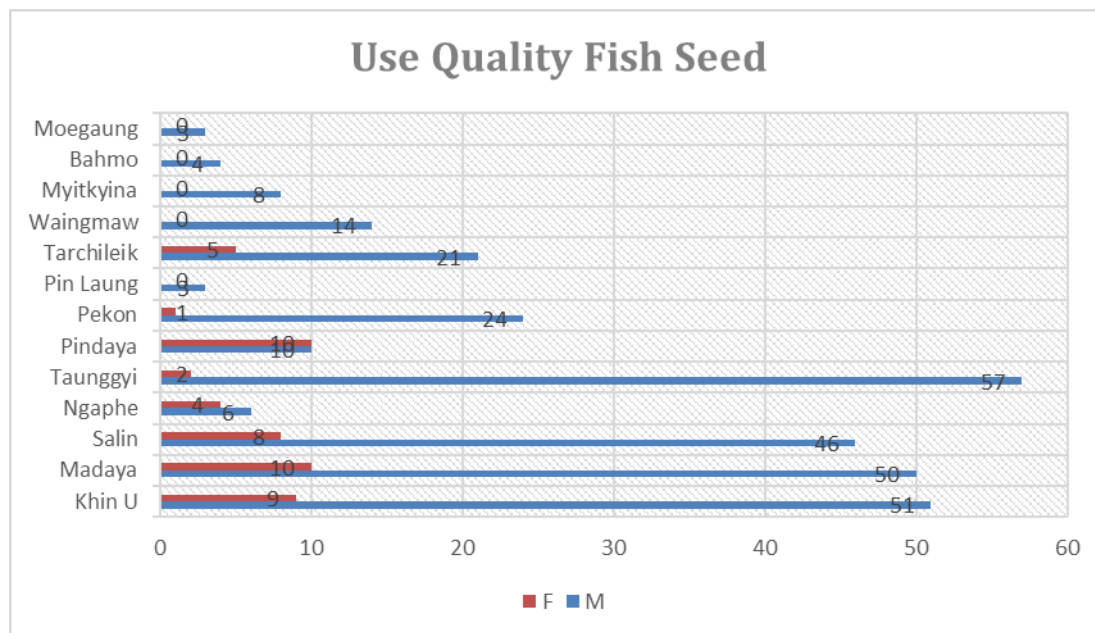
### 3.5. Testing the amount of natural food in ponds



**Figure 6.** Numbers of farmers testing for the amount of natural food in their pond.

For the survey, ponds were tested to determine the amount of natural food in them. Testing was done using a Secchi disk, with visibility between 10 and 25 inches indicating a proper level of natural food. Among the townships in the survey, as shown in Figure 6, 82 percent of the farmers (286) had an adequate amount of natural food in their pond. The remaining 18 percent did not test their ponds for natural food. Some of the ponds showed signs of red algal blooms.

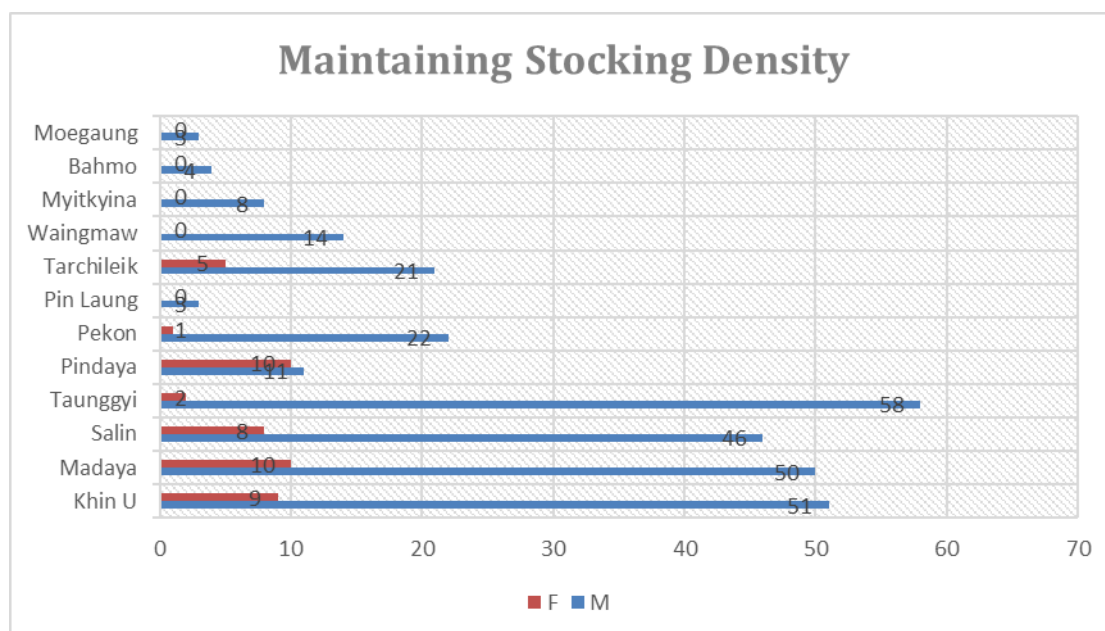
### 3.6. Use of quality fish seed



**Figure 7.** Number of farmers that stock good quality fish.

As per Figure 7, almost all of the farmers (99 percent) use quality fish seed from a hatchery. The rest reported that their ponds are so close to a stream that it is easy for them to get seed from the wild, with one respondent saying that his pond did not get good quality fish seed at the time of stocking.

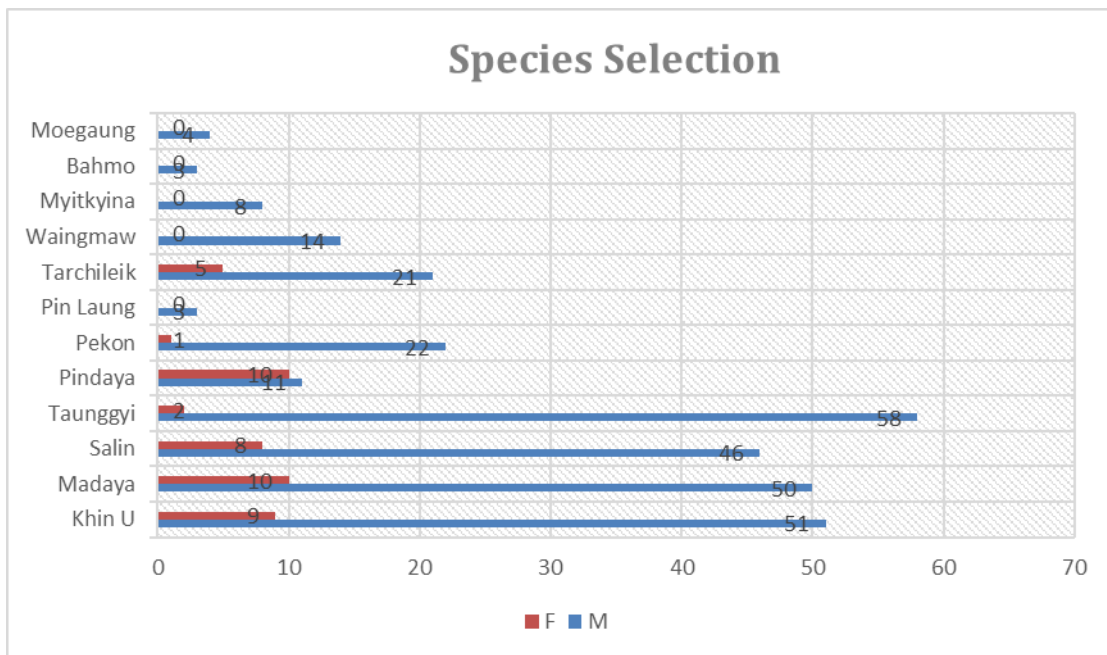
### 3.7. Maintaining stocking density



**Figure 8.** Number of farmers that maintain the recommended stocking density.

A whopping 96 percent of respondents, across every township except Ngaphe, maintained proper stocking density, as shown in Figure 8. According to respondents from Ngape, their ponds were stocked late, and they had been stocked with other species from other sources.

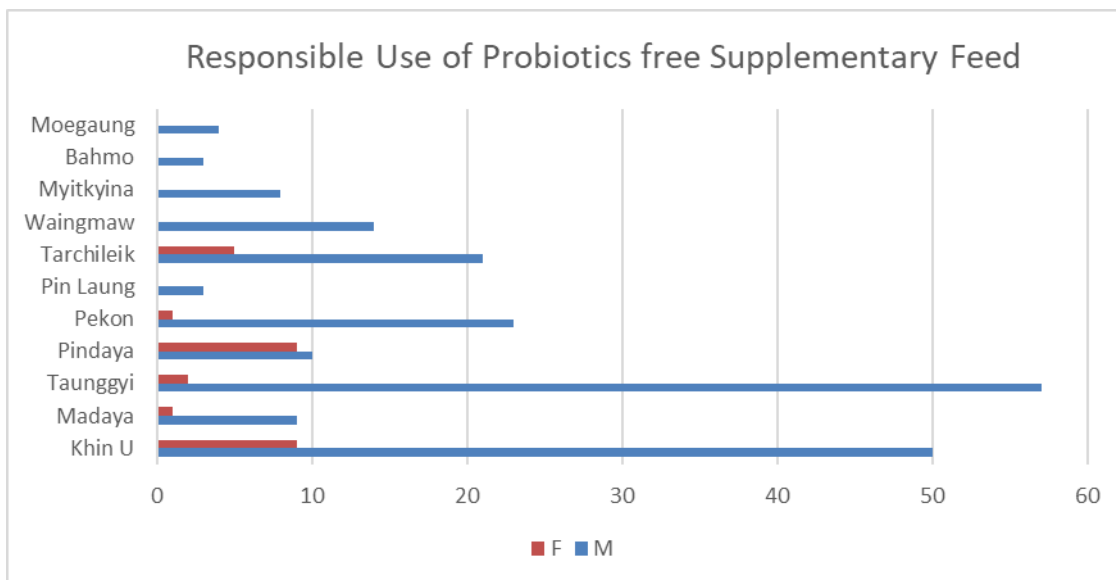
### 3.8. Species selection



**Figure 9.** Number of farmers who selected the correct fish species for stocking.

Almost all of the farmers (96 percent) stocked their ponds with the correct species, as Figure 9 indicates. This was the case for every township except Ngaphe.

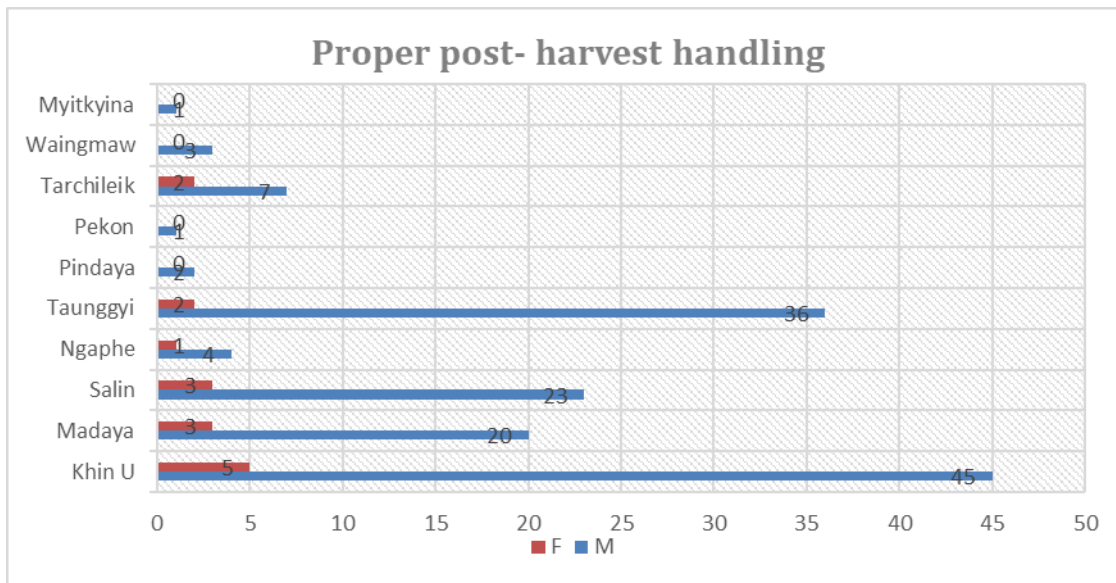
### 3.9. Responsible use of Probiotics Free Supplementary Feed



**Figure 10.** Number of farmers feeding their fish responsible use of probiotics -free supplementary feed.

Figure 10 shows that 65 percent of farmers use antibiotic-free supplementary feed. Farmers in Salin and Ngaphe were the only ones among all the study townships that do not. According to some of the respondents, they are unable to feed their fish regularly because they do not have enough money, which means they cannot feed their stock in accordance with the size of their fingerlings.

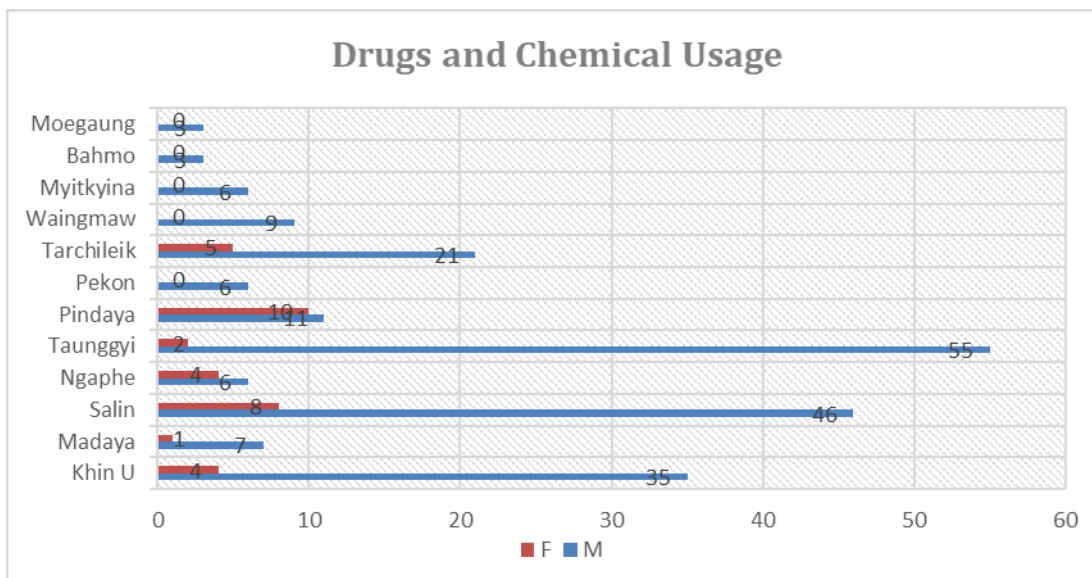
### 3.10. Proper post-harvest handling



**Figure 11.** Number of farmers using correct post-harvest handling practices.

As shown in Figure 11, among the 160 farmers who had already harvested their ponds before the survey, 99 percent (158) had adopted proper post-harvest measures and followed the instructions from the implementing partners. They reported selling fish in the village market, because they do not keep their fish on ice during transportation. The remaining two farmers (1 percent) said that they harvested only for household consumption.

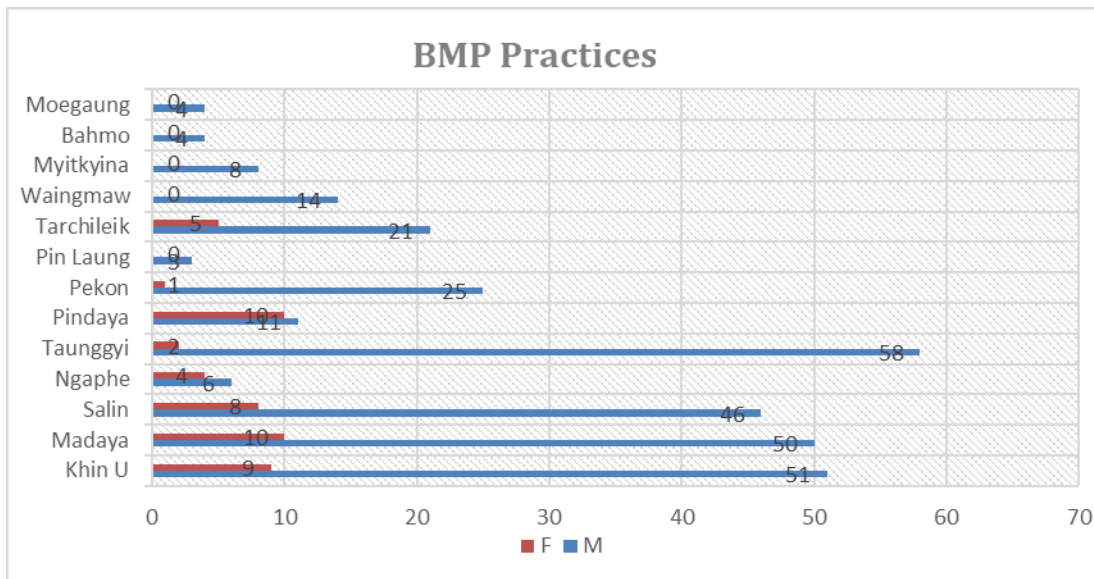
### 3.11. Drugs and chemicals



**Figure 12.** Number of farmers using therapeutic chemicals (F = Female; M = Male)

As shown in Figure 12, according to the data, 69 percent of the farmers do not use therapeutic chemicals, while the remaining 31 percent said that they use natural herbs but did not mention what type.

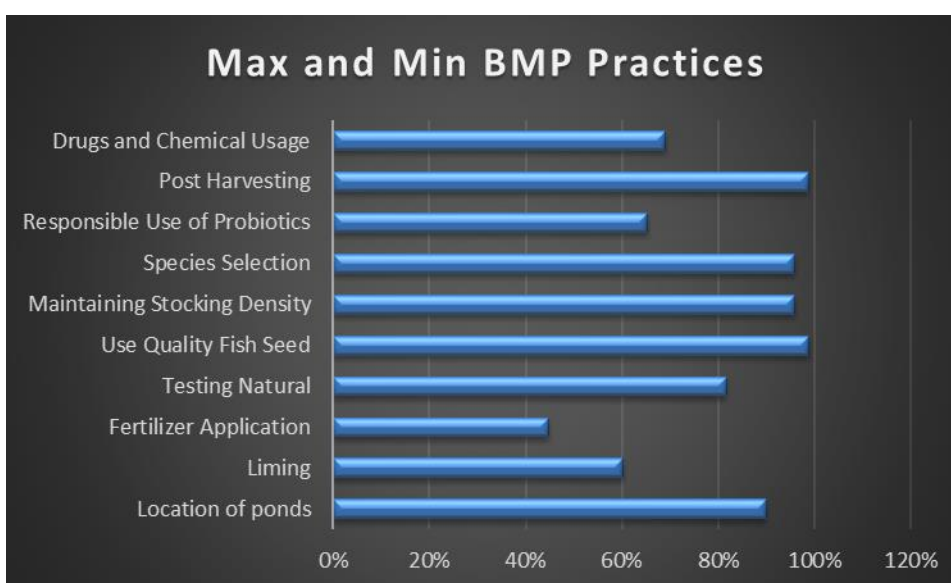
### 3.12. Practicing better management practices



**Figure 13.** Number of farmers practicing the recommended BMPs.

The BMP criteria consist of 10 parameters. All of the respondents adopted BMPs and reported following at least three or more of them, as per Figure 13. Only one farmer reported that he followed at least three parameters of the standard BMP criteria. Farmers from the townships of Pindaya, Waing Maw, Taunggyi, Khin U and Tachileik adopted all of the BMPs. Farmers in Ngaphe use the BMPs the least of all the townships.

### 3.13. BMP that farmers use most



**Figure 14.** BMPs that farmers use most.



Location of ponds	Liming	Fertilizer Application	Testing Natural	Use Quality Fish Seed	Maintaining Stocking Density	Species Selection	Responsible Use of Probiotics	Post Harvesting	Drugs and Chemical Usage
90%	60%	45%	82%	99%	96%	96%	65%	99%	69%

**Table 3.** BMPs that farmers use most.

Figure 14 lists the 10 BMPs and the percentage of respondents who follow them. Using quality fish seed and following proper post-harvest care in fish production are the parameters used the most, followed by maintaining stocking density and selecting the correct species. The least adopted BMPs is fertilizer application.

## Findings

- Providing project-supported hatchery seed to farmers was a success. The farmers in all of the townships were grateful to get good quality fish seed for their ponds.
- All of the townships except Ngaphe have adopted and applied BMPs. Farmers in Ngaphe stocked their fish late and were unable to follow the correct stocking density and to select the appropriate species.
- All of the respondents use at least three BMPs.
- Most of the farmers do not apply fertilizer, though not all of the areas need to use fertilizer monthly.
- Some farmers only add lime before stocking and do not add it for grow-out.
- Eighteen percent of farmers do not measure the amount of natural food in their ponds, while some farmers have an adequate amount of natural food because of where their ponds are located.
- Farmers use natural herbs and sometimes traditional methods as probiotics instead of antibiotics and drugs to rid their fish of diseases, positive adoption of BMP guidelines regarding the responsible use of antibiotics and where possible adoption of probiotic use.

## Recommendations

- Implementing partners should encourage farmers in their respective townships, especially Ngaphe, to follow and adopt more BMPs.
- WorldFish's field team and the staff from implementing partners should discuss the use of lime and fertilizer according to the specific location of the pond.
- Promote post-harvest quality control, even just for family consumption.
- Using demo farmers is the best way to promote BMPs. If all demo farmers apply all 10 BMPs, they will set an example that the rest of the farmers can follow.
- Emphasize the importance of applying fertilizer for ponds that need it. The frequency should be adjusted based on the requirements and the local context.
- BMPs are linked with other monitoring tools like farmers' record books and monthly progress reports. Check and validate these with other monitoring tools for the promotion and adoption of BMPs by farmers in their ponds.

