SOBA 4.4: CONSULTATIONS ON WILD RESOURCES AND LIVELIHOODS IN THE AYEYARWADY BASIN

AYEYARWADY STATE OF THE BASIN ASSESSMENT (SOBA)

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Disclaimer
"The Ayeyarwady State of the Basin Assessment (SOBA) study is conducted within the political boundary of Myanmar, where more than 93% of the Basin is situated."

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LIST OF ABBREVIATIONS

DoF	Department of Fisheries
FGD	focus group
KII	key informant
MIMU	Myanmar Information Management Unit
NWRC	National Water Resources Committee
OAA	other aquatic animals
SOBA	State of the Basin Assessment

EXECUTIVE SUMMARY

Field consultations on the role of wild resources in people's livelihoods were conducted in the Ayeyarwady Basin from the delta in the south to Putao in the north of Myanmar. Interviews and group discussions with local people, key government, and non-government stakeholders in 14 districts provided insights into the status and trends of wild resources and their management.

It is important to note that the study at hand represents a small sample from a large and diverse area. Accordingly, the results are to be viewed as rough estimates that can provide a common framework for comparison across the five zones of the basin and help to understand the current trends in terms of the interaction between wild resources and livelihoods.

Fishing, hunting, and collecting of wild resources have generally declined in the districts surveyed. This trend is due to a decrease in available habitats as well as increased pressure on available resources. Illegal fishing is widespread across the entire Ayeyarwady Basin, and people consistently emphasized this as a cause for concern in terms of the sustainability of aquatic resources.

INCOME SOURCES AND SOCIO-ECONOMIC DEVELOPMENT IN THE AYEYARWADY BASIN

From a basin-wide perspective, agriculture is the number one income source as it brings in approximately 33% of the income of the Ayeyarwady Basin according to the surveyed population. Livestock, processing, and trading of agricultural products accounts for approximately half of the basin's income. Fishing, hunting, and collecting wild resources brings in approximately a tenth of the income when including processing and trading. Aquaculture brings in a minimal percentage of income.

Fishing alone makes up approximately two thirds of the combined income from fish and wild resources. However, the differences between zones are significant, with fishing making up approximately a tenth of the income in the delta, compared with a few percent in Chindwin and the Upper Ayeyarwady. Wild resources, including hunting and collecting, are relatively more important for the economy in the Upper Ayeyarwady, followed by the Middle Ayeyarwady and Chindwin. In the delta and the Lower Ayeyarwady, wild resources contribute less to income according to the surveyed population.

In addition to the direct economic importance of fish and wild resources, the nutritional, cultural, and food security aspects of fish and wild resources need to be accounted for to fully comprehend the importance of these resources.

The economic importance of fishing, hunting, and collecting of wild resources varies considerably between the five zones. The estimated share of the total income derived from these ecosystem dependent activities range from a few percent in the Lower Ayeyarwady and Chindwin to approximately 17% in the delta and up to a quarter of the total income in the Upper Ayeyarwady, according to the surveyed population.

Considering the importance of wild resources to people's income, it is concerning that the income sources related to fishing, hunting, and collecting are reportedly in a declining trend. Despite this, people generally reported improved living standards in terms of economic and social well-being and expected this trend to continue.

All study sites experienced migration, and the respondents surveyed generally view this as positive due to subsequent income and educational opportunities. Further, migration benefits businesses in need of workers (e.g., in the aquaculture sector), as is the case at Maubin in the delta.

Physical infrastructure improvements, including roads, bridges, and telecommunications, were the most commonly cited major positive socio-economic change that occurred during the last decade, followed by improved health and education infrastructure and the transformation from traditional to mechanized farming.

The most common negative changes experienced by people were a decline in fish species and abundance, deforestation, and declines in mining and forest-related industries. Floods, shallowing of creeks and rivers, delayed arrival of the monsoon, proliferation of drugs, and increases in illegal fishing were other downsides to development that has been taking place in the last decade.

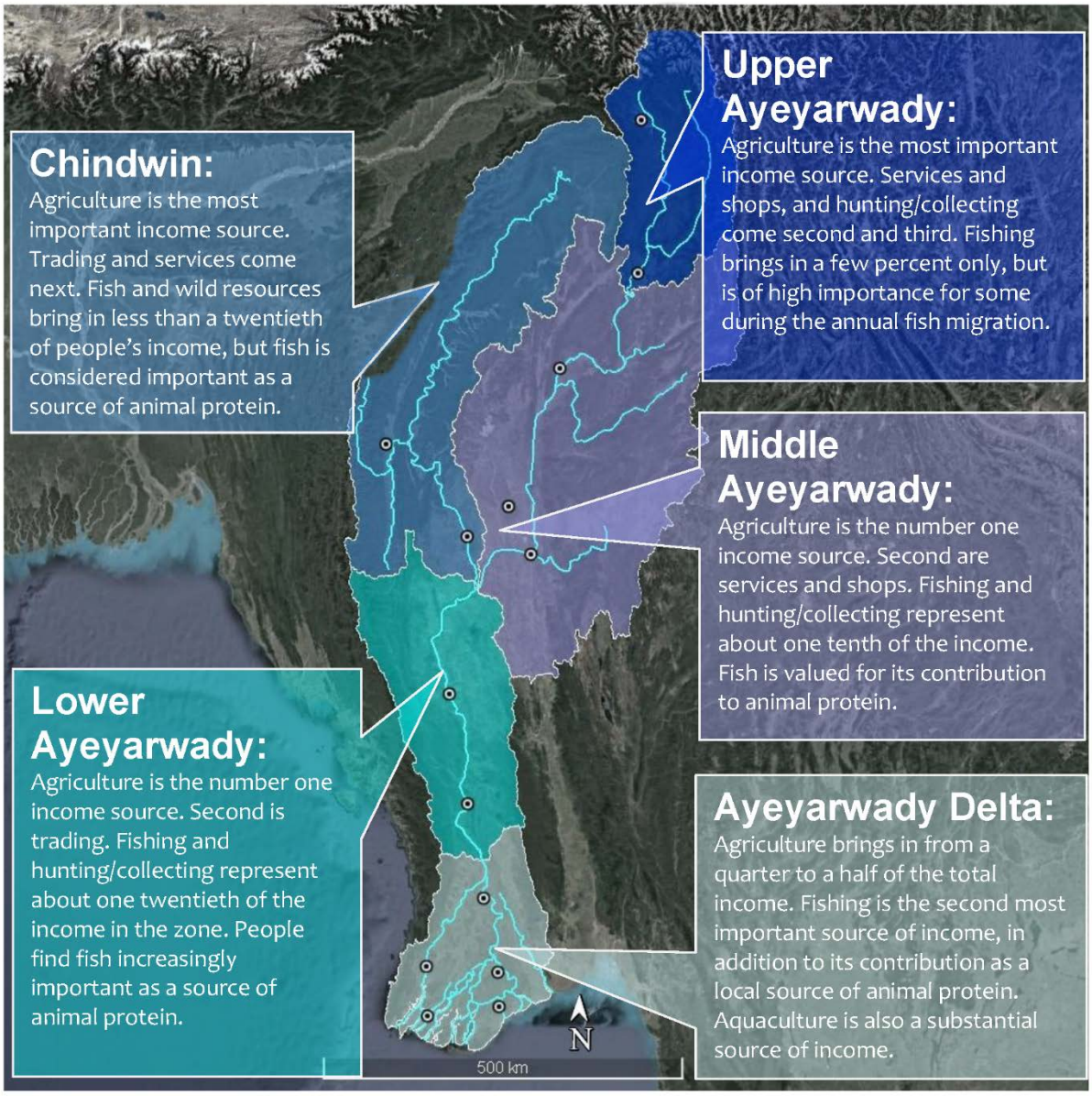

Figure 1 – Main income sources as perceived by the population surveyed: *The most important income sources and the contribution of fish and wild resources in the five zones of the Ayeyarwady Basin (field consultations, Jun to Aug 2017).*

THE ROLE OF WILD RESOURCES IN LIVELIHOOD

The importance of fishing as a livelihood varied considerably between the zones. The delta saw the highest share of families fishing with approximately a fifth of the population involved. At the other end of the scale, participation in fishing in the Lower Ayeyarwady and the Middle Ayeyarwady indicated a lower reliance on fishing as a livelihood strategy, starting at just a few percent.

The average participation in hunting and/or collecting across the five zones of the Ayeyarwady Basin varied from approximately a tenth10% of the population to almost two fifths40%. According to focus groups surveyed, the highest involvement is in Chindwin, the delta, and the Lower Ayeyarwady, whereas key informants reported the highest involvement in hunting and/or collecting was in the Upper Ayeyarwady and the Middle Ayeyarwady.

From a basin-wide perspective, the gender distribution of fishers is around men and one quarter women when averaged between all five zones. In terms of involvement in fishing-related activities, such as processing and sale, women make up at least three quarters and men less than one quarter.

In terms of women's participation in fishing, the focus groups surveyed indicated that the distribution of fishing is less disaggregated into stereotyped gender roles in Chindwin and the Lower Ayeyarwady, where approximately two fifths of the fishers are women. When it comes to fishing-related activities in the delta, the Middle Ayeyarwady, and Chindwin, men had the highest participation at approximately 33%. However, the overall picture remains one of a relatively clear work division between the genders.

It is worth noting that fisheries law requires registration for the use of many fishing gears and that most families will register only the male household head. Therefore, official numbers largely exclude women from being identified and counted as fishers. As an example, in the Maubin District in the delta, women often fish together with their husbands, but this is not reflected accurately in the official fishery statistics.

From a basin-wide perspective, the focus groups surveyed indicated that women make up a small majority of the gender distribution of hunters and/or collectors. However, the key informants estimated a clear over-representation of men involved in hunting and/or collecting. In terms of involvement in hunting and/or collecting-related activities, the focus group participants and the key informants agreed that women make up approximately three quarters75% of those involved.

Unlike most agricultural crops, fish and wild resources, in many cases, represent an opportunity to obtain food and income on a daily basis. This characteristic benefits people in the Ayeyarwady Basin, who give special importance to fish as a way to earn extra income for children's schooling and for medicine needed in the rainy and winter seasons. Fish is also of special importance in relation to seasonal fish migration (e.g., in Putao, where people take advantage of particularly good fisheries during this yearly occurrence).

Wildlife hunted includes birds, monkeys, rats, sambar, wild boar, and other ungulates. Hunting of birds is common throughout the delta, the Lower Ayeyarwady, the Middle Ayeyarwady, and Chindwin. In Chindwin and the Upper Ayeyarwady, some hunting of monkeys takes place. Sambar appeared to be one of the more commonly hunted sources of wild animal protein in the basin.

THE ROLE OF WILD RESOURCES IN NUTRITION

Fish was consistently valued as the number one source of animal protein in all five zones of the Ayeyarwady Basin. Chicken and pork were the second and third most important sources of animal protein seen on a basin-wide scale. Like fish, these protein sources were present in all districts surveyed. People also considered prawns and shrimps important as a source of protein in all zones, except the Upper Ayeyarwady.

Fish and other aquatic animals were of relatively lower importance in the Upper Ayeyarwady than in the other four zones. However, the importance of wildlife, as a source of animal protein, was remarkably higher than average in the Putao District than in the Upper Ayeyarwady. Among the wild resources cited as important for animal protein in the basin were sambar, rat, antelope, leaf deer, mython (*Bibos frontalis*), and wild boar.

Throughout the Ayeyarwady Basin, fish and other aquatic animals are widely perceived as more important for animal protein now than compared to 10 years ago. Reasons for this include improved knowledge about the health benefits of fish, livelihood dependency on fish, and increased demand from a growing population.

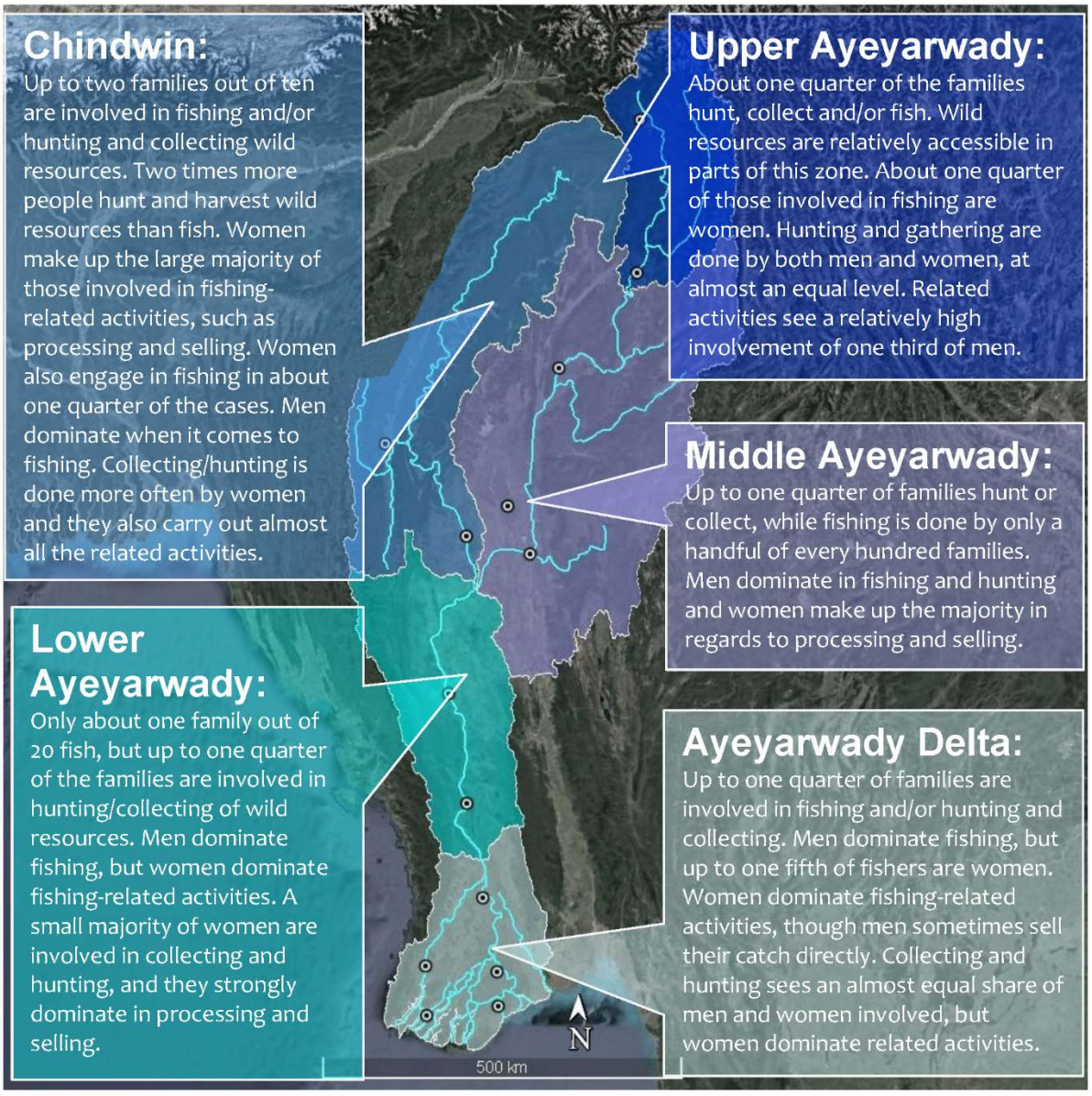

Figure 2 – Fishing and hunting/collecting of wild resources: *The participation of men and women in fishing and hunting/collecting of wild resources (field consultations, Jun to Aug 2017).*

Furthermore, people consider fish and other aquatic animals important for the nutrition of children and believe they aid their development, including strengthening bones and brain development. They also see them as preventing infections and appreciate that these food sources are widely available at a fair price.

The majority of the surveyed population stated that people consume fish and/or other aquatic animals either almost every day or 2 to 5 times per week. This is well in line with the finding that fish and other aquatic animals are widely perceived as more important for animal protein now as compared to 10 years ago throughout the Ayeyarwady Basin.

People consume wild resources almost every day or 2 to 5 times per week, according to focus groups. The most commonly cited reasons for the importance of wild resources included nutritional benefits to children, medical properties of some plants, and the belief that wild resources generally contribute to good health and prevent infections by providing protein and vitamins. Those who did not consider wild resources important argued that they are hard to find and that other farmed alternatives are widely available.

The majority of respondents who perceived wild resources as an important source of animal protein, however, also believed that they have been declining during the last decade. The main explanations for this were loss of wildlife habitats, decreased abundance of wild resources, and easy access to alternative protein from livestock. Due to their increasing rarity, people in large parts of the basin can no longer depend on wild resources as a source of animal protein.

The main reasons provided by those perceiving wild resources as an increasingly important source of animal protein were increasing human population (i.e. increasing demand for such food source), as well as enhanced knowledge leading people to consider these as healthier than meat from farm animals.

HABITAT TYPES AND SPECIES IMPORTANT TO PEOPLE'S LIVELIHOODS

From a basin-wide perspective, habitat types found to be most important to people's livelihoods in at least four of the five zones are permanent rivers, creeks, wetlands, rice fields, seasonally flooded wetlands, forests, mountains, and bushes. Other habitat types found to be important in approximately half of the zones are seasonally flooded bushes, swamps, agricultural farms, reservoirs, and rain-fed ponds.

Understanding habitats and their importance to the sustainability of healthy ecosystems is of high importance both from a biodiversity and a livelihoods perspective. In terms of management of the Ayeyarwady Basin, working toward increased conservation of important habitats in cooperation with the people who depend on them will be of high importance.

In terms of fish, *Wallago attu* was found to be among the 10 most important species in all five zones of the Ayeyarwady Basin. *Sperata sp.*, *Cirrhinus mrigala,* and *Macrobranchium rosenbergii* were also among the five most important species for people's livelihoods in the delta, the Lower Ayeyarwady, the Middle Ayeyarwady, and Chindwin.

Metapenaeus species were important in the delta, the Lower Ayeyarwady, and the Middle Ayeyarwady. *Channa striata* were among the most important in the Middle Ayeyarwady and Chindwin. *Notopterus notopterus* was one of the 10 most important species in the Lower Ayeyarwady and Chindwin. *Tenualosa ilisha* was the most important species in the delta and was considered important in the Lower Ayeyarwady.

The Upper Ayeyarwady, especially Putao in the far north, reported among their top-ten a number of species that were not mentioned in any of the other four zones (e.g., *Tor spp. Semiplotus modestus, Garra nasuta,* and *Garra notata)*.

From an income perspective, the focus groups considered *Silonia silondia, Sperata sp.,* and *Macrobrachium rosenbergii* of high importance in the delta, the Lower Ayeyarwady, the Middle Ayeyarwady, and Chindwin. In the Upper Ayeyarwady, *Garra notata*, *Tor spp.,* and *Garra nasuta* were the three most important species in terms of income.

Monopterus albus, *Heteropneustes fossilis,* and *Macrobrachium rosenbergii* were among the most important species for animal protein in a good part of the basin. *Wallago attu*, *Channa striata*, *Labeo spp*, and *Anguilla sp.* were other species in that category.

Though considered important, or maybe as a result of this, the abundance of almost all of the fish species quoted by the surveyed population were reported to have decreased in the last decade. Likewise, people expect the abundance to decrease further in the coming decade.

People cited loss of habitat, illegal fishing, and pollution as the main reasons for the decline in the abundance of the species that many depend on for their livelihoods.

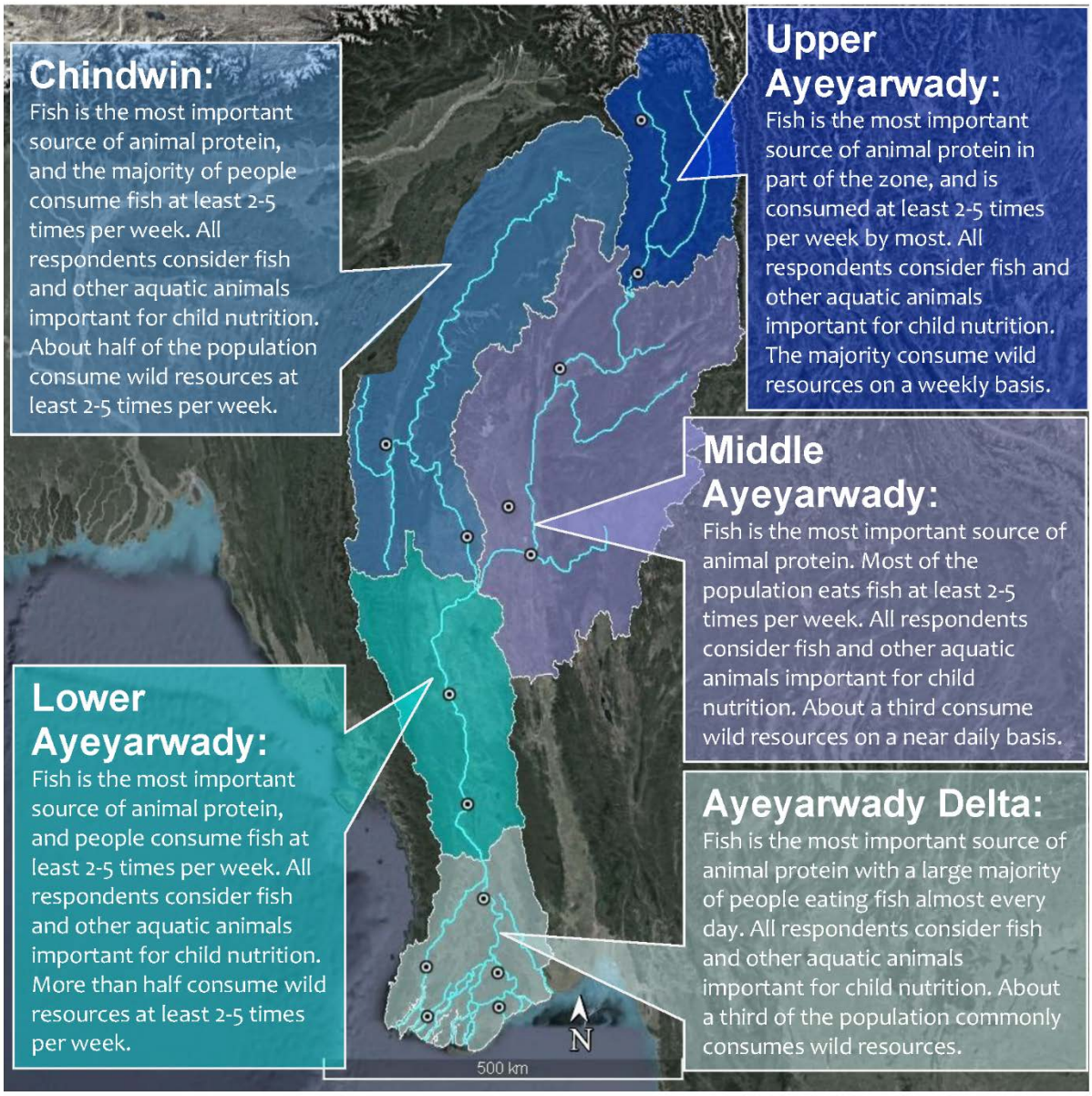

Figure 3 – Importance of fish and wild resources for nutrition: *The role of fish as a source of animal protein, and the frequency of fish and wild resource consumption in the five zones of the Ayeyarwady Basin (field consultations, Jun to Aug 2017).*

CHALLENGES MET BY FISHERS, HUNTERS, AND COLLECTORS

In all five zones, the consulted communities declared that electrofishing and pesticide fishing were significant challenges that reduced the quality of fish habitats and damaged reproduction. Fishing with small mesh sizes and in closed seasons and areas were also commonly reported in most of the basin, and in Chindwin and the Upper Ayeyarwady, dynamite fishing was reported.

Other challenges are reduced mangrove areas, sand and gravel dredging, shallowing of rivers and creeks, and water pollution from factories and farm runoff. Late arrival of the monsoon season affects rice cultivation, fish migration, and spawning. Deforestation causes wild animals to migrate to other places.

To rectify these problems, people recommended preventing fishing in closed seasons and areas by monitoring and enforcing laws and punishing perpetrators with fines and imprisonment. Control of mining operations, logging, and the number of hunters as well as replanting forests and mangroves were also

recommended. Along with control and monitoring, the surveyed people encouraged increased dissemination of information on laws.

THREATS TO THE SUSTAINABILITY OF NATURAL FISH AND WILD RESOURCES

Threats observed by the surveyed respondents include illegal fishing, with electrofishing and pesticide fishing reported at an alarming scale across the entire Ayeyarwady Basin. Use of small mesh sizes and fishing in closed seasons and areas were also highlighted throughout the basin as threats to the sustainability of the wild fisheries. Increased fishing pressure, due to population increase, and a rising number of trawl boats in the delta were other reported threats.

The negative effects from this widespread illegal fishing include damage to habitats, decline in fish species and abundance, reduced fertility of fish, and possible hazards to human health from consumption of fish caught with the use of pesticides.

In terms of wild resources, agricultural extension, deforestation, and overhunting (including the use of illegal traps), perhaps especially in the Upper Ayeyarwady, pose threats to the abundance of wild resources, with the surveyed respondents expecting a further decrease in the number of prey species. In the Upper Ayeyarwady, people highlighted the spreading of banana cultivation as a cause of deforestation and pollution from the use of pesticides. In Myitkyina and in Putao, people viewed over-collection of medicinal plants as a threat to their sustainability. The latter represents a threat both to the biodiversity of the area and to the livelihoods of those local people who depend on medicinal plants for at least a part of their income.

Resource extraction, in the form of mining and sand and gravel dredging, were other significant threats reported by the people of the basin. The impacts from these threats include a decline in fish species, due to the destruction of their spawning grounds, and water pollution. Lack of employment and limited livelihood options adds to the pressure on the natural resources.

Weak law enforcement is related to many of the threats reported, and the management of the fisheries and forestry related sectors will need improvement to enable sustainable resource use in the basin, according to many respondents. Among the challenges is government understaffing and insufficient resources to prevent illegal activities, such as illegal fishing and hunting in remote areas. Under these conditions, officials reportedly find it hard to take action against illegal activities in time.

To prevent the abovementioned threats from causing further damage to the sustainability of the fish and wild resources of the Ayeyarwady Basin, the surveyed population recommended enforcement of the laws, including control of fishing gears used, and more regulation of agriculture, to stop deforestation and limit the negative effects from pesticide use. Reforestation, including of mangrove areas, and conservation measures were recommended, as were the release of fingerlings to boost fish abundance in the natural waterways.

MANAGEMENT RECOMMENDATIONS

Finding ways to stop illegal fishing was among the top recommendations for improving the management of fish and wild resources. Enforcement of the laws, including awareness raising, monitoring, and controlling, were among the measures proposed to minimise electrofishing, pesticide fishing, use of small mesh sizes, and fishing in closed seasons and areas.

In this regard, many respondents called for increased cooperation between the authorities, the resource users, and the different government departments. For example, the fishery, forestry, and agriculture departments could benefit from cooperating more. Such collaboration may limit conflicts between fishers and farmers and help to manage agricultural extension and deforestation, which threaten wild habitats.

Respondents suggested establishing community forestry and community fisheries, to create local ownership and to strengthen resource management, and enforcing laws and regulations. In this regard, they found cooperation between communities and the authorities as important steps toward improved conservation and sustainable natural resource use.

Awareness raising on natural resources and ecosystems to students and resource users is also an important aspect of improved management. Replanting and conserving forests and mangroves to restore habitats and to increase the abundance of fish and wild resources were strongly encouraged, with some suggesting the government supply an adequate budget for forest rehabilitation.

Better maintenance of riverine quality, including limiting pollution from factories and the mining sector, were called for to deal with water pollution. Sand and gravel dredging should also be better controlled and limited to avoid damage to habitats, according to some respondents.

To improve the value of wild resources, including fish, people suggested for the government to support value-adding technology. Many respondents viewed stocking of fingerlings to wild waterways as a way to boost fish production in the wild, and some suggested extending rice-fish culture. Improving the aquaculture sector (e.g., in the form of hatchery openings) and sharing modern techniques were other recommendations that may help to support fisheries production and potentially reduce the pressure on the wild fisheries.

People expressed strong interest in organizing and collaborating with the authorities to share knowledge and to monitor and control illegal activities, especially during migration and spawning seasons and in the dry season when the reduced size of water bodies makes electrofishing more lucrative and harmful.

1 INTRODUCTION

With the objective of establishing a framework for discussion and prioritising in terms of wild resource management, we undertook consultations with key stakeholders throughout the Ayeyarwady Basin. We present below the results of these consultations, while underlining that they reflect the perception of these stakeholders, rather than scientifically established facts and quantified figures. However, such consultations have proven an effective way to get a broad-brush picture of a given resource, situation, or sector (Johannes, 1991; 1993), particularly in the case of the following:

- Livelihoods (Bernard, 2000; Folke, 2004; Schirmer and Casey, 2005)
- Natural resources management (Baird and Overton, 2001; Dubois, 2005; Silvano and Begossi, 2012)

Stakeholder consultations in natural resources assessments and management are particularly relevant in cases of time-constrained or budget-limited assessments. Comparative studies have shown that these consultations provide large amounts of reliable information rapidly and at minimal cost (Poizat and Baran, 1997; Ticheler et al., 1998; Garrison et al., 2006).

Last, gathering opinions about issues or proposed solutions also reflects social drivers and dynamics among stakeholders. These dominant perceptions, justified or not, make people move in a given direction or make certain decisions that will affect the resource. They are, therefore, particularly relevant to the managers of that resource.

The conclusions of the present report will serve as input to the wider analysis of the SOBA chapter on *Biodiversity and Fisheries*. A companion report more focused on fishers and fishery resources (*SOBA 4-03: Consultations of Fishers on Fishery Resources and Livelihoods in the Ayeyarwady Basin*) complements the present analysis.

2 METHODOLOGY

2.1 The Area Consulted

The consultations were conducted in 14 districts across five zones of the Ayeyarwady Basin. The selection of districts was based on the population density in each zone while also integrating northern zones with low populations but high biodiversity (Figure 4). The selection resulted in the districts listed in Table 1.

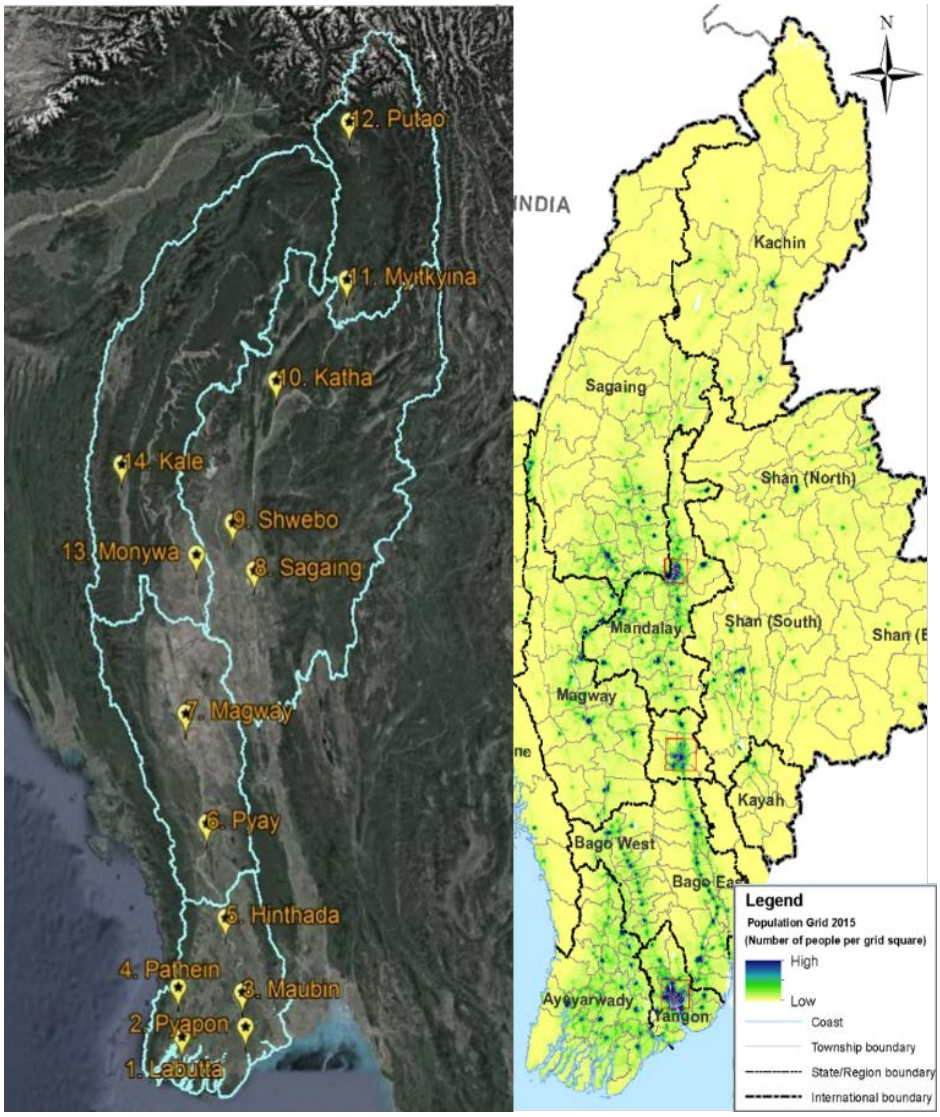

Figure 4 – Map of the 14 districts consulted within the five zones of the Ayeyarwady Basin (left) and of the population distribution (right) *MiMU, 2015; based on 2014 census data*

Table 1 - Zones and districts surveyed

Ayeyarwady Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady
Maubin	Pyay	Sagaing	Monywa	Myitkyina
Pyapon	Magway	Shwebo	Kale	Putao
Pathein		Katha		
Labutta				
Hinthada				

The consultations were based on a protocol of local knowledge already gathered and well-established by the Department of Fisheries (DoF) (Baran et al., 2015; Win Ko Ko et al., 2016).

2.2 Consultation Methods Applied and Selection of Respondents

Focus group discussions were applied to consult larger numbers of participants from community groups and to understand local perspectives of the role of wild resources in livelihoods.

Key informant interviews served to gain insights from experts and officials involved in resource management and to understand the issues and trends in wild resource use and livelihoods from a broader district and regional-level perspective.

In the selection of the survey respondents, the focus was on obtaining perspectives from a wide range of stakeholders, including experts with knowledge of the role of fish and other wild resources on people's livelihoods. The following selection criteria were applied:

1) For the focus group discussions, community members were selected from three different villages per district:
   - a fishing village
   - a farming village
   - a trade village

   Each village was represented by people from different trades, including fishers, farmers, employees, and business people, with at least one woman from each village (i.e., 25% of the participants).

2) For the key informant interviews, district level authorities and civil society groups with knowledge of wild resources and fisheries in their area were selected. These include people from the following entities:
   - The General Administrative Department
   - The Planning Department
   - The Forestry Department
   - The Environmental Conservation Department
   - DoF
   - Civil society groups

2.3 Questionnaire Development, Field Testing, and Analysis

The questionnaire applied addresses the status and trends in the economic and nutritional role of wild resources and in the status of the habitats and species that people in the basin depend upon. Further, the challenges met by resource users, threats to the sustainability of the wild resources, and recommendations for improving their management, were examined. The questionnaire is available in Annex I.

The questionnaire was tested during a field trip to the Maubin District in the delta. This testing allowed the field surveyors to familiarize themselves with the questions and to learn how the respondents perceived the questions. Following the field-testing, minor amendments were made to the questionnaire to optimize its suitability for the intended target groups.

Prior to the field consultations, a training in the questionnaire was conducted with participants from the universities of Yangon, Dagon, and Maubin – some of whom were selected to support the implementation of the field consultations.

The field consultations entailed two trips to the Ayeyarwady Delta, a trip to the Lower and the Middle Ayeyarwady and Chindwin, and two trips to Myitkyina and Putao in the Upper Ayeyarwady.

The results from 14 focus group discussions and 35 key informant interviews were entered directly into Excel spreadsheets. They were then reviewed by the surveyors for final validation. Results of the analysis are detailed in the chapters below.

2.4 Definitions Used in This Report

- The term "wild resources" includes all biodiversity and natural resources (other than fish and aquatic animals), including terrestrial animals, plants, and insects, that contribute to people's livelihoods (income and/or nutrition).
- The term "fish" generally includes other aquatic animals (OAA).

3 LIVELIHOODS AND INCOME SOURCES

3.1 Income Sources and Trends

3.1.1 *Income sources according to the focus groups surveyed*

Seen from a basin-wide perspective, agriculture is the number one income source. According to the focus groups surveyed, agriculture brought in an estimated 34% directly, or approximately 50% if including livestock, processing, and trading of agricultural products.

Fishing, hunting, and collecting brings in approximately 11% of the basin income, when including processing and trading. Fishing alone averages 7%, and hunting and collection of wild resources accounts for 1% of the estimated income in the Ayeyarwady Basin. However, the differences between zones are significant, with fishing making up 10% of the income in the delta, compared with 2% in Chindwin and the Upper Ayeyarwady.

Wild resources, including both hunting and collection, are most important for the economy in the Upper Ayeyarwady with 5%, followed by the Middle Ayeyarwady with 1%. In the delta, the Lower Ayeyarwady, and Chindwin, wild resources amounts to less than 1% in each zone.

Considering the township level in the Ayeyarwady Delta, fishing and related processing and trade at Labutta comprise 27% of the local income and 15% or more in both Pyapon and Pathein, according to the focus group participants. Fishing, alone makes up 14% in Pyapon and 10% in each of Labutta, Pathein, and Hinthada in the delta.

In the Lower Ayeyarwady, fishing makes up approximately 3 to 4% of the township's income, while it comprises 3 to 10% in the surveyed townships of the Middle Ayeyarwady. In Chindwin and the Upper Ayeyarwady, fishing comprises 1 to 3% of the township's income.

Aquaculture accounts for 8% of the income of the delta, but it is negligible in the other four zones in terms of the income it brings in. At the township level, the highest contribution of aquaculture to the local income was found in Maubin and Labutta in the delta, with 30% and 5%, respectively.

3.1.2 *Income sources according to the key informants consulted*

As with the focus group results, the key informant interviews also show that agriculture comes out as the number one income source. Seen from a basin-wide perspective, agriculture brings in an estimated 35% directly, or a total of 52% if including livestock, processing, and trading of agricultural products.

Fishing, hunting, and collecting brings in an estimated 10% of the basin income, when including processing and trading. Fishing alone averages 6%, and hunting and collection of wild resources averages 3% of the estimated income. However, the differences between zones are significant, with fishing making up 16% of the income in the delta compared with a few percent in the Middle Ayeyarwady and Chindwin.

Wild resources, including both hunting and collection, are significantly more important for the economy in the Upper Ayeyarwady with 17%. In the other four zones, hunting and collecting amounts to less than 1% in each zone, according to the key informants consulted.

At first glance, income from aquaculture appears negligible in four out of the five zones, while making up a few percent of the estimated income in the Middle Ayeyarwady. However, key informants, in some cases, included aquaculture in other fisheries related income, and thus, the actual income from aquaculture will be somewhat higher than what the results table reflects.

Table 2 shows the most important income sources per zone and from a basin-wide perspective. Figure 5 illustrates the estimated income distribution across the Ayeyarwady Basin from the perspectives of the focus groups (FGD) and key informants (KII) surveyed.

Table 2 - Income sources: distribution of income sources in the Ayeyarwady Basin.
(Field consultations, Jun to Aug 2017)

Income Source	Delta		Lower Ayeyarwady		Middle Ayeyarwady		Chindwin		Upper Ayeyarwady		Ayeyarwady Basin	
	FGD	KII	FGD	KII	FGD	KII	FGD	KII	FGD	KII	FGD	KII
Aquaculture	8%	0%	0%	0%	0%	2%	0%	0%	0%	0%	3%	0%
Artisan	7%	2%	6%	2%	4%	7%	14%	4%	2%	2%	7%	4%
Farming	26%	48%	36%	38%	42%	36%	35%	25%	51%	26%	34%	35%
Fishing	10%	16%	3%	6%	8%	2%	2%	2%	2%	6%	7%	6%
Hunting and collection of wild resources	0%	0%	0%	0%	1%	0%	1%	0%	5%	17%	1%	3%
Labourer	7%	0%	4%	0%	8%	0%	11%	0%	11%	7%	8%	1%
Livestock production	6%	13%	12%	10%	6%	7%	2%	4%	5%	12%	6%	9%
Processing of agricultural products	4%	2%	8%	2%	1%	2%	5%	0%	0%	0%	4%	1%
Processing of fish and wild resources	1%	0%	0%	0%	0%	3%	0%	0%	0%	0%	1%	1%
Processing of natural resources	1%	0%	0%	1%	0%	2%	0%	0%	0%	2%	0%	1%
Production of manufactured products	1%	1%	0%	0%	0%	2%	0%	2%	0%	0%	0%	1%
Resource Extraction	4%	2%	0%	0%	0%	3%	0%	2%	1%	3%	1%	2%
Services and Shops	7%	11%	1%	14%	18%	16%	10%	17%	14%	15%	10%	14%
Trading of agricultural products	6%	0%	3%	7%	5%	1%	10%	24%	0%	5%	6%	7%
Trading of fish and wild resources	3%	0%	0%	0%	3%	0%	1%	1%	0%	0%	2%	0%
Trading of manufactured products	3%	4%	25%	14%	1%	14%	10%	11%	5%	4%	7%	9%
Trading of natural resource products	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%
Transportation	5%	1%	1%	6%	2%	5%	0%	8%	3%	2%	3%	4%

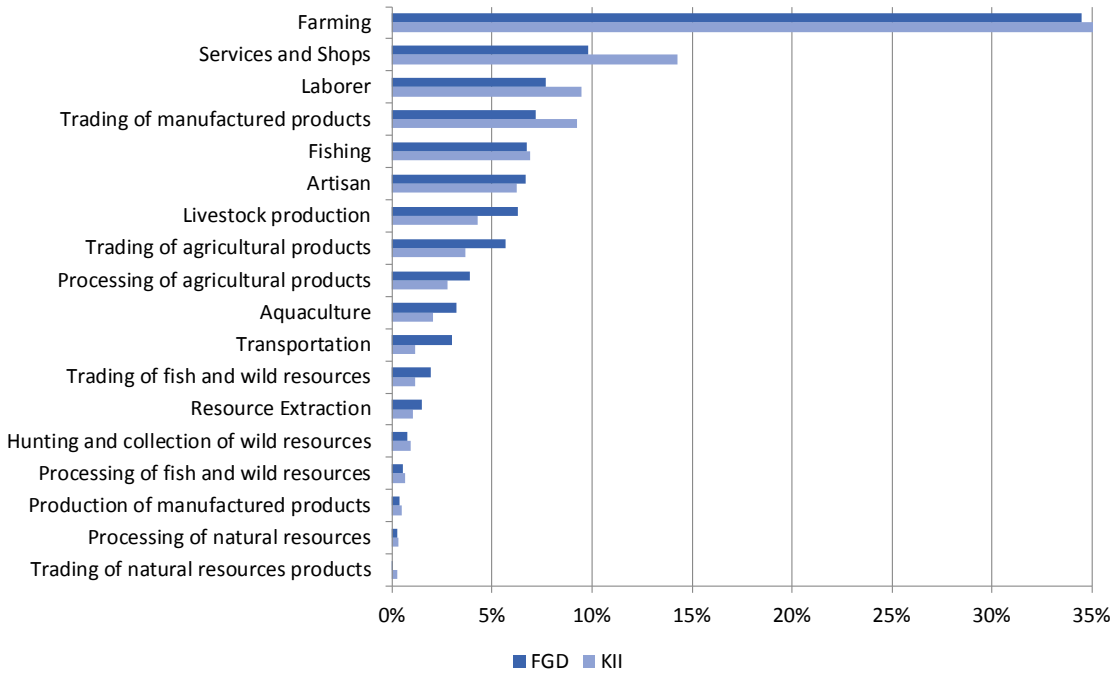

Figure 5 – Income sources: distribution of income sources in the Ayeyarwady Basin: *(Field consultations, Jun to Aug 2017)*

3.1.3 Conclusion

Seen from a basin-wide perspective, agriculture is the number one income source, bringing in approximately 33% of the income of the Ayeyarwady Basin, according to the surveyed population. If including livestock, processing, and trading of agricultural products, agriculture amounts to approximately 50% of the basin's income.

Fishing, hunting, and collecting brings in approximately 10% of the income, when including processing and trading. Aquaculture brings in a few percent. Fishing alone makes up approximately 67% of the combined income from fish and wild resources. However, the differences between zones are significant, with fishing making up 10% of the income in the delta compared with a few percent in Chindwin and the Upper Ayeyarwady.

Wild resources, including both hunting and collection, are relatively more important for the economy in the Upper Ayeyarwady, followed by the Middle Ayeyarwady and Chindwin. In the delta and the Lower Ayeyarwady, wild resources contribute less to the income, according to the surveyed population.

In addition to the direct economic importance of fish and wild resources, the nutritional, cultural, and food security aspects of fish and wild resources need to be accounted for to fully comprehend the importance of these resources. These aspects of the non-financial importance of fish and wild resources for livelihoods are explored later in this report.

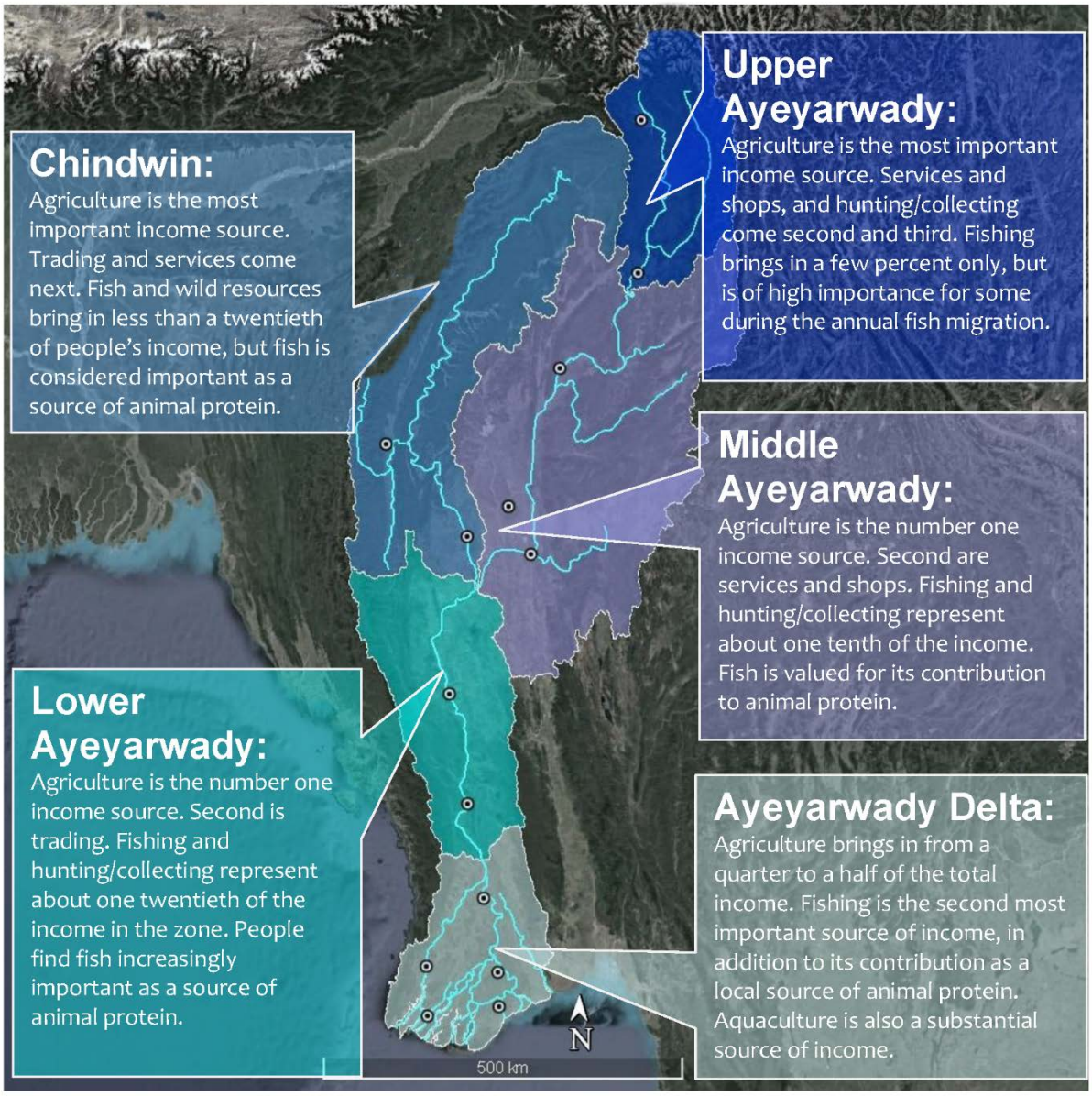

Figure 6 – Main income sources as perceived by the population surveyed: *The most important income sources and the contribution of fish and wild resources in the five zones of the Ayeyarwady Basin (field consultations, Jun to Aug 2017).*

3.2 Trends in Income Sources and Living Standards

3.2.1 *Trends in income sources*

The general trend is an increasing income. The surveyed population considers approximately three quarters of the income sources in the Ayeyarwady Basin to be more important now than they were 10 years ago. However, fishing, hunting, and collecting were among the income sources considered of decreasing importance for the income in the surveyed townships and districts.

The general trend in the development in fishing-related activities is a decline in the importance of fishing, whereas the focus groups perceive fish trading as increasingly important.

Annex II includes tables of the income trends in the five zones of the Ayeyarwady Basin.

3.2.2 *Development in living standards*

Almost all of the focus groups and key informants reported improved living standards in the last 5 years. The expectations for the next 5 years were also mostly positive, with 11 of 14 focus groups expressing expected further improvements in living standards. According to three groups, however, the future development in living standards will depend on social groups. Among the key informants, 30 of 35 expect continued improvements, while 3 believe things will remain the same.

Lack of peace is one concern with the potential to prevent improvements in people´s living standards. Without peace business cannot develop, Therefore, people in parts of the Kachin State do not expect improvements in the next 5 years, unless there is peace.

3.2.3 *Conclusion*

People consider most income sources more important now compared to a decade ago. However, income related to fishing and hunting/collecting appears to be decreasing. This may reflect the overall economic development and the increased pressure on fish, wild resources, and their habitats.

People generally stated that their living standard, in terms of economic and social well-being, has improved in the last 5 years. Likewise, the majority of the people consulted expect these improvements to continue in the coming 5 years.

3.3 The Economic Importance of Fish, Wild Resources, and Trends

Seen from a basin-wide perspective, the surveyed population estimates that the income generated from fishing, hunting, and collecting, including related activities of processing and sale, is approximately 10% of the basin's income. See Figure 7.

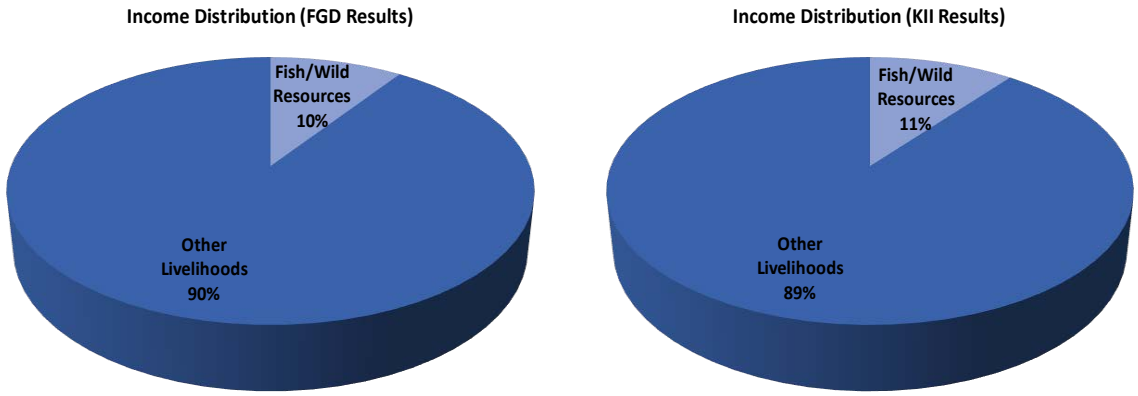

Figure 7 – Income share of fishing and hunting/collecting: *The estimated share of the total Ayeyarwady Basin's income derived from fishing and hunting/collecting activities (field consultations, Jun to Aug 2017).*

The income share of fishing, hunting, and collecting, including the related activities of processing and selling the fish and wild resources, varies considerably between the five zones and the surveyed population. The estimated income share ranges from a few percent in the Lower Ayeyarwady and Chindwin to approximately a sixth in the delta and up to a quarter in the Upper Ayeyarwady. See Figure 8 and Figure 9.

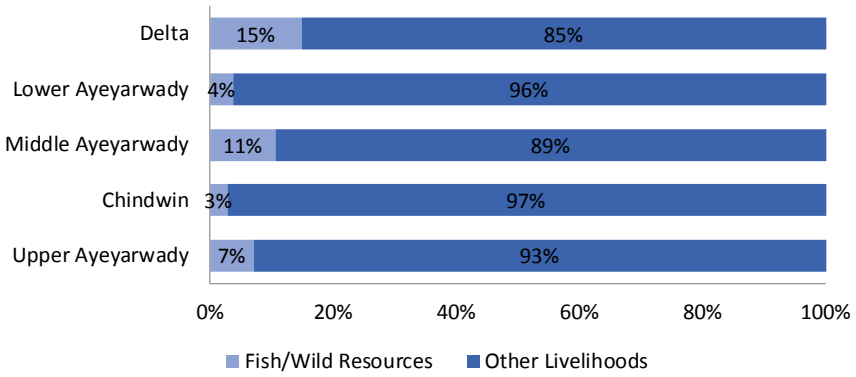

Figure 8 – Income share of fishing and hunting/collecting: *The estimated share of income from fishing and hunting/collecting activities according to the focus groups (field consultations, Jun to Aug 2017).*

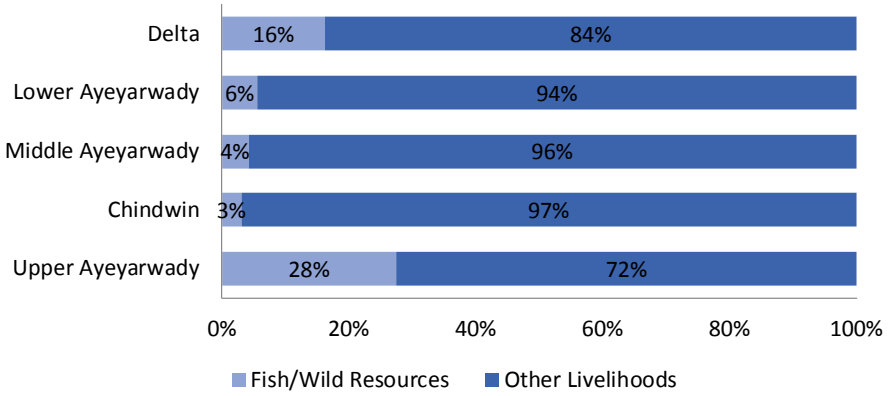

Figure 9 – Income share of fishing and hunting/collecting: *The estimated share of income from fishing and hunting/collecting activities according to the key informants (field consultations, Jun to Aug 2017).*

Table 3 and Figure 10 show the economic importance of fishing and hunting/collecting activities per zone and for the Ayeyarwady Basin combined.

Table 3 – Economic importance of fish and wild resources: *The share of township (FGD) and district (KII) income from fishing and hunting/collecting (field consultations, Jun to Aug 2017).*

Income Source	Delta		Lower Ayeyarwady		Middle Ayeyarwady		Chindwin		Upper Ayeyarwady		Ayeyarwady Basin	
	FGD	KII	FGD	KII	FGD	KII	FGD	KII	FGD	KII	FGD	KII
Fishing	10.4%	16.3%	3.5%	5.6%	7.7%	1.6%	1.7%	1.7%	2.0%	5.6%	6.7%	6.2%
Hunting and collecting of wild resources	0.0%	0.0%	0.0%	0.0%	1.3%	0.0%	0.5%	0.0%	5.1%	17.1%	0.8%	2.7%
Processing of fish and wild resources	1.4%	0.0%	0.0%	0.0%	0.0%	2.5%	0.0%	0.0%	0.0%	0.0%	0.5%	0.6%
Trading of fish and wild resources	3.1%	0.0%	0.3%	0.0%	2.7%	0.0%	0.5%	1.3%	0.0%	4.8%	1.9%	1.0%
Total	14.9%	16.3%	3.7%	5.6%	11.7%	4.1%	2.7%	3.0%	7.1%	27.5%	10.0%	10.6%

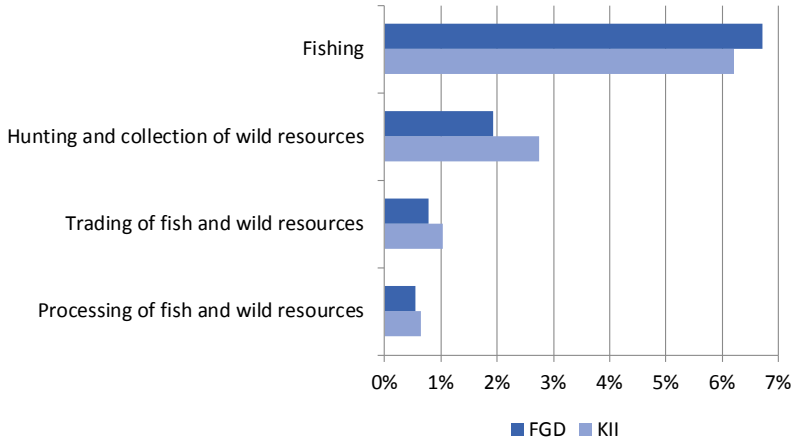

Figure 10 – Economic importance of fish and wild resources: *The share of township (FGD) and district (KII) income from fishing and hunting/collecting (field consultations, Jun to Aug 2017).*

3.3.1 *Trends in the importance of fish and wild resources for income*

The economic importance of the income sources related to fishing and hunting/collecting is in a downwards trend according to the focus groups surveyed, with approximately two thirds of these activities said to be of less importance now than 10 years ago.

According to the key informants, however, the economic importance of income sources related to fishing and hunting/collecting is in a positive trend, with approximately two thirds67% expressing that these income sources are more important now. Figure 11 illustrates the trends in the perceived importance of fish and wild resources for income.

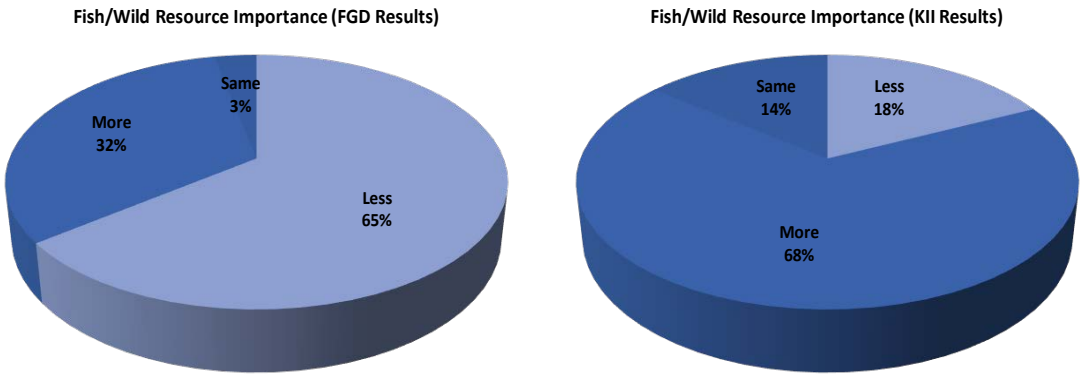

Figure 11 – Trends in importance of fish and wild resources for income: *Trends in the economic importance of fish and wild resource-related income sources in the Ayeyarwady Basin now and compared to 10 years ago. Results from focus groups (left) and key informants (right) (field consultations, Jun to Aug 2017).*

Tables showing the trends in the importance of fishing, hunting/collecting, and related activities per zone are available in Annex III.

3.3.2 Conclusion

The economic importance of fishing, hunting, and collecting of wild resources varies considerably between the five zones. The estimated share of the total income derived from these ecosystem dependent activities in each zone ranges from a few percent in the Lower Ayeyarwady and Chindwin, to approximately a sixth in the delta, and up to a quarter of the income in the Upper Ayeyarwady, according to the surveyed population.

Considering the importance of wild resources for people's income, it is concerning that the economic importance of the income sources related to fishing and hunting/collecting is reportedly in a downwards trend, according to the focus groups surveyed. The key informants, however, were more optimistic in their perception of the current trends in the economic importance, with approximately two thirds expressing that these income sources are more important now.

3.4 Migration and Socio-Economic and Environmental Changes

3.4.1 Migration

Migration of people is common across the Ayeyarwady Basin and is, in most cases, perceived as positive. People migrate to seek better opportunities that bring about economic benefits and to enable students to pursue higher education in regional centres. In-migration helps to fulfil the need for labourers (e.g., in the aquaculture, agricultural, and mining sectors.

There is much seasonal migration in relation to the agriculture sector. Some migration is triggered by highly productive seasons for fishing and the collection of wild resources (e.g., in Putao in the Upper Ayeyarwady). Negative aspects of migration primarily focused on introduction to vices (e.g., drug use and gambling).

3.4.2 Socio-economic and environmental changes

The focus groups and key informants generally mentioned more positive than negative changes experienced in the last decade. Physical infrastructure improvements, including roads, bridges, and telecommunication, were the most commonly cited major positive changes in terms of socio-economic and environmental developments that benefitted livelihoods in the last decade. Other positive changes included improved health and education infrastructure, increases in the number of small businesses, and the transformation from traditional agriculture to mechanized farming. The latter was, in some cases, also viewed as a negative due to a decrease in jobs being available at the local level.

In relation to the fisheries sector, the changes from lease fisheries to open fisheries and fishing with motorboats were viewed positively by some focus group participants. Among the negative changes highlighted were a decline in fish species and abundance, reduced fish catch, shallowing of creeks and rivers, damages from floods, and deforestation (including cutting of mangrove). Some people perceived the declines in the mining and forest-related industries negatively due to the loss of jobs in those sectors. Others, however, perceive the same declines positively due to the environmental benefits of less mining and logging. Delayed arrival of the monsoon, illegal fishing, and the proliferation of drugs were other downsides experienced in some zones.

Tables of the main positive and negative socio-economic and environmental changes of the last decade are available in Annex IV.

3.4.3 Socio-economic and environmental changes from a gender perspective

According to the focus group participants, most changes they have experienced in the last decade affected men and women equally. However, proliferation of household shops in Myitkyina, in the Upper Ayeyarwady, favoured women, whereas a decrease in forest products, in the same district, negatively affected them. Decreased mining in Myitkyina had a negative impact, especially for men, whereas a change to fishing with motorboats favoured some men in the delta.

3.4.4 Conclusion

All study sites experienced migration. According to the respondents surveyed this is generally viewed as positive due to the income and educational opportunities it contributes.

In terms of socio-economic and environmental developments benefitting livelihoods in the last decade, physical infrastructure improvements, including roads, bridges, and telecommunication, were the most commonly cited major positive changes, followed by improved health and education infrastructure and the transformation from traditional to mechanized farming.

The most common negative changes experienced by people were a decline in fish species and abundance, deforestation, and declines in mining and forest-related industries. Floods, shallowing of creeks and rivers, delayed arrival of the monsoon, proliferation of drugs, and increases in illegal fishing were other downsides of the developments in the last decade.

4 DEPENDENCY ON FISH AND WILD RESOURCES

4.1 The Role of Fish and Wild Resources to Livelihoods

4.1.1 *Fishing as an occupation*

According to the focus groups surveyed, involvement in fishing, at the township level, varies considerably between the zones, ranging from 1% of the families in the Lower Ayeyarwady to more than 20% in the delta. The Middle Ayeyarwady averages 4%, and in Chindwin, 15% of the families in the township fish. There were differing opinions about the involvement in the Upper Ayeyarwady.

The average involvement of the district population in fishing, according to the key informants, ranges from 4% in Chindwin to 19% in the Upper Ayeyarwady. The delta sees an average participation of 10%, the Lower Ayeyarwady 6%, and the Middle Ayeyarwady 7%.

At the township level, the focus groups reported that the share of families involved in fishing in the delta ranged from 7% in Hinthada to 58% in Maubin. In the Lower Ayeyarwady, Pyay and Magway see approximately 2% involvement in fishing. In the Middle Ayeyarwady, Sagaing, Shwebo, and Katha involvement ranges from 3 to 5%. In Chindwin, Kale and Monywa reported 3% to 26% fishing involvement.

Figure 12 shows the involvement of families in fishing in the examined townships and districts in four zones of the Ayeyarwady Basin. Due to the small sampling size, results are only rough indications that depend partly on the local situation.

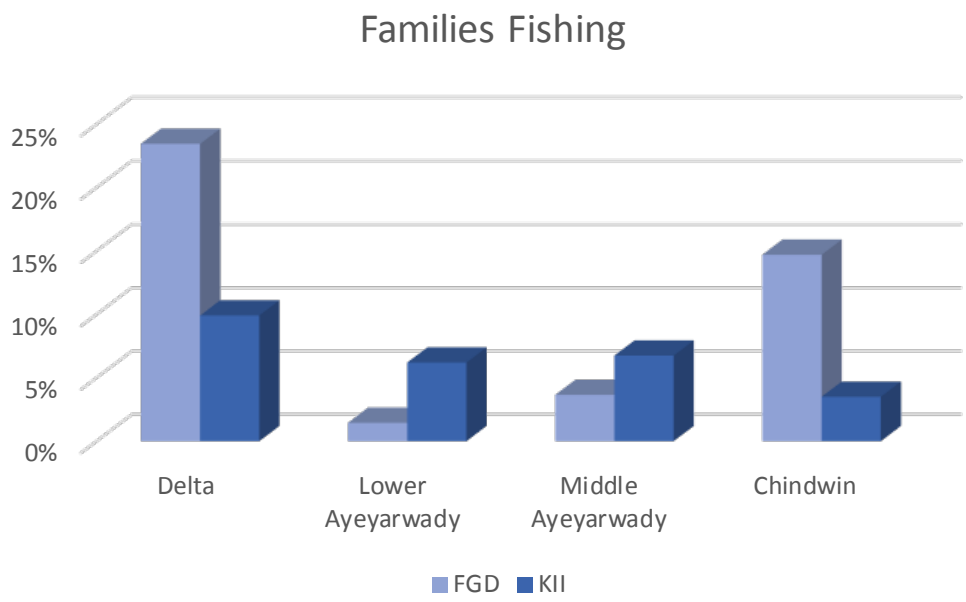

Figure 12 - Distribution of fishing population: *The percentage of families involved in fishing in surveyed townships and districts (field consultations, Jun to Aug 2017).*

According to the focus group participants, the majority of the fishing families in the delta, the Lower Ayeyarwady, the Middle Ayeyarwady, and Chindwin fish full time. On the contrary, in the Upper Ayeyarwady only approximately one out of seven fishing families fish full time.

The key informants also reported that at least half of the fishing families in the Lower Ayeyarwady, the Middle Ayeyarwady, and Chindwin fish full time, whereas the share of full-time fishers were said to be one fifth in the delta and a quarter in the Upper Ayeyarwady.

4.1.2 *Hunting and collecting as an occupation*

The focus groups reported the share of families involved in hunting and collecting ranged from 8% in the Upper Ayeyarwady to 38% in Chindwin. The delta, the Lower Ayeyarwady, and the Middle Ayeyarwady had 30%, 26%, and 10% of families involved, respectively.

According to the key informants, the percentage of families involved in hunting and collecting ranged from 35% in the Upper Ayeyarwady to 4% in the Lower Ayeyarwady. The delta, the Middle Ayeyarwady, and Chindwin had 9%, 23%, and 8% of families involved, respectively.

At the township level, the share of families involved in hunting and collecting in the delta ranged from 10% in Labutta, Pyapon, and Maubin; to 50% in Pathein; to 70% in Hinthada. In the Lower Ayeyarwady, Pyay and Magway had 50% and 1% of families involved, respectively. In Sagaing, Shwebo, and Katha, in the Middle Ayeyarwady, approximately 10% of families are hunting and/or collecting. The focus groups in Chindwin reported from 25% to 50% involved in Monywa and Kale, respectively. In Putao, in the Upper Ayeyarwady, 8% of the population are reportedly involved in hunting and collecting.

Figure 13 shows the involvement in hunting and/or collecting in the five zones of the Ayeyarwady Basin.

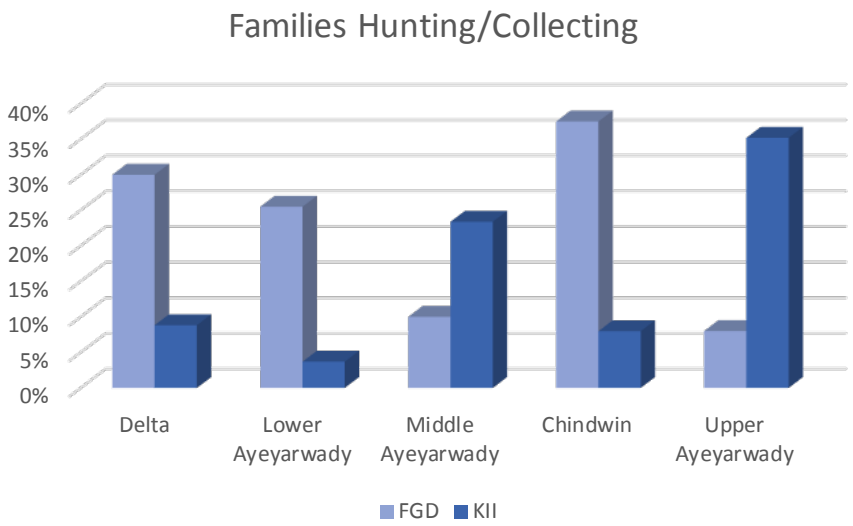

Figure 13 – Share of population hunting and/or collecting wild resources: *The percentage of township (FGD) and district (KII) population hunting and/or collecting wild resources (field consultations, Jun to Aug 2017).*

According to the focus group participants, the share of families who hunt and collect full time ranged from 5% in the Lower Ayeyarwady to 28% in Chindwin. The Middle Ayeyarwady, the delta, and the Upper Ayeyarwady had 6%, 18%, and 25%, respectively, of the townships' populations hunt and/or collect full time.

4.1.3 Conclusion

The importance of fishing, as a livelihood activity, varied considerably between the zones. The delta saw the highest participation in fishing with approximately 20% of the families involved. At the other end of the scale, families who participated in fishing in the Lower Ayeyarwady and the Middle Ayeyarwady ranged from 1 to 7% of the population.

The average participation in hunting and/or collecting across the Ayeyarwady Basin varied from approximately one tenth to two fifths, according to the focus groups. The key informants reported a level of involvement slightly lower. According to the focus groups, the highest involvement is in Chindwin, the delta, and the Lower Ayeyarwady. The key informants, however, reported the highest involvement in hunting and/or collecting in the Upper Ayeyarwady and the Middle Ayeyarwady.

4.2 Gender in Fishing, Hunting, and Collecting

4.2.1 Gender in fishing and fishing-related activities

In terms of gender in the fisheries sector, the results show that throughout the Ayeyarwady Basin, the majority of fishers are men, and women dominate when it comes to fishing-related activities, such as processing and sales.

The gender distribution in fishing ranges from 58 to 95% of fishers reported to be men according to the focus groups, and 76 to 86% according to the key informants. On a basin-wide scale, the reported gender distribution in fishing is 74 to 82% men and 18 to 26% women, on average.

For the involvement of men and women in fishing-related activities, such as processing and sales, women make up from 69 to 100% of the activities according to the focus groups, and from 58 to 88% of the activities according to the key informants. On average, the gender distribution in fishing-related activities is 77 to 83% women and 17 to 23% men.

According to the focus groups, Chindwin is the zone with the most women involved in fishing (42%), whereas the Middle Ayeyarwady sees the least participation of women (5%).

Figure 14, Figure 15, and Figure 16 show the involvement of men and women in fishing. Figure 17, Figure 18, and Figure 19 show the involvement of men and women in fishing-related activities.

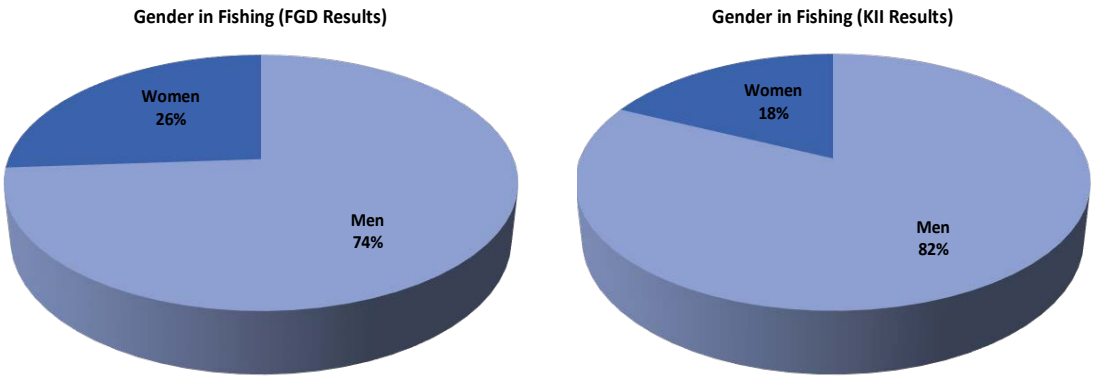

Figure 14 – Gender in fishing: *Average gender distribution of fishers in the Ayeyarwady Basin (field consultations, Jun to Aug 2017).*

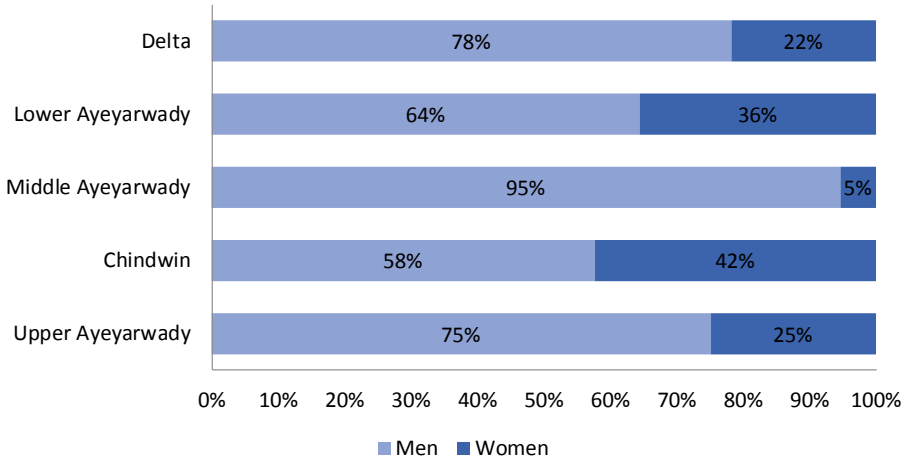

Figure 15 – Gender in fishing: *Average gender distribution of fishers in the Ayeyarwady Basin according to the focus groups (field consultations, Jun to Aug 2017).*

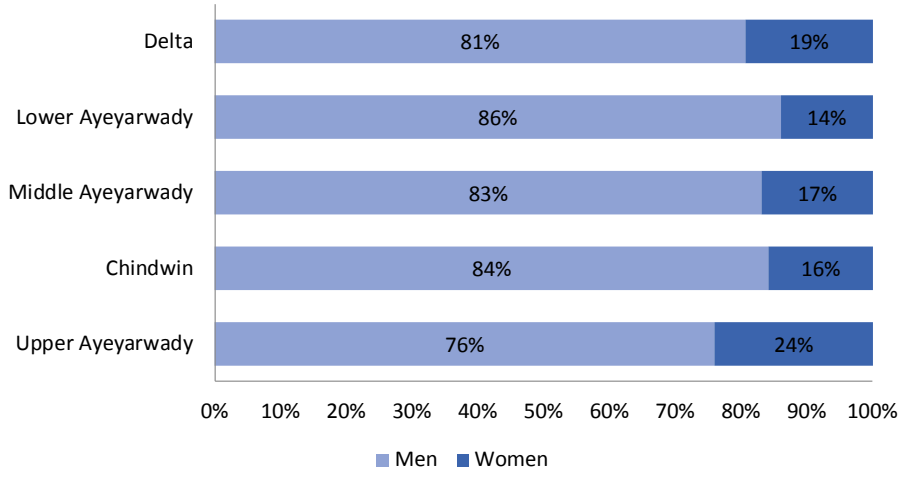

Figure 16 – Gender in fishing: *Average gender distribution of fishers in the Ayeyarwady Basin according to the key informants (field consultations, Jun to Aug 2017).*

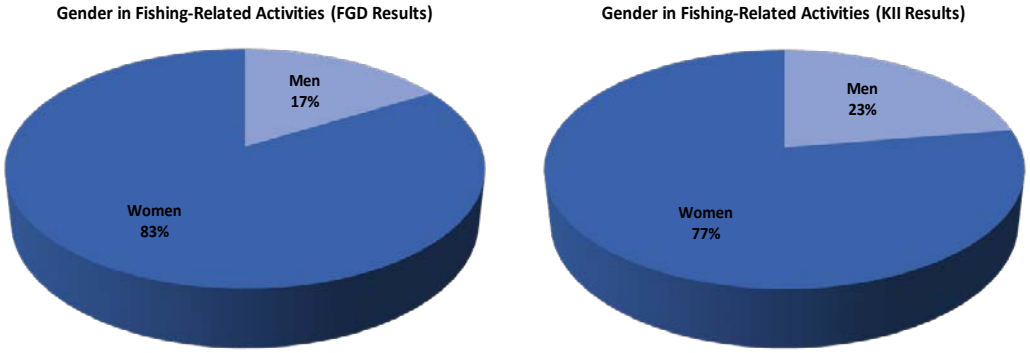

Figure 17 – Gender in fishing-related activities: *Average gender distribution of fishing-related activities in the Ayeyarwady Basin (field consultations, Jun to Aug 2017).*

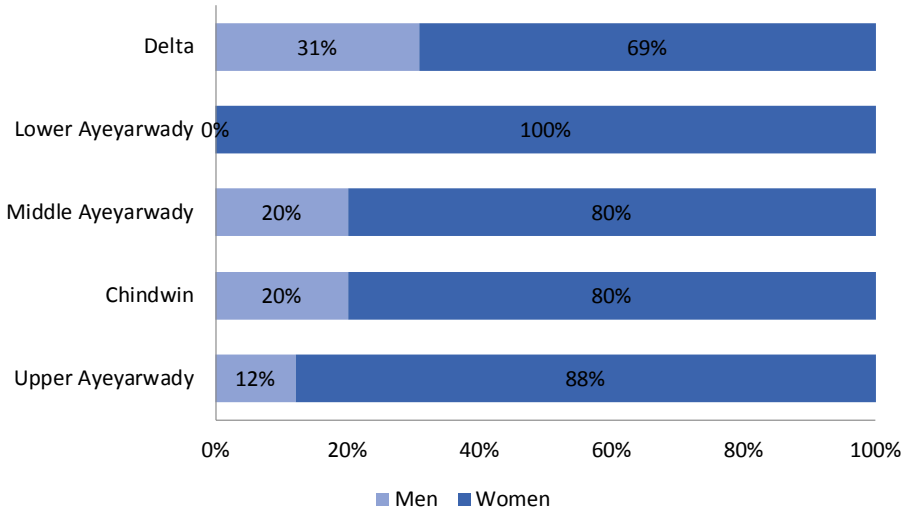

Figure 18 – Gender in fishing-related activities: *Average gender distribution of fishing-related activities in the Ayeyarwady Basin according to the focus groups (field consultations, Jun to Aug 2017).*

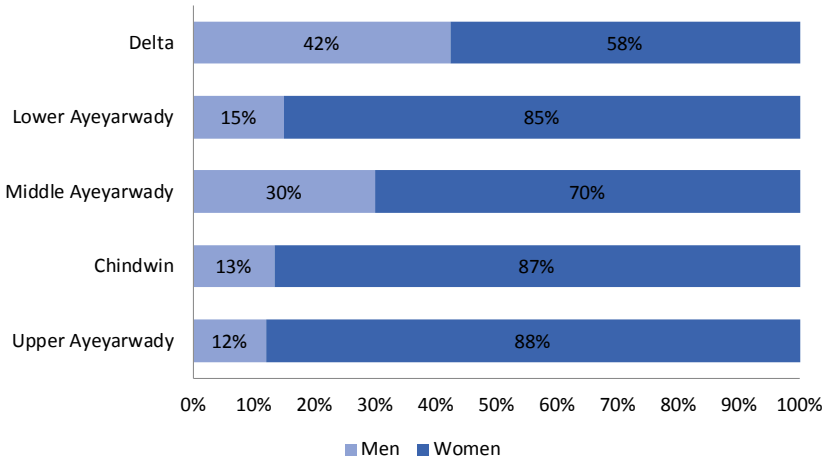

Figure 19 – Gender in fishing-related activities: *Average gender distribution of fishing-related activities in the Ayeyarwady Basin according to the key informants (field consultations, Jun to Aug 2017).*

Among the results of the focus groups, there are some indications that the gender distribution in fishing is less disaggregated into typical stereotyped gender roles in Chindwin and the Lower Ayeyarwady where 42% and 36%, respectively, of the fishers are women. When it comes to fishing-related activities, the delta, the Middle Ayeyarwady, and Chindwin reported the most participation of men, with 31%, 20% and 20%, respectively. However, the overall picture remains one of a relatively clear work division between the genders.

It is worth noting, however, that the fisheries law requires registration for the use of many fishing gears and that most families will register only the male household head. Therefore, the official numbers will largely exclude women from being characterized, and counted, as fishers. As an example, in the Maubin District in the delta, women often join in fishing activities with their husbands, but this participation is not accounted for in the official fisheries statistics. Consequently, official numbers obtained from key informant interviews with the DoF are likely biased against women fishers, whereas the focus group discussions may better reflect the real situation, at least at their townships.

4.2.2 *Gender in hunting/collecting and hunting/collecting-related activities*

In hunting and collecting, the gender participation is more equal than in fishing. In hunting and collecting-related activities, there is a clear majority of women involved.

The gender distribution in hunting and/or collecting ranges from 43 to 75% of hunters/collectors being women, according to the focus groups, and 28 to 49% being women according to the key informants. On a basin-wide scale, on average, the reported gender distribution in hunting and/or collecting is 40 to 72% men and 28 to 60% women. Whereas the focus groups estimated a slight majority of women as hunters and/or collectors, the key informants estimated a majority of men.

For the involvement of men and women in hunting and/or collecting-related activities, such as processing and sale, women make up from 70 to 95% of the involvement according to the focus groups, and from 64 to 84% according to the key informants. On average, the gender distribution in hunting/collecting-related activities is approximately 74 to 83% women and 17 to 26% men.

Figure 20, Figure 21, and Figure 22 show the involvement of men and women in hunting and/or collecting. Figure 23, Figure 24, and Figure 25 show the involvement of men and women in hunting and/or collecting-related activities.

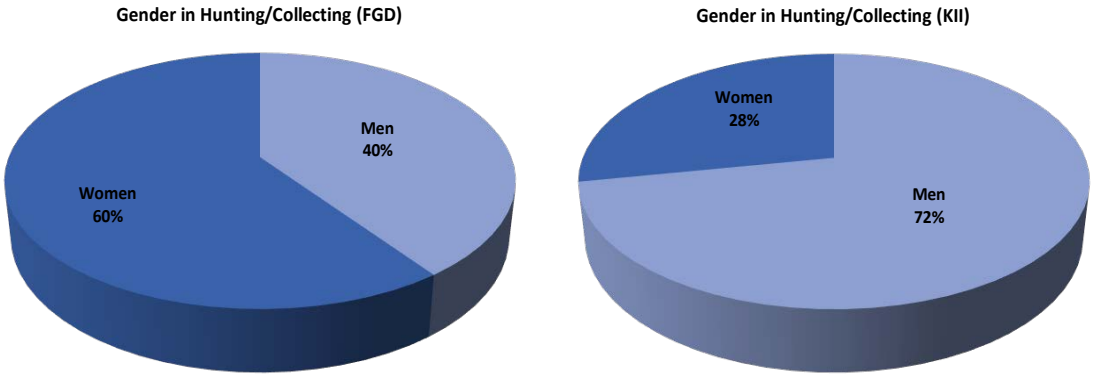

Figure 20 – Gender in hunting/collecting: *Average gender distribution of hunters/collectors in the Ayeyarwady Basin (field consultations, Jun to Aug 2017).*

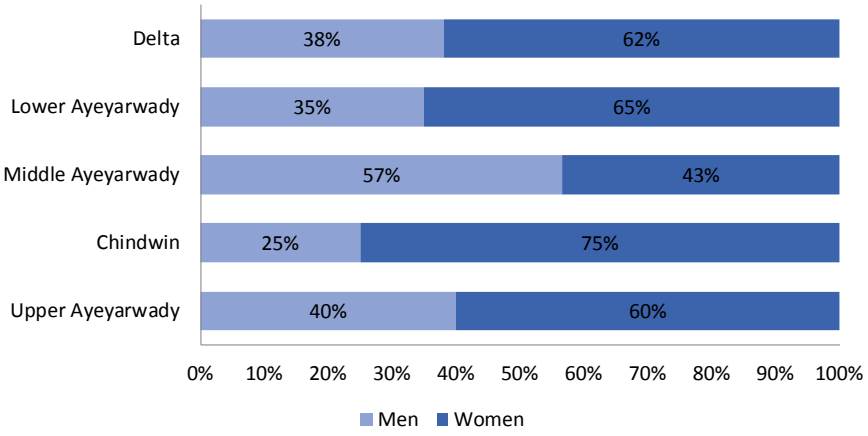

Figure 21 – Gender in hunting/collecting: *Average gender distribution of hunters/collectors in the Ayeyarwady Basin according to the focus groups (field consultations, Jun to Aug 2017).*

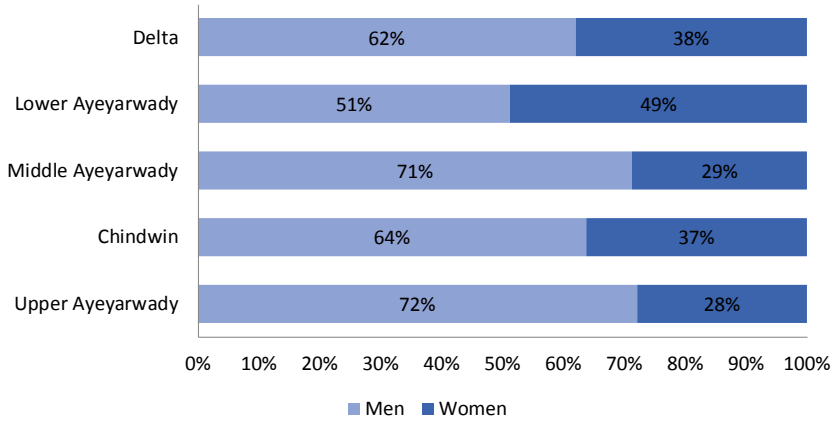

Figure 22 – Gender in hunting/collecting: *Average gender distribution of hunters/collectors in the Ayeyarwady Basin according to the key informants (field consultations, Jun to Aug 2017).*

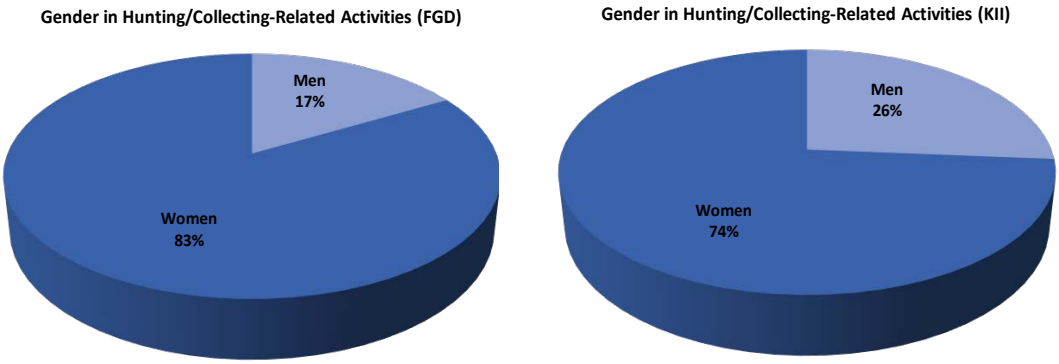

Figure 23 – Gender in hunting/collecting-related activities: *Average gender distribution of hunting/collecting-related activities in the Ayeyarwady Basin (field consultations, Jun to Aug 2017).*

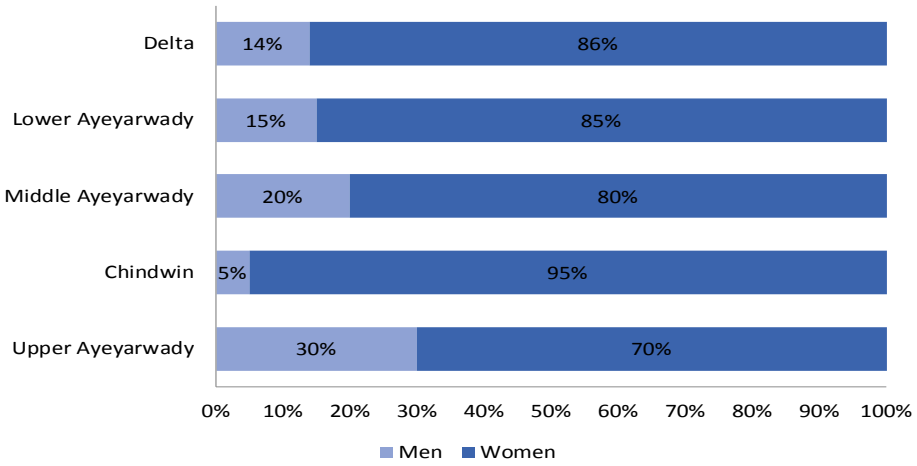

Figure 24 – Gender in hunting/collecting-related activities: *Average gender distribution of hunting/collecting-related activities according to the focus groups (field consultations, Jun to Aug 2017).*

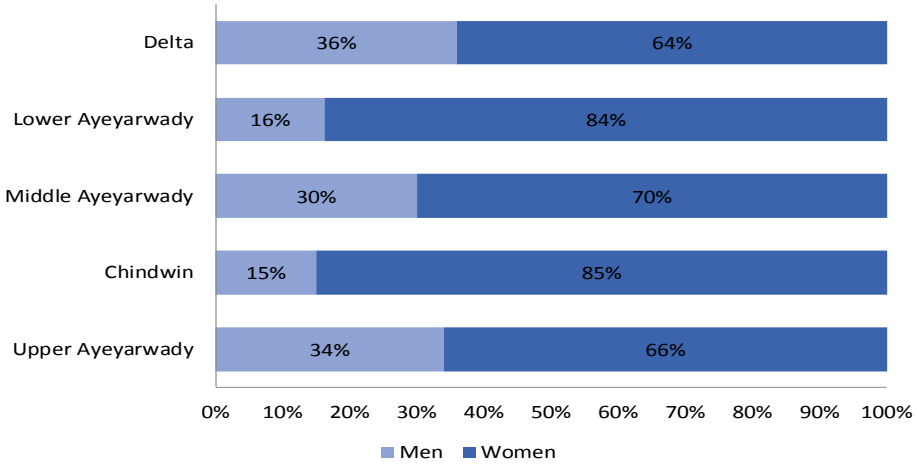

Figure 25 – Gender in hunting/collecting-related activities: *Average gender distribution of hunting/collecting-related activities according to the key informants (field consultations, Jun to Aug 2017).*

4.2.3 Conclusion

From a basin-wide perspective, the gender distribution of fishers is around three quarters men and one quarter women, when averaged between all five zones. In terms of involvement in fishing-related activities, however, such as processing and sale, women make up at least three quarters of the involvement, and men less than one quarter.

From a basin-wide perspective, the gender distribution of hunters and/or collectors sees a slight majority of women involved, according to the focus groups. However, the key informants estimated a majority of men involved in hunting and/or collecting.

In terms or involvement in hunting and/or collecting-related activities, both focus groups and key informants agreed that women make up approximately three quarters of those involved.

4.3 Trends in the Importance of Fish and Wild Resources

With an increasing human population, a greater knowledge of the nutritious benefits of fish, and the relative abundance, availability, and low price of fish compared to many other sources of protein, fish and other aquatic animals are perceived of higher importance now than 10 years ago, according to the focus group participants in four of the five zones. Only in the Lower Ayeyarwady did the surveyed people consider fish and other aquatic animals less important now due to illegal fishing and species decline (see Table 4 and Figure 26).

Annex V provides an overview of the reasons why people consider fish and other aquatic animals more or less important now than compared to 10 years ago.

Table 4 – Importance of fish and OAA for livelihoods now: *The trends in importance of fish and OAA for livelihoods now as compared to 10 years ago (field consultations, Jun to Aug 2017).*

Zone	More important		Less important		Same as before		Total	
	FGD	KII	FGD	KII	FGD	KII	FGD	KII
Delta	5	8		1		2	5	11
Lower Ayeyarwady		5	2				2	5
Middle Ayeyarwady	3	6				2	3	8
Chindwin	2	3		3			2	6
Upper Ayeyarwady	2	2				3	2	5
Total	12	24	2	4	0	7	14	35

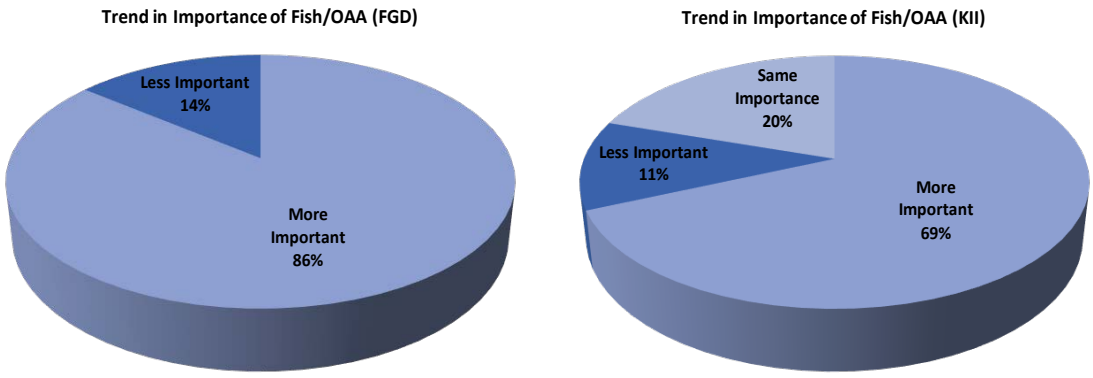

Figure 26 – Importance of fish and OAA for livelihoods now: *The trend in importance of fish and OAA now as compared to 10 years ago (field consultations, Jun to Aug 2017).*

Half of the focus groups perceive wild resources of lower importance now than 10 years ago. They attribute this decreasing importance to deforestation, loss of habitats, loss of access to hunting areas, and overhunting. The other half of the focus groups found the importance of wild resources either more important (5 of 14 groups) or of the same importance (2 of 14 groups) now than compared to 10 years ago. The reasons provided for the perceived higher importance of wild resources now include increased human population, declining wild resources, and health benefits and improved knowledge about these. An overview of the reasons for the trends in the importance of wild resources is in Annex VI.

According to the focus group participants, they generally see wild resources as less important now in the delta and the Lower Ayeyarwady, while there is a trend of perceived increasing importance in Chindwin, the Middle Ayeyarwady, and the Upper Ayeyarwady (see Table 5).

Figure 27 shows the importance of wild resources for livelihoods now compared to 10 years ago, as perceived by the surveyed population.

Table 5 – Importance of wild resources for livelihoods: *The trends in importance of wild resources now as compared to 10 years ago (field consultations, Jun to Aug 2017).*

Zone	More important		Less important		Same Importance		Total	
	FGD	KII	FGD	KII	FGD	KII	FGD	KII
Delta	1	3	4	6		2	5	11
Lower Ayeyarwady		3	1	2	1		2	5
Middle Ayeyarwady	2	4		2	1	2	3	8
Chindwin	1	1	1	4		1	2	6
Upper Ayeyarwady	1	3	1	2			2	5
Ayeyarwady Basin	5	14	7	16	2	5	14	35

The key informants mentioned loss of forest and other important habitats as reasons for considering wild resources less important now than compared to 10 years ago. Common reasons cited for the lower importance in wild resources were their limited abundance, an increase in alternatives from farming, and livestock being available at the markets.

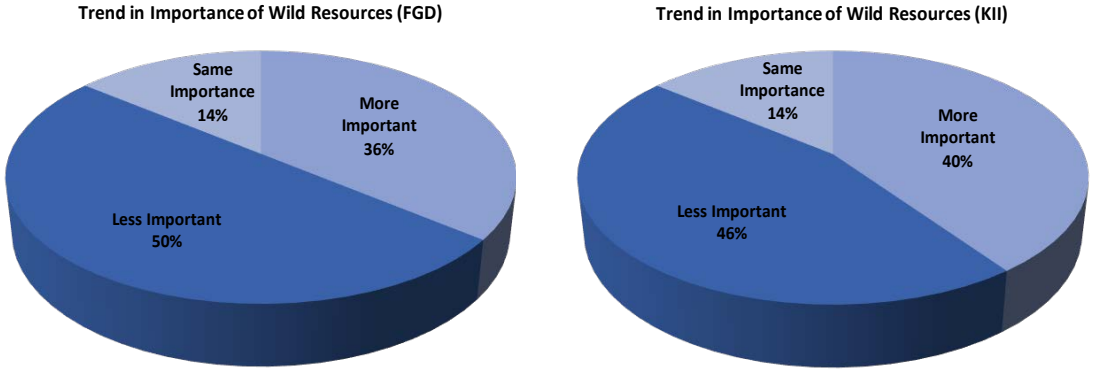

Figure 27 – Importance of wild resources for livelihoods: *The trends in importance of wild resources now as compared to 10 years ago (field consultations, Jun to Aug 2017).*

4.4 Cultural and Seasonal Importance of Fishing

4.4.1 *Culture associated with fish and wild resources*

Cultural issues reported by the focus group participants all related to not killing certain aquatic and terrestrial species. For example, it is bad to kill *Mystus gulio*, a fish considered spiritual in Maubin in the Ayeyarwady Delta, according to some focus groups in four of the five zones. Table 6 shows the cultural issues reported from the focus group discussions for each zone.

Table 6 – Culture related to fish and wild resources: *Description of cultural issues associated with fish and wild resources in the five zones of the Ayeyarwady Basin (field consultations, Jun to Aug 2017).*

Ayeyarwady Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady
People consider the fish, *Mystus gulio,* to be spiritual and, therefore, it should not be killed (Maubin and Pathein).	The fish *Mystus gulio* should not be killed (Magway).	*Mystus gulio* should not be killed (Katha, Shwebo).	People should not kill *Mystus gulio* and dolphins (Monywa).	No cultural issues reported.
The fish, *Channa marulius,* should not be killed (Pathein).	People should not kill elephants (Magway).	Irrawaddy dolphins, boa, and banded krait (*Bungarus fasciatus*) should not be killed (Shwebo).		
People should not kill dolphins, rays, and turtles (Labutta).				

4.4.2 *Seasonal importance of fishing*

The three most commonly cited situations where fish have special importance are 1) to earn income for children's schooling, 2) to earn income for medicine needed in the rainy and winter seasons, and 3) to take advantage of particularly good fisheries, typically in relation to seasonal fish migration.

As many families fish full time, fish is important throughout the year. However, according to the focus groups, special importance is attributed to fishing in the beginning of the rainy season (which coincides with the beginning of the school year), certain periods seeing high fish migration, and in the winter season (when children tend to get ill and need medicine). In these periods, fishing represents an important opportunity to obtain the income needed to cover seasonally inflicted costs.

An overview of the seasons and situations where fish have a special importance is available in Annex VII.

4.4.3 Conclusion

Cultural issues reported all related to not killing certain aquatic and terrestrial species. For example, it is bad to kill *Mystus gulio*, a fish considered spiritual in Maubin in the Ayeyarwady Delta, according to focus groups in four of the five zones.

Unlike most agricultural crops, fish and wild resources, in many cases, represent an opportunity to obtain food and income on a daily basis. This characteristic also benefits people in the Ayeyarwady Basin, who give special importance to fish as a way to earn extra income for children's schooling and for medicine needed in the rainy and winter seasons. Fish is also of special importance during seasonal fish migration (e.g., in Putao, where people take advantage of particularly good fisheries during this yearly occurrence).

4.5 Hunting of Birds and Monkeys

According to the focus groups, no one hunts for dolphins, but sometimes fishers catch or harm dolphins by accident. For example, in Shwebo, in the Middle Ayeyarwady, there are examples of dolphins harmed when people do electrofishing. In Monywa, in Chindwin, trammel drift nets pose a threat to dolphins. If caught, people release the dolphins back into the river.

Chindwin and the Upper Ayeyarwady sees some hunting of monkeys, including the capped langur, gibbon, and rhesus macaque. Hunting of birds was common throughout the delta, the Lower Ayeyarwady, the Middle Ayeyarwady, and Chindwin. Among the species caught were dove, sparrow, egret, mynah, rock pigeon, quail, moorhen, and different duck species.

A list of the bird and monkey species hunted in the Ayeyarwady Basin, according to the focus groups, is in Annex VIII.

4.5.1 Conclusion

Hunting of birds was common throughout the delta, the Lower Ayeyarwady, the Middle Ayeyarwady and Chindwin. In Chindwin and the Upper Ayeyarwady, some hunting of monkeys takes place.

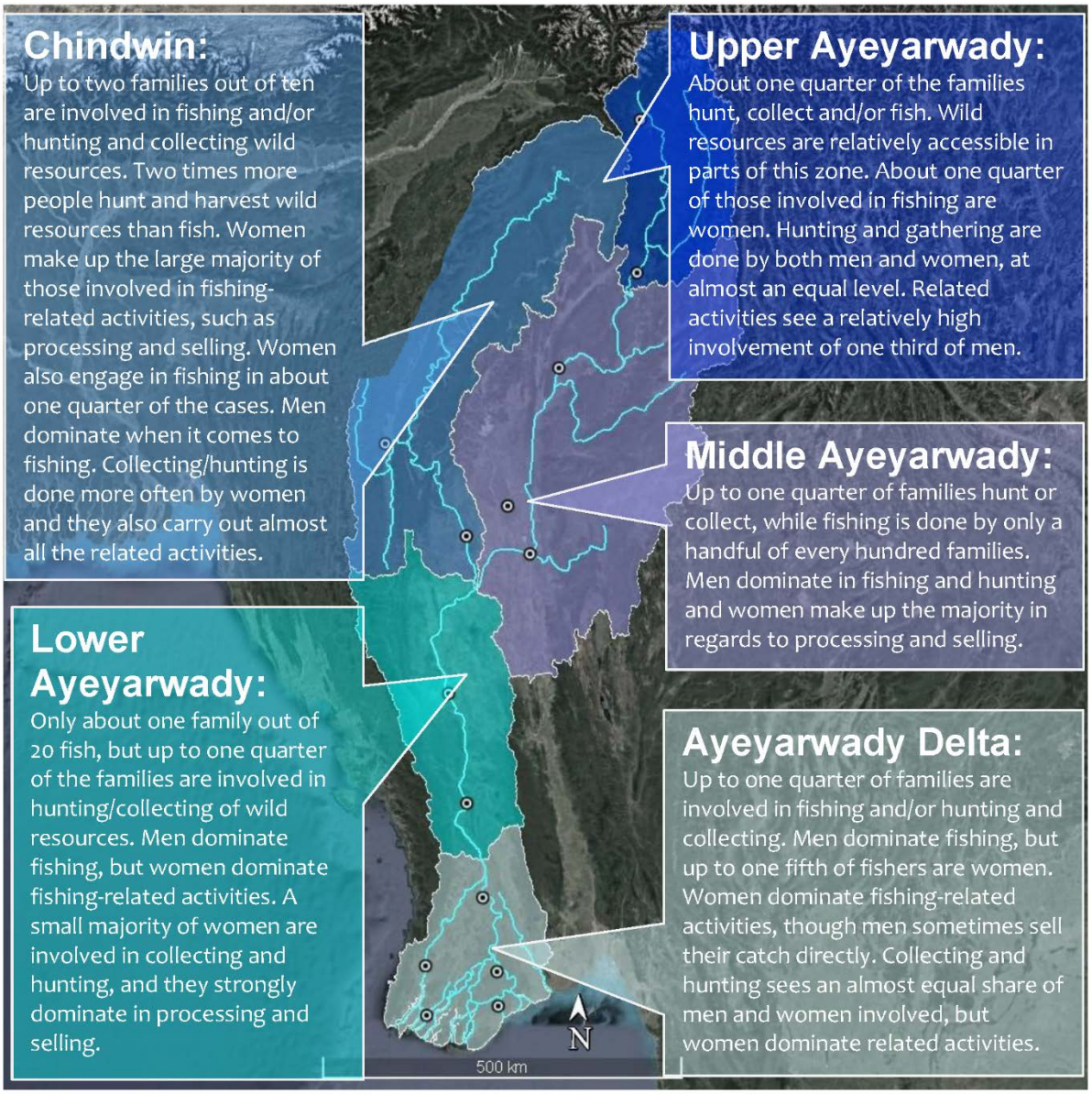

Figure 28 – Fishing and hunting/collecting of wild resources: *Involvement in fishing and hunting/collecting of wild resources and the participation of men and women (field consultations, Jun to Aug 2017).*

5 THE ROLE OF FISH AND WILD RESOURCES FOR NUTRITION

5.1 Sources of Animal Protein in the Ayeyarwady Basin

Fish is the most important source of animal protein in all zones. In the delta, the Lower Ayeyarwady, the Middle Ayeyarwady, Chindwin, and the Upper Ayeyarwady, people generally stated that fish is their number one source of animal protein.

Chicken and pork were the second and third most important sources of animal protein seen on a basin-wide scale. These meats were present in all townships and districts surveyed. Goat was the fourth most important source, followed by beef, prawn/shrimp, and ducks.

Considering the focus groups' results, prawn/shrimp were among the six most important sources of animal protein in 9 of 14 focus group discussions across four zones. The Upper Ayeyarwady was the only zone without prawn or shrimp listed among the seven most important sources of animal protein.

Fish and other aquatic animals were of relatively lower importance in the Upper Ayeyarwady than in the other four zones, according to the focus group participants. However, the importance of wildlife as a source of animal protein was remarkably higher than average in Putao District in the Upper Ayeyarwady, where three of the seven most important sources of animal protein came from wild animals. The only other district with more than one wild animal species among the seven most important sources of animal protein was Kale, in Chindwin, with two wild species listed.

The species of wild resources contributing to the seven most important sources of animal protein, listed by the focus group discussions, included rats in the delta and the Middle Ayeyarwady; sambar in Chindwin and the Middle and the Upper Ayeyarwady; and leaf deer, wild boar, and other wild meat in the Upper Ayeyarwady.

Among the wild resources cited as important for animal protein across the Ayeyarwady Basin were sambar, rat, antelope, leaf deer, mython, (*Bibos frontalis*) and wild boar.

Table 7 shows the most important sources of animal protein, according to the focus groups.

Table 7 – Animal protein sources: *The most important sources of animal protein in the five zones of the Ayeyarwady Basin according to the focus groups (field consultations, Jun to Aug 2017).*

Protein Source	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Fish	5	2	3	2	2	14
Pork	5	2	3	2	2	14
Chicken	5	2	2	2	2	13
Goat	4	3	4	2		13
Cow and Buffalo	2	2	2	2	1	9
Prawn/Shrimp	5	1	2	1		9
Ducks	4				1	5

5.1.1 Conclusion

Fish was consistently valued as the number one source of animal protein in all five zones of the Ayeyarwady Basin. Chicken and pork were the second and third most important sources of animal protein seen on a basin-wide scale, and like fish, these protein sources were present in all districts surveyed. Prawns and shrimps were also important sources of animal protein in all zones, except the Upper Ayeyarwady.

Fish and other aquatic animals were of relatively lower importance in the Upper Ayeyarwady than in the other four zones. However, the importance of wildlife as a source of animal protein was remarkably higher than average in Putao District in the Upper Ayeyarwady.

Among the wild resources cited as important for animal protein across the Ayeyarwady Basin were sambar, rat, antelope, leaf deer, mython, and wild boar.

5.2 Consumption of Fish and Its Importance for Nutrition

5.2.1 Frequency of fish consumption

The participants of the focus group consistently reported consuming fish and other aquatic animals almost every day, or 2 to 5 times per week, in all five zones. Likewise, among the key informants, the large majority stated that people in their districts consume fish and OAA almost every day, or 2 to 5 times per week, across all five zones.

In 5 of 35 interviews in parts of the Middle Ayeyarwady, Chindwin, and the Upper Ayeyarwady, the key informants estimated that people eat fish once a week. Table 8 and Figure 29 show the frequency of fish consumption in the Ayeyarwady Basin and its five zones.

Table 8 – Fish and OAA consumption: *The frequency of fish consumption in the Ayeyarwady Basin per zone (field consultations, Jun to Aug 2017).*

Zone	2 to 5 times a week		Almost every day		Once a week		Total	
	FGD	KII	FGD	KII	FGD	KII	FGD	KII
Delta		4	5	7			5	11
Lower Ayeyarwady	1	3	1	2			2	5
Middle Ayeyarwady	1	7	2			1	3	8
Chindwin		3	2			3	2	6
Upper Ayeyarwady	1	1	1	3		1	2	5
Total	3	18	11	12	0	5	14	35

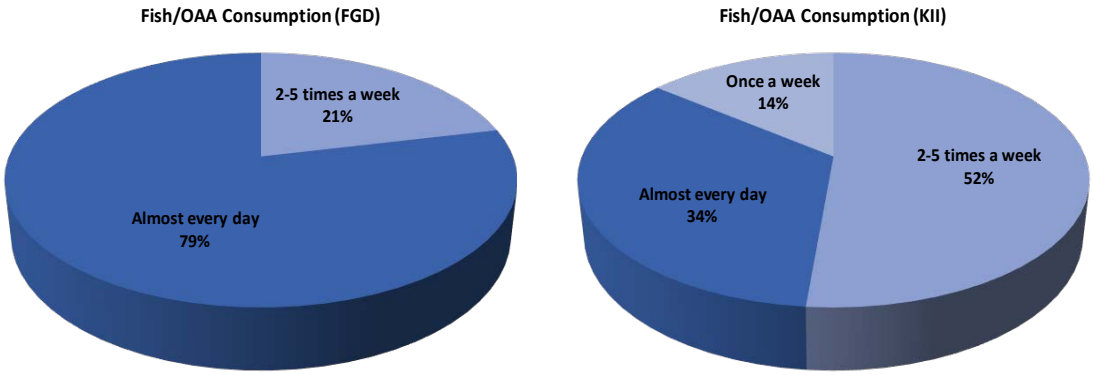

Figure 29 – Fish/OAA consumption: *The frequency of fish consumption in the Ayeyarwady Basin (field consultations, Jun to Aug 2017).*

5.2.2 *Importance of fish and other aquatic animals for child nutrition*

In 13 of 14 focus group discussions, the participants stated that fish and other aquatic animals are important for child nutrition. The most commonly cited reasons for the importance of fish and OAA for child nutrition were to provide protein, to develop the brain and bones, and to prevent infections. In Katha in the Middle Ayeyarwady, the focus group participants were not aware of the importance of fish and OAA for child nutrition, but they eat fish and OAA almost every day because their ancestors did.

The respondents in all 35 key informant interviews believed that fish and OAA is important for child nutrition. The key informants emphasized the health benefits attributed to fish, including strong bones, brain development, good eyes, and protection from disease. The informants perceived fish and other aquatic animals as high in nutrients and protein and, as one respondent in Putao highlighted, free from poison when coming from the wild. Importantly, fish is cheaper than other meats, which makes it a source of animal protein that most families can consume.

Table 9 shows the perceived importance of fish and OAA for child nutrition now as compared to 10 years ago, from the perspectives of the focus group participants and the key informants surveyed. A table of the reasons for the perceived importance of fish and OAA for child nutrition is available in Annex IX.

Table 9 – The importance of fish and OAA for child nutrition in the Ayeyarwady Basin: *(Field consultations, Jun to Aug 2017)*

Zone	Important		Not Important		Total	
	FGD	KII	FGD	KII	FGD	KII
Delta	5	11			5	11
Lower Ayeyarwady	2	5			2	5
Middle Ayeyarwady	2	8	1		3	8
Chindwin	2	6			2	6
Upper Ayeyarwady	2	5			2	5
Total	13	35	1	0	14	35

5.2.3 *The importance of fish as a source of animal protein now and 10 years ago*

The focus group participants clearly indicated that fish and other aquatic animals are viewed as more important sources of animal protein now than they were 10 years ago (13 of 14 groups). The reason for this perceived increase in importance is improved knowledge about the benefits of fish and OAA obtained from health professionals and the mass media. Livelihood dependency on resources from the wild, health benefits, increased population, and cheap price were other explanations provided.

In 25 of 35 interviews, the key informants said that fish and OAA is more important as a source of animal protein now than compared to 10 years ago. Ten of 35 key informants stated that the importance was the same. The respondent in one interview viewed fish and OAA as less important now. Population increase and increased consumption of fish and OAA were the reasons for the rise in importance, as were their abundance as a source of locally available animal protein at a fair price.

Table 10 and Figure 30 illustrate the perceived importance of fish and OAA as a source of animal protein now as compared to 10 years ago, from the perspectives of the focus group participants and the key informants.

A table of the reasons for the perceived importance of fish and OAA as a source of animal protein is available in Annex X.

Table 10 – Importance of fish and OAA as a source of animal protein: *The perceived importance of fish and OAA as a source of animal protein now as compared to 10 years ago (field consultations, Jun to Aug 2017).*

Zone	More important		Less important		Same importance		Total	
	FGD	KII	FGD	KII	FGD	KII	FGD	KII
Delta	5	7				4	5	11
Lower Ayeyarwady	2	1		1		3	2	5
Middle Ayeyarwady	2	7			1	1	3	8
Chindwin	2	5				1	2	6
Upper Ayeyarwady	2	4				1	2	5
Total	13	24	0	1	1	10	14	35

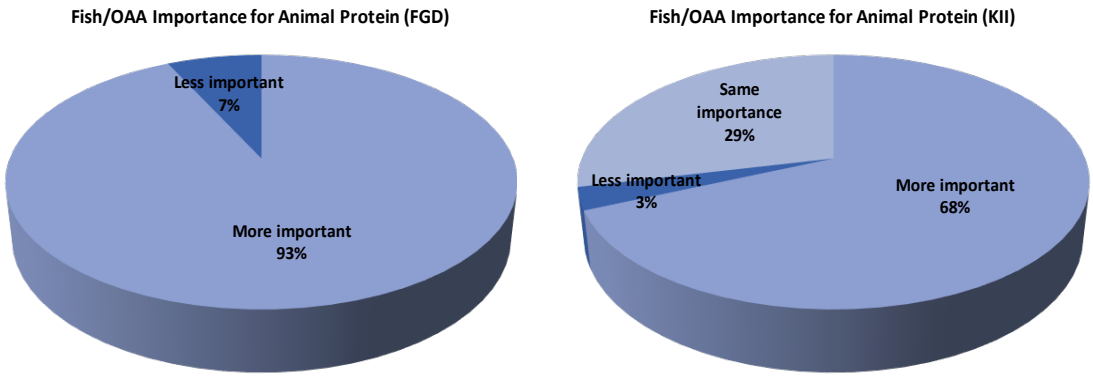

Figure 30 – Importance of fish and OAA as a source of animal protein: *The perceived importance of fish and OAA as a source of animal protein now as compared to 10 years ago (field consultations, Jun to Aug 2017).*

5.2.4 Conclusion

The large majority of respondents, in both focus group discussions and key informant interviews, stated that people consume fish/other aquatic animals either almost every day or 2 to 5 times per week.

People consider fish and other aquatic animals important for the nutrition of children throughout the Ayeyarwady Basin. The contribution of fish and other aquatic animals to children's development include strengthening of bones and improving brain development. They also see a diet of fish and other aquatic animals as preventing infections and appreciate that they are widely available at a fair price, making these food sources accessible to most people.

Across the Ayeyarwady Basin, fish and other aquatic animals are widely perceived as increasingly important for animal protein now as compared to 10 years ago. The reasons include improved knowledge about the health benefits of fish and OAA, increased population and demand for fish, livelihood dependency, and the abundance and fair price of this food source.

5.3 Wild Resource Consumption and Its Importance for Nutrition

5.3.1 Frequency of wild resource consumption

During 13 of 14 focus group discussions, people from all zones reported consuming wild resources almost every day or 2 to 5 times per week.

Among the key informants, however, the answers in 27 of 35 interviews indicated that people in their districts consumed wild resources less than once a week (21 of 35) or once a week (6 of 35). In 8 of 35 interviews the respondents estimated that people eat wild resources either 2 to 5 times per week or almost every day (see Table 11 and Figure 31).

The differences in perception may partly be due to the different contexts in which the focus group participants and the key informants live and work (village vs. city level), and thus their level of indigenous knowledge about wild resources and their utilization. It is also worth noting that government officials regularly move from one region to another, and thus may be less familiar with the types and quantities of wild resources consumed locally.

However, the large discrepancy suggests an unintentional difference in the way the question was asked in the focus group discussions and in some of the key informant interviews. It is likely that some key informants have been under the impression that the question on the importance of wild resources was in relation to wild animal resources only, which people consume much more rarely than wild resources in general.

Table 11 – Wild resource consumption: *The frequency of wild resource consumption in the Ayeyarwady Basin per zone (field consultations, Jun to Aug 2017).*

Zone	2 to 5 times a week		Almost every day		Once a week		Less than once a week		Total	
	FGD	KII	FGD	KII	FGD	KII	FGD	KII	FGD	KII
Delta	2		3			2		9	5	11
Lower Ayeyarwady	1	2	1	1				2	2	5
Middle Ayeyarwady			3	1		1		6	3	8
Chindwin		2	2			1		3	2	6
Upper Ayeyarwady	1	1		1		2		1	2	5
Total	4	5	9	3	0	6	1	21	14	35

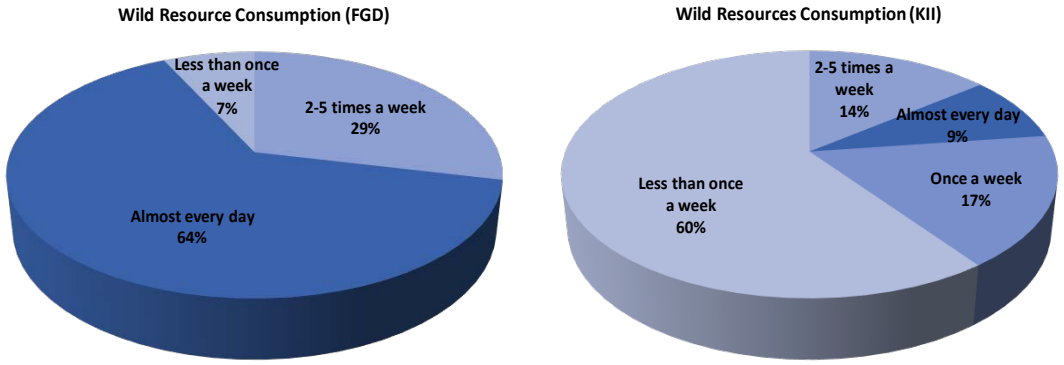

Figure 31 – Wild resource consumption: *The frequency of wild resource consumption in the Ayeyarwady Basin (field consultations, Jun to Aug 2017).*

5.3.2 *Importance of wild resources for child nutrition*

According to 12 of 14 focus group discussions, in all zones, people consider wild resources important for the nutrition of children. The most commonly cited reasons for the stated importance of wild resources for child nutrition were to give good health, prevent infections, and to provide protein and vitamins. One focus group also highlighted the absence of chemicals in wild resources as a positive quality.

In the 2 of 14 focus group discussions where the respondents did not find wild resources important for nutrition, the reasons provided were that it is hard to get wild resources and that they do not hunt regularly.

The majority of key informants (26 of 35) did not perceive wild resources as being important for the nutrition of children in their districts. Their reasons included a decrease in wild resources that made them difficult to get and the ease of obtaining nutritious food and protein from other sources, such as potatoes, beans, peas, eggs, and livestock. Some said that the difficulty of finding wild resources, especially on a daily basis, had led people to stop consuming these.

Nine of 35 respondents considered wild resources as being important for the nutrition of children. They emphasized these resources as being nutritious and healthy and providing proteins and fibres at a fair price. They also highlighted the medical properties of some wild resources and, in Kale District in Chindwin, they were considered fresh and easy to collect.

Table 12 shows the perceived importance of wild resources for child nutrition now as compared to 10 years ago, from the perspectives of the focus group participants and the key informants. A table of the reasons for the perceived importance of wild resources for child nutrition is available in Annex XI.

Table 12 – Importance of wild resources for child nutrition: *The perceived importance of wild resources for child nutrition in the Ayeyarwady Basin per zone (field consultations, Jun to Aug 2017).*

Zone	Important		Not Important		Total	
	FGD	KII	FGD	KII	FGD	KII
Delta	4	1	1	10	5	11
Lower Ayeyarwady	2	1		4	2	5
Middle Ayeyarwady	3	4		4	3	8
Chindwin	2	2		4	2	6
Upper Ayeyarwady	1	1	1	4	2	5
Total	12	9	2	26	14	35

5.3.3 *Importance of wild resources as a source of animal protein now and 10 years ago*

In 7 of 14 focus group discussions, wild resources were considered a more important as a source of animal protein now than 10 years ago. However, 5 of 14 groups considered wild resources less important now than 10 years ago.

The main reasons for perceiving wild resources as a more important source of animal protein were enhanced knowledge (leading them to consider that wild resource consumption provided health benefits), increased human population.

The two main reasons for the perceived decrease in the importance of wild resources as a source of animal protein in the last decade were loss of habitat and a decreased abundance of wild resources.

Among the key informants, only 4 of 35 considered wild resources as a more important source of animal protein now as compared to 10 years ago. The majority (21 of 35) perceived wild resources as a less important source of animal protein now than 10 years ago. Ten of 35 considered wild resources as having the same importance now as before.

The two main reasons for the perceived decrease in the importance of wild resources as a source of animal protein in the last decade were decreased availability of wild animals and easy access to alternative protein sources from livestock. Wild resources have become rare and difficult for people to find, and thus, livestock has largely substituted wild resources in many parts of the Ayeyarwady Basin.

In Chindwin, the reasons for wild resources being a more important source of animal protein included their popularity, perceived higher nutrient content, healthier alternative to meat from livestock, and the availability from the wild. In parts of the delta, key informants argued that wild resources were increasingly important for food security (due to the increased population and consumption) and because of the natural animal protein they provide.

In Putao, in the Upper Ayeyarwady, one respondent attributed the difficulty in finding wild resources to the management of conservation areas by the Forest Department.

Table 13 and Figure 32 illustrate the perceived importance of wild resources as a source of animal protein now as compared to 10 years ago, from the perspectives of the focus group participants and the key informants.

A table of the reasons for the trends in the perceived importance of wild resources as a source of animal protein is available in Annex XII.

Table 13 – Importance of wild resources for animal protein: *The perceived importance of wild resources as a source of animal protein now as compared to 10 years ago. (field consultations, Jun to Aug 2017).*

Zone	Less important		More important		Same importance		Total	
	FGD	KII	FGD	KII	FGD	KII	FGD	KII
Delta	2	7	1	2	2	2	5	11
Lower Ayeyarwady	2	3				2	2	5
Middle Ayeyarwady		6	3			2	3	8
Chindwin		3	2	2		1	2	6
Upper Ayeyarwady	1	2	1			3	2	5
Total	5	21	7	4	2	10	14	35

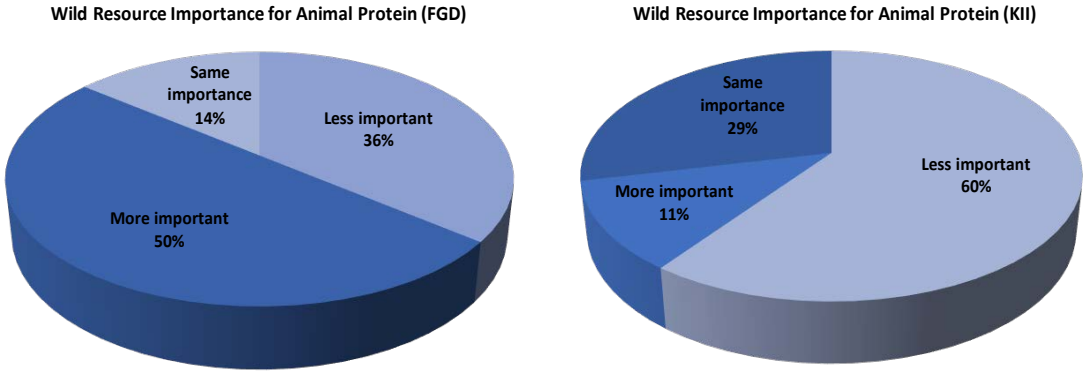

Figure 32 – Importance of wild resources for animal protein: *The perceived importance of wild resources as a source of animal protein now as compared to 10 years ago (field consultations, Jun to Aug 2017).*

5.3.4 Conclusion

While a large majority of focus group participants stated that people consume wild resources almost every day or 2 to 5 times per week, many key informants indicated that people in their districts consume wild resources less frequently.

According to focus group participants in all zones, people consider wild resources important for the nutrition of children. The most commonly cited reasons were for good health, to prevent infections, and to provide protein and vitamins. Two focus groups that did not consider wild resources important for child nutrition argued that it is hard to find wild resources.

On the contrary, the majority of key informants did not perceive wild resources as being important for the nutrition of children in their districts. The difficulties of obtaining wild resources and the abundance of farmed alternatives were the main reasons provided.

The key informants who did consider wild resources as important for the nutrition of children emphasized the nutritious benefits of proteins and fibres, which they found wild resources to deliver at a fair price. People also highlighted the medicinal properties of some wild resources.

The majority of respondents believed that the importance of wild resources as a source of animal protein had declined during the last decade. The main explanations for this were loss of habitat, decreased abundance of wild resources, and easy access to alternative protein from livestock. Due to their rarity, people in large parts of the Ayeyarwady Basin can no longer depend on wild resources as a source of animal protein.

For those perceiving wild resources as an increasingly important source of animal protein, enhanced knowledge (leading them to consider wild resources as healthier than meat from farmed animals), increased human population, and a decline in wild resources were the main reasons provided.

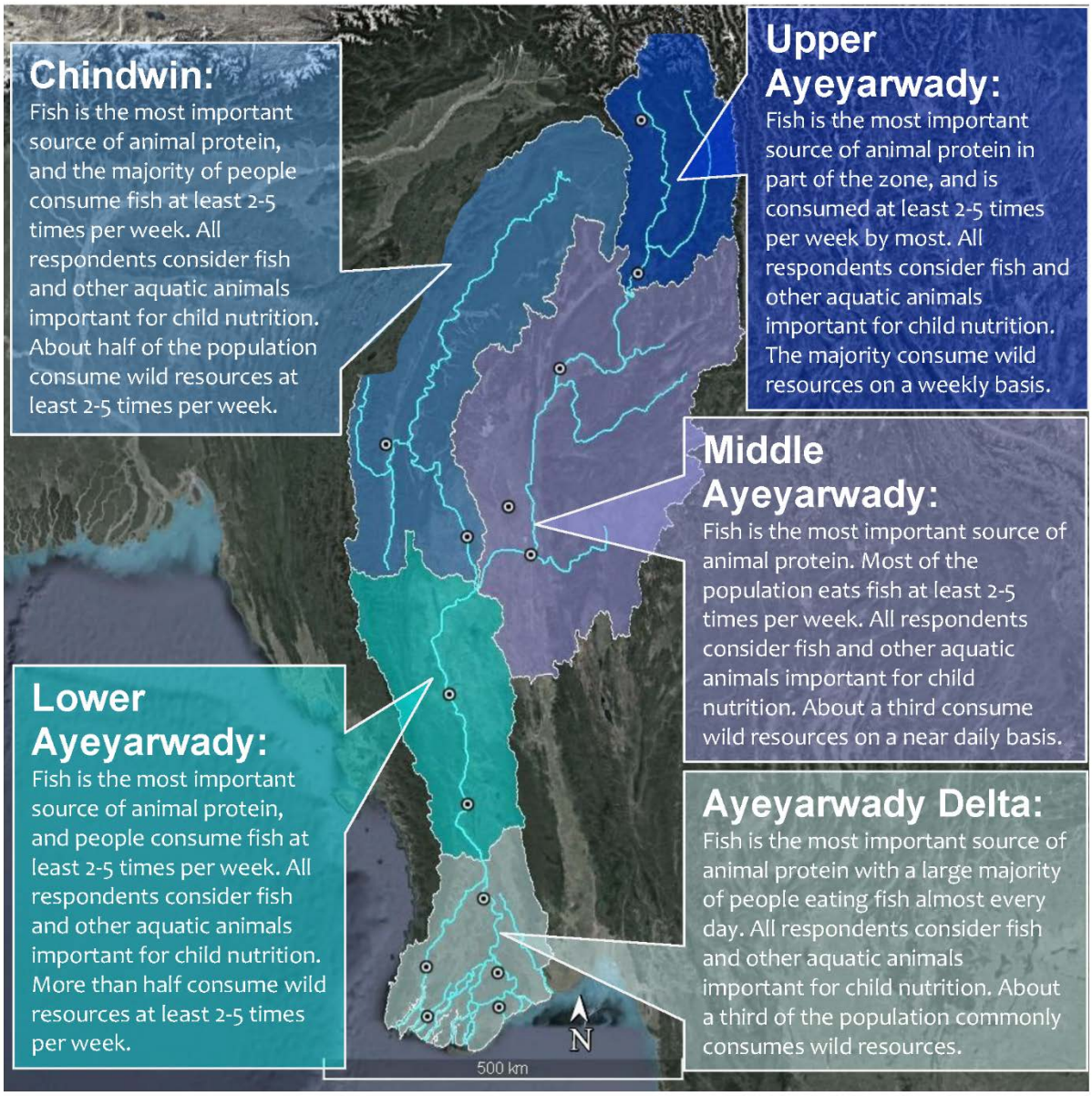

Figure 33 – Importance of fish and wild resources for nutrition: *The role of fish as a source of animal protein and the frequency of fish and wild resource consumption in the five zones of the Ayeyarwady Basin (field consultations, Jun to Aug 2017).*

6 HABITAT TYPES AND SPECIES OF HIGH IMPORTANCE FOR LIVELIHOODS

6.1 Fish and Wild Resource Habitat Types

6.1.1 *Ranking of important habitats for fish and other aquatic animals*

More than 50% of the focus groups and key informants surveyed considered each of the following habitats among the most important for fish and other aquatic animals across the Ayeyarwady Basin:

- Permanent creeks, wetlands, and rivers
- Rice fields, swamps, and bushes
- Seasonal wetlands, flooded bushes, and forests

People generally considered forests more important in the Upper Ayeyarwady, whereas they considered swamps and seasonal wetlands more important in the delta and the Lower Ayeyarwady. Other habitat types that the focus groups found important included agricultural farms, reservoirs, and rain-fed ponds. A full list of important habitat types for fish and other aquatic animals is available in Annex XIII.

6.1.2 *Ranking of important habitats for wild resources*

More than 50% of the focus groups and key informants considered each of the following habitats among the most important for wild resources in the zones of the Ayeyarwady Basin:

- Permanent creeks, rivers, and wetlands
- Rice fields, swamps, seasonally flooded wetlands, and seasonally flooded bushes
- Forests, mountains, and bushes

Forests were generally found important for wild resources across all zones, though even more so in Chindwin, the Middle Ayeyarwady, and the Upper Ayeyarwady. A full list of important habitat types for wild resources is available in Annex XIV.

6.1.3 *Conclusion*

From a basin-wide perspective, the habitat types found most important for people's livelihoods in at least four of the five zones are permanent rivers, permanent creeks, and permanent wetlands; rice fields and seasonally flooded wetlands; forests; mountains; and bushes. Other habitat types found important in two to three of the five zones are seasonally flooded bushes, swamps, agricultural farms, reservoirs, and rain-fed ponds. The understanding of habitats and their importance for the sustainability of healthy ecosystems is of high importance both from a biodiversity and a livelihoods perspective. Thus, in terms of management of the Ayeyarwady Basin, working toward increased conservation of important habitats, in cooperation with the people who depend on them, will be of high importance.

6.2 The Most Important Species for Livelihoods

6.2.1 *Ranking of most important species of fish and wild resources for livelihoods*

According to the focus groups, *Wallago attu* was the only species to be ranked among the 10 most important species in all five zones of the Ayeyarwady Basin. *Sperata sp.*, *Cirrhinus mrigala,* and *Macrobranchium rosenbergii* were among the five most important species for people's livelihoods in the delta, the Lower Ayeyarwady, the Middle Ayeyarwady, and Chindwin.

Metapenaeus spp. was found important in the delta, the Lower Ayeyarwady, and the Middle Ayeyarwady. In the Middle Ayeyarwady and Chindwin, *Channa striata* was among the most important species. *Notopterus notopterus* was among the 10 most important species in the Lower Ayeyarwady and Chindwin.

Tenualosa ilisha was the most important species in the delta and was also found important in the Lower Ayeyarwady. The Upper Ayeyarwady, especially Putao in the far north, reported a number of species among the 10 most important, which were not mentioned in any of the other four zones (e.g., *Tor spp., Semiplotus modestus, Garra nasuta,* and *Garra notata).*

For a full list of the 10 most important species for people's livelihoods, according to the focus group participants, see Annex XV. The ranked results from the key informant consultations are available in the same annex.

6.2.2 *Ranking of most important species for income*

The focus group participants ranked *Silonia silondia*, *Sperata sp.,* and *Macrobrachium rosenbergii* as the most important species for income in the delta, the Lower Ayeyarwady, the Middle Ayeyarwady, and Chindwin. In the Upper Ayeyarwady, *Garra notata, Tor spp.,* and *Garra nasuta* were the three most important species in terms of income.

6.2.3 *Ranking of most important species for animal protein*

According to the focus group participants, *Monopterus albus, Heteropneustes fossilis,* and *Macrobranchium rosenbergii* were among the 10 most important species for animal protein in the Lower Ayeyarwady, the Middle Ayeyarwady, and Chindwin. *Wallago attu* was listed in the delta, the Lower Ayeyarwady, and the Middle Ayeyarwady; *Channa striata* in the Lower Ayeyarwady and the Middle Ayeyarwady; *Labeo spp.* in the Middle Ayeyarwady and Chindwin; and *Anguilla sp.* in Chindwin and the Upper Ayeyarwady.

6.2.4 *Conclusion*

Wallago attu was among the 10 most important species in all five zones of the Ayeyarwady Basin. *Sperata sp., Cirrhinus mrigala,* and *Macrobrachium rosenbergii* were among the five most important species for people's livelihoods in the delta, the Lower Ayeyarwady, the Middle Ayeyarwady, and Chindwin.

Metapenaeus spp. was important in the delta, the Lower Ayeyarwady, and the Middle Ayeyarwady. In the Middle Ayeyarwady and Chindwin, *Channa striata* was among the most important species. *Notopterus notopterus* was among the 10 most important species in the Lower Ayeyarwady and Chindwin. *Tenualosa ilisha* was the most important species in the delta and was also considered important in the Lower Ayeyarwady.

The Upper Ayeyarwady, especially Putao in the far north, reported a number of species among the 10 most important, which were not mentioned in any of the other four zones (e.g., *Tor spp., Semiplotus modestus, Garra nasuta,* and *Garra notata).*

From an income perspective, the focus group participants in the delta, the Lower Ayeyarwady, the Middle Ayeyarwady, and Chindwin considered *Silonia silondia, Sperata sp*., and *Macrobrachium rosenbergii* of high importance. In the Upper Ayeyarwady, *Garra notata, Tor spp.,* and *Garra nasuta* were the three most important species in terms of income.

Monopterus albus, Heteropneustes fossilis, and *Macrobrachium rosenbergii* were among the most important species for animal protein in a good part of the basin. *Wallago attu, Channa striata, Labeo spp.,* and *Anguilla sp.* were other species in that category.

6.3 Decreased Abundance of Species Important to Livelihoods

In general, the focus group participants believed that all the fish species' populations considered most important for people's livelihoods had decreased in the last decade. Likewise, they expect this negative trend to continue in the next 10 years.

The only exception was the species *Monopterus albus,* which they said had increased in Shwebo, in the Middle Ayeyarwady. However, in that same location, they expect it to decrease in the coming decade. According to the focus group participants, they had not fished for this eel species before. However, as the market demand for this species has gone up, many people have started fishing for *Monopterus albus*, and this is now taking its toll on the species. Due to intensive fishing, including catch of small size eels, the population is decreasing.

A list of the development in the abundance of the most important species in the last 10 years and the expected development in the coming 10 years is available in Annex XVI.

6.3.1 *Causes of changes to species abundance*

According to the focus groups, illegal and destructive fishing gears and methods and increased human population were among the suspected causes for the gradual deterioration of the wild fish resources.

People in all zones highlighted electrofishing and fishing with pesticides as the main causes for the decrease in abundance of the species most important for people's livelihoods. Use of small mesh sizes and fishing in closed season and closed areas are other illegal activities that are reportedly taking place in large parts of the Ayeyarwady Basin. In some areas in Chindwin and the Upper Ayeyarwady, people reported incidents of dynamite fishing. Other causes for species decline included the late arrival of the monsoon, agricultural extension, a decline in mangrove areas, and sedimentation and pollution from mining.

Table 14 provides an overview of the causes for the decline in species experienced in the last decade, as perceived by the focus group participants. Annex XVII includes a full list of the causes for changes to the species abundance, according to both focus group participants and the key informants.

6.3.2 *Conclusion*

The abundance of almost all of the most important fish species quoted by the surveyed communities and key informants decreased in the last decade. Likewise, people expect the abundance to decrease further during the coming decade.

People cited loss of habitat, illegal fishing, and pollution as the main causes for the decline in the abundance of the species that many depend on for at least part of their income and livelihoods.

Table 14 – Causes for changes to species abundance: *Description of the perceived causes for changes to species abundance per zone according to the focus groups surveyed (field consultations, Jun to Aug 2017).*

Ayeyarwady Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady
Electrofishing	Electrofishing	Electrofishing	Electrofishing	Electrofishing
Pesticide fishing	Pesticide fishing	Pesticide fishing	Pesticide fishing	Pesticide fishing
Increased number of fishers	Decline in fish species	Increased number of fishers	Agricultural extension	Dynamite fishing
Use of small mesh sizes for fishing	Use of small mesh sizes for fishing	Use of small mesh sizes for fishing	Use of small mesh sizes for fishing	Pollution from mining
Fishing in closed seasons and areas	Sedimentation from sand and gravel dredging causes shallow rivers and creeks	Fishing in closed seasons and areas	Burning of bushes	
Decline in mangrove areas		Use of trammel drift net	Dynamite fishing	
Late arrival of the monsoon		Less fish spawning due to low fertility caused by electrofishing	Late arrival of the monsoon	
Increased number of trawling boats at the sea (fish cannot reach upstream)				
Lack of research on fish species in lease areas				

7 CHALLENGES, THREATS, AND RECOMMENDATIONS

7.1 Challenges Met by Fishers, Hunters, and Collectors

In all five zones, the consulted communities declared electrofishing and pesticide fishing as significant challenges, reducing the quality of fish habitats and damaging reproduction. People also commonly reported fishing with small mesh sizes and in closed seasons and areas in most of the basin as additional challenges. In Chindwin and the Upper Ayeyarwady, people reported incidents of dynamite fishing.

Other challenges are reduced mangrove areas, sand and gravel dredging, shallowing of rivers and creeks, and water pollution from factories and farm run-off. Late arrival of the monsoon affects rice cultivation, fish migration, and spawning. Deforestation causes wild animals to migrate to other places.

To rectify these problems, people recommended preventing fishing in closed seasons and areas by monitoring and enforcing laws and by punishing perpetrators with fines and imprisonment. Control of mining operations, logging, and the number of hunters as well as replanting forests and mangroves were also recommended. Along with control and monitoring, the surveyed people encouraged increased dissemination of information on laws.

An overview of all the challenges, impacts, and related recommendations highlighted and proposed by the surveyed population is available in Annex XVIII.

7.2 Threats to the Sustainability of Natural Fish and Wild Resources

Threats observed by the surveyed respondents, include illegal fishing, with electrofishing and pesticide fishing reported at an alarming scale across the entire Ayeyarwady Basin. People throughout the basin also highlighted use of small mesh sizes and fishing in closed seasons and areas as threats to the sustainability of the wild fisheries. Increased fishing pressure, due to population increase and increase in number of trawl boats in the delta, were other reported threats.

The negative effects from the widespread illegal fishing include damage to habitats, decline in fish species and abundance, reduced fertility of fish, and possible hazards to human health from consumption of fish caught with the use of pesticides.

In terms of wild resources, agricultural extension, deforestation, and overhunting (including with illegal traps, especially in the Upper Ayeyarwady) pose threats to the abundance of wild resources. Surveyed respondents expect a further decrease in the number of prey. In the Upper Ayeyarwady, people highlighted the spreading of banana cultivation as a cause of deforestation. In Myitkyina, people said that pollution was the result of pesticide use. People in Putao viewed over-collection of medicinal plants as a threat to their sustainability, which represents a threat both to the biodiversity of the area and to the livelihoods of those who depend on medicinal plants for a part of their income.

Resource extraction, in the form of mining and sand and gravel dredging, were other significant threats reported by the people of the basin. The impacts from these threats include a decline in fish species due to destruction of their spawning grounds and water pollution. Lack of employment and other livelihood options adds to the pressure on the natural resources.

According to many respondents, weak law enforcement relates to many of the threats reported, and the management of the fisheries- and forestry-related sectors would need improvement to enable sustainable resource use in the basin. Examples of the challenges in this regard include government understaffing and insufficient resources to prevent illegal fishing of hunting in remote areas. Under these conditions, officials reportedly find it hard to take action against illegal activities in time.

To prevent the above-mentioned threats from causing further damage to the sustainability of the fish and wild resources of the Ayeyarwady Basin, the surveyed population recommended enforcement of the laws

(including control of fishing gears used) and more regulation of agriculture (to stop deforestation and limit negative effects from pesticide use). They also recommended reforestation (including mangrove areas), conservation measures, and the release of fingerlings to boost fish abundance in the natural waterways.

An overview of all the threats, expected impacts, and related recommendations highlighted and proposed by the surveyed respondents is available in Annex XIX.

7.3 Recommendations for the Management of Fish and Wild Resources

Finding ways to stop illegal fishing was among the top recommendations for improving the management of fish and wild resources. Enforcement of the laws, including awareness raising, monitoring, and controlling illegal fishing activities were among the measures proposed to minimise electrofishing, pesticide fishing, use of small mesh sizes, and fishing in closed seasons and areas.

In this regard, many respondents called for increased cooperation between the authorities and the resource users as well as between different government departments. For example, the Fishery, Forestry, and Agriculture Departments could benefit from cooperating more. Such collaboration may limit conflicts between fishers and farmers and help to manage agricultural extension and deforestation, which threaten wild habitats.

Several respondents suggested establishing community forestry and community fisheries to create local ownership, strengthen resource management, and enforce laws and regulations. People generally viewed cooperation between communities and the authorities as important steps toward improved conservation and sustainable natural resource use.

People considered awareness raising of natural resources and ecosystems to students and resource users as an important aspect of improved management. Replanting and conservation of forests and mangroves to restore habitats and increase the abundance of fish and wild resources were strongly encouraged, with some suggesting that the government supply an adequate budget for forest rehabilitation.

Better maintenance of riverine quality, including limiting pollution from factories and the mining sector, were called for to deal with water pollution. Sand and gravel dredging should also be better controlled and limited to avoid damage to habitats, according to some respondents.

To improve the value of wild resources, including fish, people suggested that the government support value-adding technologies. Many respondents viewed stocking of fingerlings to wild waterways as a way to boost fish production in the wild, and some suggested extending the rice-fish culture. Improving the aquaculture sector (e.g., in the form of hatchery openings) and sharing modern techniques were other recommendations that may help to support fisheries production and potentially reduce the pressure on the wild fisheries.

People expressed strong interest in organizing and collaborating with the authorities to share knowledge and to monitor and control illegal activities, especially in key seasons for migration and spawning and in the dry season when the reduced size of water bodies makes electrofishing more lucrative and harmful.

An overview of the recommendations proposed by the surveyed population is in Annex XX.

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ANNEX I – QUESTIONNAIRE FOR FIELD CONSULTATIONS

QUESTIONNAIRE FOR FOCUS GROUP DISCUSSIONS

THE ROLE OF FISH AND WILD RESOURCES IN LIVELIHOODS

FORM A: SURVEY IDENTIFICATION

A1. Date:
A2. Region:
A3. District:
A4. Township:
A5. Village track:
A6. Village:
A7. Survey number (MonthDayQuestionnaire#):
A8. Who led the interview?
A9. Who entered the answers from the interview?

Introductory notes for the interview team

1) When referring to "**wild resources**" this includes all biodiversity and natural resources (other than fish and other aquatic animals), including terrestrial animals, plants, insects, etc. that contribute to people's livelihoods in terms of income and/or nutrition.

(**Fish and other aquatic animals** are covered in the category "**fish**", and **shall not** be included in wild resources in this questionnaire).

2) When referring to "**fish**" in this questionnaire **this includes other aquatic animals** (OAA).

FORM B: INCOME SOURCES IN THE TOWNSHIP

a) Ask for all sources of income in the township (livelihood activities/occupations) (list on flipchart)

b) Ask them to rank each source of income depending on its economic importance for the township (the **most important activity ranked as #1**)

c) Ask them to estimate the **percent of the total township income** coming from each activity/income source

d) Ask them to indicate the economic importance of each activity **now**, compared to 10 years ago. (Is the activity now **equally (Same), more (M) or less (L)** important for the township than it was 10 years ago?)

Rank	Livelihood activity (occupation)	Percent of total Township income coming from activity	Economic importance now compared to 10 years ago. (Equally important (Same), More (M), Less (L))
1	**B1.**	**B2.**	**B3.**
2	**B4.**	**B5.**	**B6.**
3	**B7.**	**B8.**	**B9.**
4	**B10.**	**B11.**	**B12.**
5	**B13.**	**B14.**	**B15.**
6	**B16.**	**B17.**	**B18.**
7	**B19.**	**B20.**	**B21.**
8	**B22.**	**B23.**	**B24.**
9	**B25.**	**B26.**	**B27.**
10	**B28.**	**B29.**	**B30.**
11	**B31.**	**B32.**	**B33.**
12	**B34.**	**B35.**	**B36.**

DEVELOPMENT IN THE LIVING STANDARD OF FAMILIES IN THE TOWNSHIP

B37. How have peoples living standards (economic and social well-being) changed in the last 5 years?

□ Improved □ Worsened □ Remained the same □ Depends on social group

B38. How do you expect peoples' living standards (economic and social well-being) to develop in the next 5 years?

□ Improve □ Worsen □ Remain the same □ Depends on social group

MIGRATION

B39. Are people migrating to the township? □ Yes □ No

B40. If yes, what are the main reasons for migration to the township?

_____

B41. Is this migration positive for the township? □ Yes □ No

B42. Are people migrating away from the township? □ Yes □ No

B43. If yes, what are the main reasons for migration away from the township?

_____

B44. Is this migration positive for the township (e.g., remittances)? □ Yes □ No

SOCIAL, ECONOMIC AND ENVIRONMENTAL CHANGES IN THE LAST 10 YEARS, AND THE IMPACT ON LIVELIHOODS

a) Ask what changes have been most important for livelihoods in the township in the last 10 years (list on flipchart) (Include both positive and negative changes that had an impact)

b) Ask them to rank each change depending on its impact on livelihoods (the highest impact ranked as #1)

c) Ask them to indicate if the change is **positive (POS)** or **negative (NEG)**

d) Ask them if the change has mostly impacted **men (M)** or **women (W)**, or **both equally (B)**

Rank	Main changes that impacted livelihoods in the last 10 years	Is change Positive (POS) or Negative (NEG)	Impacted mostly: Men (M), Women (W), Both (B)
1	**B45.**	**B46.**	**B47.**
2	**B48.**	**B49.**	**B50.**
3	**B51.**	**B52.**	**B53.**
4	**B54.**	**B55.**	**B56.**
5	**B57.**	**B58.**	**B59.**
6	**B60.**	**B61.**	**B62.**
7	**B63.**	**B64.**	**B65.**

DEPENDENCY ON FISH AND WILD RESOURCES

B66. Does wild fish and wild resources have a special importance in some seasons or situations?
(E.g. in order to find income for seeds, to cover seasons with limited other food available, in cases of extra health expenses, etc.)

□ Yes □ No

B67. If yes, what and when? _____

B68. If the wild fish and wild resources are lost, are there other occupations that can compensate for that loss?

□ Yes □ No

B69. If yes, which occupations? _____

FORM C: FISH AND WILD RESOURCES IN LIVELIHOODS

THE ROLE OF WILD FISH AND OTHER AQUATIC ANIMALS (OAA) IN LIVELIHOODS

a) Ask how many percent of the families in the township are fishing and/or collecting OAA?

b) How many percent of those fishing and/or collecting, do so full time?

c) How many percent of the fishers are men and women, respectively?

d) How many percent of people doing fish-related activities are men and women, respectively (e.g., fish processing or selling)?

Families in the Township who fish (in %)	**Fishing families who fish full time (in %)**	**Men among fishers (in %)**	**Women among fishers (in %)**	**Men in fishing-related activities** (processing, sale, etc.) **(in %)**	**Women in fishing-related activities** (processing, sale, etc.) **(in %)**
C1.	**C2.**	**C3.**	**C4.**	**C5.**	**C6.**

C7. Generally speaking, are wild fish and other aquatic animals now more or less important for the livelihoods of people in the township, than they were 10 years ago?

□ More important □ Less important □ No change (same importance as before)

C8. Why/why not? _____

THE ROLE OF WILD RESOURCES IN LIVELIHOODS

a) Ask how many percent of the families in the township are hunting/collecting wild resources?

b) How many percent of those hunting/collecting wild resources do this full time?

c) How many percent of the hunters/collectors are men and women, respectively?

d) How many percent of people doing hunting/collecting-related activities are men and women, respectively (e.g., processing or selling)?

Families in the Township who hunt/collect (in %)	**Hunting/collecting families who do so full time (in %)**	**Men among hunters/collectors (in %)**	**Women among hunters/collectors (in %)**	**Men in hunting/collecting-related activities** (processing, sale, etc.) **(in %)**	**Women in hunting/collecting related activities** (processing, sale, etc.) **(in %)**
C9.	**C10.**	**C11.**	**C12.**	**C13.**	**C14.**

C15. Generally speaking, are hunting/collecting wild resources now more or less important for the livelihoods of people in the township, than they were 10 years ago?

□ More important □ Less important □ No change (same importance as before)

C16. Why/why not? _____

FISH AND WILD RESOURCES AND CULTURE IN THE TOWNSHIP

(**Note**: The facilitator can share examples, (e.g., if some people will not fish or hunt due to religious reasons, or if some fish or animal species may have a special role, or cultural value, in certain areas.)

C17. What are the cultural issues and values related to fish and wild resources in the township?
(The role of fish and wild resources on culture, and role of culture on fish and wild resources)

_____

FORM D: THE IMPORTANCE OF FISH AND WILD RESOURCES FOR NUTRITION

SOURCES OF ANIMAL PROTEIN

a) Ask what the most important sources of animal protein are for people in the township

b) Ask them to rank each source of animal protein (the most important type ranked as #1)

Rank	Sources of animal protein
1	D1.
2	D2.
3	D3.
4	D4.
5	D5.
6	D6.
7	D7.

FISH CONSUMPTION

D8. How often do people in the township eat fish and other aquatic animals (OAA)?

□ Almost every day □ 2 to 5 times a week □ Once a week □ Less than once a week

D9. Is fish and OAA important for the nutrition of children in the township? □ Yes □ No

D10. Why/why not? _____

D11. Is fish and OAA now more or less important, as a source of animal protein for people in the township, than it was 10 years ago?

□ More important □ Less important □ No change (same importance as before)

D12. Why/why not? _____

WILD RESOURCE CONSUMPTION

D13. How often do people in the township eat wild resources?

□ Almost every day □ 2 to 5 times a week □ Once a week □ Less than once a week

D14. Are wild resources important for the nutrition of children in the township? □ Yes □ No

D15. Why/why not? _____

D16. Are wild resources now more or less important, as a source of animal protein for people in the township, than it was 10 years ago?

□ More important □ Less important □ No change (same importance as before)

D17. Why/why not? _____

FORM E: IMPORTANT HABITATS AND SPECIES

IMPORTANT HABITAT TYPES FOR WILD FISH/OTHER AQUATIC ANIMALS AND WILD RESOURCES

(**Note**: For each habitat type please make sure to get specific characteristics of the area type, (e.g., mainstream river, wetland, lake, pond, floodplain, forest, etc.)

a) Ask what the most important habitat types in the township are for wild fish and OAA and wild resources (list on flipchart)

b) Ask them to rank each habitat type depending on its importance (the most important type ranked as #1)

c) Ask them if the habitat is important for wild fish and OAA or wild resources (**Fish/OAA = F, Wild resources = W**) (If the habitat is important for both fish and OAA and wild resources write "F, W")

Rank	Habitat types (specify characteristics)	Habitat important for fish and OAA and/or wild resources (Fish/OAA = F, Wild resources = W)
1	**E1.**	**E2.**
2	**E3.**	**E4.**
3	**E5.**	**E6.**
4	**E7.**	**E8.**
5	**E9.**	**E10.**
6	**E11.**	**E12.**
7	**E13.**	**E14.**
8	**E15.**	**E16.**
9	**E17.**	**E18.**
10	**E19.**	**E20.**

MOST IMPORTANT SPECIES OF WILD FISH/OAA AND WILD RESOURCES FOR THE LIVELIHOODS OF PEOPLE

a) Ask which species of wild fish and OAA and wild resources are the most important for the livelihoods of people in the township (list on flipchart)

b) Ask them to rank each species depending on its **overall importance for the livelihoods** of families in the township (the most important species ranked as #1)

c) Ask them to indicate the importance of each species **in terms of income** for families in the township. (**high (3), medium (2), low (1)** or **none (0)**)

d) Ask them to indicate the importance of each species **as a contributor of animal protein** for families in the township. (**high (3), medium (2), low (1)** or **none (0)**)

Rank	Most important species (Fish/OAA and wild resources)	Importance for income (high (3), medium (2), low (1), none (0))	Importance for animal protein (high (3), medium (2), low (1), none (0))
1	**E21.**	**E22.**	**E23.**
2	**E24.**	**E25.**	**E26.**
3	**E27.**	**E28.**	**E29.**
4	**E30.**	**E31.**	**E32.**
5	**E33.**	**E34.**	**E35.**
6	**E36.**	**E37.**	**E38.**
7	**E39.**	**E40.**	**E41.**
8	**E42.**	**E43.**	**E44.**
9	**E45.**	**E46.**	**E47.**
10	**E48.**	**E49.**	**E50.**

FORM F: ABUNDANCE OF WILD SPECIES IMPORTANT FOR LIVELIHOODS

ABUNDANCE OF SPECIES IMPORTANT FOR THE LIVELIHOODS OF PEOPLE IN THE TOWNSHIP

a) Insert the 6 highest ranked species listed in previous section (most important species of fish and OAA and wild resources)

b) Ask how the abundance of each listed species has changed in the last 10 years. (**Increased (Inc), Decreased (Dec), Remained the same (Same)**)

c) Ask how they expect the abundance of each listed species to change in the next 10 years. (**Increase (Inc), Decrease (Dec), Remain the same (Same)**)

Species most important for livelihoods (insert the 6 highest ranked species from previous section)	**Change in abundance in the last 10 years** (Increased (Inc), Decreased (Dec), Remained the same (same))	**Expected change in abundance in the next 10 years** (Increase (Inc), Decrease (Dec), Remain the same (Same))
F1.	**F2.**	**F3.**
F4.	**F5.**	**F6.**
F7.	**F8.**	**F9.**
F10.	**F11.**	**F12.**
F13.	**F14.**	**F15.**
F16.	**F17.**	**F18.**

F19. What do you think are the causes of the changes to the species abundance in the last 10 years?

_____

F20. Please list any wild fish and OAA and wild resource species that people in the township used to be able to catch or collect 10 years ago, but that people are now not able to catch/collect anymore.

_____

FORM G: WILDLIFE RESOURCE USE (SPECIES INFORMATION)

G1. Do people in the township hunt or catch birds? □ Yes □ No

G2. If yes, which species are hunted/caught? _____

G3. Do people in the township collect bird eggs? □ Yes □ No

G4. If yes, from which species? _____

G5. Do people in the township hunt dolphins? □ Yes □ No

G6. Do people sometimes catch dolphins by accident? □ Yes □ No

G7. If yes, how does this happen? _____

G8. Do people in the township hunt monkeys? □ Yes □ No

G9. If yes, which species? _____

FORM H: CHALLENGES, RECOMMENDATIONS, THREATS AND OPPORTUNITIES FOR WILD FISH/OTHER AQUATIC ANIMALS AND WILD RESOURCES

CHALLENGES, IMPACTS AND RECOMMENDATIONS FOR FISHERS AND HUNTERS/COLLECTORS IN THE TOWNSHIP

a) Ask what the **biggest challenges are for fishers and hunters/collectors** in the township (list on flipchart)

b) Ask them to rank each listed challenge depending on its impact on people in the township (the biggest challenge ranked as #1)

c) Ask them to explain what the main impacts from each challenge are

d) Ask them to recommend measures/actions that they think can help to improve the situation (what can be done, how, by who and when)

Rank	Challenges for fishers and hunters/collectors	Main impacts from the challenge	Recommendations for improving the situation
1	**H1.**	**H2.**	**H3.**
2	**H4.**	**H5.**	**H6.**
3	**H7.**	**H8.**	**H9.**
4	**H10.**	**H11.**	**H12.**
5	**H13.**	**H14.**	**H15.**
6	**H16.**	**H17.**	**H18.**
7	**H19.**	**H20.**	**H21.**

THREATS AND OPPORTUNITIES FOR THE SUSTAINABILITY OF THE WILD FISH AND WILD RESOURCES IN THE TOWNSHIP

a) Ask what the biggest threats are to the **sustainability of the wild fish and wild resources** in the township (list on flipchart)

b) Ask them to rank each threat depending on its expected impact on the sustainability of the fish and wild resources (the biggest threat ranked as #1)

c) Ask them what impacts they expect from each threat

d) Ask them what opportunities they can think of to avoid, or limit, the impact from each threat

Rank	Threats to the sustainability of the fish and wild resources in the Township	Likely/expected impacts from the threat	Opportunities to avoid, or limit, the impact from the threat
1	**H22.**	**H23.**	**H24.**
2	**H25.**	**H26.**	**H27.**
3	**H28.**	**H29.**	**H30.**
4	**H31.**	**H32.**	**H33.**
5	**H34.**	**H35.**	**H36.**
6	**H37.**	**H38.**	**H39.**
7	**H40.**	**H41.**	**H42.**

FORM J: RECOMMENDATIONS FOR THE MANAGEMENT OF THE WILD FISH AND WILD RESOURCES

CHANGES, ACTIONS AND ACTIVITIES THAT CAN HELP TO ENSURE THE SUSTAINABILITY OF THE WILD FISH AND WILD RESOURCES

a) Ask what measures (actions and activities) could be taken to improve the way the fish and wild resources in the township are managed (list on flipchart).
b) Ask them to rank each of the recommendations (the highest recommendation ranked as #1).

Rank	Recommendations for managing the fish and wild resources in the Township
1	**J1.**
2	**J2.**
3	**J3.**
4	**J4.**
5	**J5.**
6	**J6.**
7	**J7.**
8	**J8.**

FORM K: CONCLUSIONS

K1. Number of participants in the interview: _____

K2. Make sure to fill out the participant list with the names, occupations and contact information for each participant (see the separate participant list).

K3. What do the interviewers think about the quality of this interview?
Good □ Average □ Poor □

K4. Other remarks concerning the interview:

ANNEX II – INCOME TRENDS IN THE FIVE ZONES

Income Source Trends in the Delta

Income Sources	Less		More		Same	
	FGD	KII	FGD	KII	FGD	KII
Aquaculture	0%	0%	100%	100%	0%	0%
Artisan	11%	0%	89%	100%	0%	0%
Farming	20%	0%	70%	60%	10%	40%
Fishing	67%	0%	33%	83%	0%	17%
Hunting and collection of fish and wild resources	0%	0%	0%	0%	0%	0%
Labourer	0%	0%	100%	0%	0%	0%
Livestock production	0%	0%	100%	83%	0%	17%
Processing of agricultural products	0%	0%	0%	60%	100%	40%
Processing of fish and wild resources	0%	0%	100%	0%	0%	0%
Processing of natural resources	0%	17%	0%	83%	0%	0%
Production of manufactured products	0%	0%	100%	80%	0%	20%
Resource Extraction	0%	0%	100%	57%	0%	43%
Services and Shops	0%	0%	89%	82%	11%	18%
Trading of agricultural products	0%	0%	75%	50%	25%	50%
Trading of fish and wild resources	0%	0%	100%	0%	0%	0%
Trading of manufactured products	20%	20%	80%	60%	0%	20%
Trading of natural resources products	0%	100%	0%	0%	0%	0%
Transportation	0%	0%	88%	100%	13%	0%
Total	8%	2%	82%	78%	10%	20%

Income Source Trends in Lower Ayeyarwady

Income Sources	Less		More		Same	
	FGD	KII	FGD	KII	FGD	KII
Artisan	0%	0%	100%	100%	0%	0%
Farming	0%	0%	100%	100%	0%	0%
Fishing	0%	0%	0%	100%	0%	0%
Hunting and collection of fish and wild resources	0%	0%	0%	0%	0%	0%
Labourer	0%	0%	100%	0%	0%	0%
Livestock production	0%	0%	100%	100%	0%	0%
Processing of agricultural products	0%	0%	100%	100%	0%	0%
Processing of fish and wild resources	0%	0%	0%	0%	0%	0%
Processing of natural resources	0%	0%	0%	100%	0%	0%
Production of manufactured products	0%	0%	0%	0%	0%	0%
Resource Extraction	0%	0%	0%	100%	0%	0%
Services and Shops	0%	0%	100%	95%	0%	5%
Trading of agricultural products	0%	0%	100%	100%	0%	0%
Trading of fish and wild resources	0%	0%	100%	0%	0%	0%
Trading of manufactured products	0%	0%	0%	100%	0%	0%
Trading of natural resources products	0%	0%	0%	100%	0%	0%
Transportation	0%	0%	100%	100%	0%	0%
Total	0%	0%	100%	98%	0%	2%

Income Source Trends in the Middle Ayeyarwady

Income Sources	Less		More		Same	
	FGD	KII	FGD	KII	FGD	KII
Aquaculture	0%	0%	0%	0%	0%	0%
Artisan	30%	7%	60%	93%	10%	0%
Farming	17%	0%	67%	75%	17%	25%
Fishing	75%	0%	25%	67%	0%	33%
Hunting and collection of fish and wild resources	0%	0%	50%	0%	50%	0%
Labourer	0%	0%	100%	0%	0%	0%
Livestock production	50%	0%	50%	100%	0%	0%
Processing of agricultural products	50%	0%	50%	50%	0%	50%
Processing of fish and wild resources	0%	0%	0%	0%	0%	0%
Processing of natural resources	0%	50%	0%	50%	0%	0%
Production of manufactured products	0%	0%	0%	67%	0%	33%
Resource Extraction	0%	67%	0%	33%	0%	0%
Services and Shops	0%	3%	100%	92%	0%	5%
Trading of agricultural products	33%	0%	33%	100%	33%	0%
Trading of fish and wild resources	50%	0%	50%	0%	0%	0%
Trading of manufactured products	0%	0%	100%	100%	0%	0%
Trading of natural resources products	0%	0%	0%	100%	0%	0%
Transportation	0%	13%	100%	88%	0%	0%
Total	20%	8%	72%	83%	7%	9%

Income Source Trends in Chindwin

Income Sources	Less		More		Same	
	FGD	KII	FGD	KII	FGD	KII
Artisan	0%	13%	100%	75%	0%	13%
Farming	0%	17%	100%	50%	0%	33%
Fishing	100%	40%	0%	40%	0%	20%
Hunting and collection of fish and wild resources	100%	0%	0%	0%	0%	0%
Labourer	0%	0%	100%	0%	0%	0%
Livestock production	0%	0%	100%	100%	0%	0%
Processing of agricultural products	0%	0%	100%	0%	0%	0%
Processing of fish and wild resources	0%	0%	0%	0%	0%	0%
Processing of natural resources	100%	0%	0%	50%	0%	50%
Production of manufactured products	0%	0%	0%	33%	0%	67%
Resource Extraction	0%	40%	0%	60%	0%	0%
Services and Shops	0%	0%	100%	97%	0%	3%
Trading of agricultural products	0%	0%	100%	80%	0%	20%
Trading of fish and wild resources	0%	0%	100%	100%	0%	0%
Trading of manufactured products	0%	0%	100%	100%	0%	0%
Trading of natural resources products	100%	100%	0%	0%	0%	0%
Transportation	0%	0%	0%	100%	0%	0%
Total	18%	9%	82%	79%	0%	12%

Income Source Trends in the Upper Ayeyarwady

Income Sources	Less		More		Same	
	FGD	KII	FGD	KII	FGD	KII
Artisan	0%	0%	100%	100%	0%	0%
Farming	50%	17%	50%	33%	0%	50%
Fishing	100%	40%	0%	40%	0%	20%
Hunting and collection of fish and wild resources	100%	0%	0%	100%	0%	0%
Labourer	0%	50%	100%	50%	0%	0%
Livestock production	50%	0%	50%	50%	0%	50%
Processing of agricultural products	0%	0%	0%	0%	0%	0%
Processing of fish and wild resources	0%	0%	0%	0%	0%	0%
Processing of natural resources	0%	33%	0%	67%	0%	0%
Production of manufactured products	0%	0%	0%	0%	0%	0%
Resource Extraction	100%	75%	0%	25%	0%	0%
Services and Shops	0%	0%	100%	65%	0%	35%
Trading of agricultural products	0%	0%	0%	100%	0%	0%
Trading of fish and wild resources	0%	0%	0%	0%	0%	0%
Trading of manufactured products	0%	50%	100%	50%	0%	0%
Trading of natural resources products	0%	100%	0%	0%	0%	0%
Transportation	100%	0%	0%	67%	0%	33%
Total	8%	2%	82%	78%	10%	20%

ANNEX III – TRENDS IN IMPORTANCE OF FISH AND WILD RESOURCES FOR INCOME

The trends in the importance of fish and wild resources for income in the five zones of the Ayeyarwady Basin now, compared to 10 years ago.

Fish and wild activity trends in Delta

Income Sources	Less		More		Same	
	FGD	KII	FGD	KII	FGD	KII
Fishing	80%	14%	20%	71%	0%	14%
Processing of fish and wild resources	50%	0%	50%	0%	0%	0%
Trading of fish and wild resources	0%	100%	100%	0%	0%	0%
Total	45%	33%	55%	56%	0%	11%

Fish and wild activity trends in Lower Ayeyarwady

Income Sources	Less		More		Same	
	FGD	KII	FGD	KII	FGD	KII
Fishing	100%	0%	0%	100%	0%	0%
Trading of fish and wild resources	0%	50%	100%	50%	0%	0%
Total	67%	20%	33%	80%	0%	0%

Fish and wild activity trends in the Middle Ayeyarwady

Income Sources	Less		More		Same	
	FGD	KII	FGD	KII	FGD	KII
Fishing	75%	0%	25%	67%	0%	33%
Hunting and collection of wild resources	0%	0%	50%	0%	50%	0%
Trading of fish and wild resources	50%	0%	50%	0%	0%	0%
Processing of fish and wild resources	0%	0%	0%	100%	0%	0%
Total	50%	0%	38%	75%	13%	25%

Fish and wild activity trends in Chindwin

Income Sources	Less		More		Same	
	FGD	KII	FGD	KII	FGD	KII
Fishing	100%	40%	0%	40%	0%	20%
Hunting and collection of wild resources	100%	0%	0%	0%	0%	0%
Trading of fish and wild resources	0%	0%	100%	100%	0%	0%
Total	80%	33%	20%	50%	0%	17%

Fish and wild activity trends in the Upper Ayeyarwady

Income Sources	Less		More		Same	
	FGD	KII	FGD	KII	FGD	KII
Fishing	100%	40%	0%	40%	0%	20%
Hunting and collection of wild resources	100%	0%	0%	100%	0%	0%
Trading of fish and wild resources	0%	0%	0%	100%	0%	0%
Total	100%	25%	0%	63%	0%	13%

ANNEX IV – SOCIO-ECONOMIC AND ENVIRONMENTAL CHANGES IN THE LAST DECADE

Positive changes (Combined FGD and KII)

Main Changes	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Improved agriculture and farming technologies, poultry, livestock, and agri-production	20	5	12	15	8	46
Improvement and Development of Transportation	7	2	7	4	2	22
Improved Infrastructure/Construction Sector (Roads/Bridges, Housing)	5	2	4	3	1	15
Improvement of Communications Infrastructure (Telephone), Electronic Communication Gadgets	3	2	2	2	1	10
Increase Small Scale Business/Industries	3	1	5		1	10
Improved Health Infrastructure and Services	4		2	2	1	9
Improved Education and Education Infrastructure	1	1	3	2		7
Improved Electricity and Solar Infrastructure	4	1	1	1		7
Improved Infrastructure/Construction Sector (Roads/Bridges, Housing)	1	1	1	4		7
Improved Education and Education Infrastructure	3			2	1	6
Improved Fishing/Fishing Industries	1	2	2			5
Increased Banks and MFIs	3		1	1		5
Increased No of Gas Stations	2		1		1	4
Decline of Mining Industry				1	2	3
Improved Building and Housing Infrastructure		2	1			3
Improvement and Development of Transportation		1	1	1		3
Improvement of the Trade Sector	2	1				3
Decline of Forest Industries Due to Govt Restrictions			2			2
Development of Hand weaving Industry				1	1	2
Improved Fishing/Fishing Industries	1	1				2

Negative Changes (combined FGD and KII)

Main Changes	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Decline of Fish Species, Production/Fish Catch, Resources and Abundance	4		2	1	3	10
Deforestation in Upland Forests and Mangroves Due to Agriculture and Logging	6				2	8
Decline of Mining Industry			4		3	7
Damages Caused by Floods	5		1			6
Decline of Forest Industries Due to Govt Restrictions	1		3		1	5
Decline of Fish Species, Production/Fish Catch, Resources and Abundance	2		1	1		4
Improved Agriculture and Farming Technologies, Poultry, Livestock and Agri Production	1	2	1			4
Shallower Creek and Rivers Due to Sediments	1	1	1			3
Decline in Job Opportunities				2		2
Decline of Salt Industry	2					2
Decreased Aquaculture Due to High Investment	2					2
Deforestation in Upland Forests and Mangroves Due to Agriculture and Logging			1		1	2
Delayed Arrival of Monsoon	1	1				2
Increased No of Restaurants	1	1				2
Proliferation of Drugs			1		1	2
Shallower Creek and Rivers Due to Sediments	1	1				2
Reduced number of Jobs available in the agriculture sector		1				1
Changing River Patterns	1					1
Closure of Small Rice Mills Due to Competition of Bigger Rice Mills	1					1
Contributed Trading of Wildlife Species					1	1

ANNEX V – TRENDS IN IMPORTANCE OF FISH

Reasons for the trends in importance of fish and OAA now, compared to 10 years ago. FGD and KII results.

Fish/OAA Importance Reasons	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Source of income, livelihood, and employment	4	2	8	4	1	19
Increase of Population/ Consumers	4	2	1		2	9
Important Source of Inexpensive Food	2	2	2		1	7
Species Decline	4	2		1		7
Source of Income, Livelihood and Employment	2	1	1	1		5
Important Source of Inexpensive Food			1	1	2	4
Wild Resources are Readily Available	1		1	1	1	4
Decline of Fish Resources	1		1	1		3
Fish Becoming Expensive	3					3
Resource Degradation			1	2		3
People Have No Other Jobs			1	1		2
Aquaculture has not Developed					1	1
Because of Illegal Fishing		1				1
Cannot do Fishing	1					1
Due to Deforestation				1		1
Fish Catch is Decreasing	1					1
Fish Products Used Regularly	1					1
Fishing Becoming an Important Industry			1			1
Have Problem on Leasing and Auction System			1			1
Improved Fishing Technology			1			1
Increased Fishers	1					1
Limited Catch			1			1
Sedimentation		1				1
Support Education and Health				1		1

ANNEX VI – TRENDS IN IMPORTANCE OF WILD RESOURCES

Reasons for the trends in importance of wild resources now, compared to 10 years ago. FGD and KII results.

Wild Resource Importance Reasons	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
People depend on wild resources for livelihood/no other jobs	1	3	6	1	6	17
Decline of Forest/Natural Resources	1	1	4	2	5	13
Wild Resources is Becoming Scarce	3	1	4	4		12
Decline of Forest/Natural Resources	2		4		1	7
Wild Resources is Becoming Scarce	2	2	2	1		7
People Depend on Wild Resources or Livelihood/No Other Jobs	2	2		2		6
People Depend on Wild Resources or Livelihood/No Other Jobs	2		3			5
Degradation of habitat	2		2			4
Decline of Forest/Natural Resources		1	2	1		4
Abundant Farm Labour	1	1		1		3
Easy to Buy Farmed Vegetables	3					3
Closure of Mining Industry					3	3
People Move in Find Forest Products					3	3
Wild Resources is Becoming Scarce	1		1	1		3
Collect When There is Abundance on a Particular Season	2					2
Degradation of habitat	2					2
Tradition	2					2
Declining Wild Resources			1	1		2
Need Wood for Cooking		2				2
There is High Price of Product			2			2
There is High Price of Product			1			1

ANNEX VII – SEASONAL IMPORTANCE OF FISHING

The special importance of fish in certain months of the year, according to focus groups surveyed.

Ayeyarwady Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady
May to Jun: To get money for the school start.	No special seasonal importance reported.	May to Jul: To get money for the school start (Katha).	Jul: To get money for the school start (Monywa).	May to Jun and Oct to Nov: Important seasons for fish (Myitkyina).
Sep to Dec: Catch of downstream migrating fish (Pathein).				Aug: Important for fish because of a very high catch rate, caused by the rainy season (Putao).
Nov to Dec: To get money for medicine, as children get sick in the winter season.				Nov: To get money for children going to university (Putao).

ANNEX VIII – BIRD AND MONKEY SPECIES HUNTED

Bird and monkey species hunted in the five zones of the Ayeyarwady Basin, according to the focus groups surveyed.

Product Hunted	Species Hunted	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Birds	Joe (Dove)	3		3	2		8
Birds	Ser (Sparrow)	2	1	3	2		8
Birds	Byine (Egret)	2	1	2	2		7
Birds	Za Yet (Mynah)	1		3	2		6
Birds	Khoe (Rock pigeon)		1	2	2		5
Birds	Noine (Quail)	1	1	2	1		5
Birds	Yay Kyat (Moorhen)	2		2	1		5
Birds	Hinnthar (Brahminy Duck)	1	1	1	1		4
Birds	Kyoe (Dove)		1	2			3
Birds	Sit Sa Li (Whistling Duck)	2		1			3
Birds	Yay Bae (Lesser Whistling Duck)	2		1			3
Birds	Kyak Tu Yay (Parrot)			1	1		2
Birds	Taw Bae (Wild Duck)			1	1		2
Monkeys	Macaca mulatta (Myuk Phin Ni)				1	1	2
Birds	Din Gyi (Cormorant)			1			1
Birds	Emerald dove					1	1
Birds	Joe Jar (Crane)			1			1
Birds	Joe Ni (Sarus crane)	1					1
Birds	Khar (Partridge)		1				1
Birds	Linn Wet (Night Heron)			1			1
Birds	Mal Nyo (Purple Moorhen)			1			1
Birds	Nga Hit (Heron)	1					1
Birds	Nuu (Green pigeon)			1			1
Birds	Pyin Aut (Pond Heron)				1		1
Birds	Pyinn Hlwar (Swallow)		1				1
Birds	Snipe (Snipe)			1			1
Birds	Tauk Ma Gyi (Watercock)	1					1

Product Hunted	Species Hunted	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Birds	Thein Hnet (Falcon)				1		1
Monkeys	Capped Langur (Myuk Nyo)				1		1
Monkeys	Gibbon (Myuk Hlaw Kyaw)					1	1
Monkeys	Myuk Sut (Rhesus macaque)				1		1

ANNEX IX – IMPORTANCE OF FISH FOR CHILD NUTRITION

Reasons for the perceived importance of fish and OAA for child nutrition now, compared to 10 years ago.

Fish importance for child nutrition	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Affordable	7	3	13	9		32
Bone and Body Development	8	1	3	6	3	21
Development of Brain and Nerves of Children	12	4	8		3	27
Fish Oil is Good for the Skin		2	3			5
Good for the Eyes				6		6
Improved Memory					1	1
Learned from School			1			1
Nutritious/High Protein	12	12	19	20	7	70
Prevent Infection	1				3	4
Readily Available	4	2	6	9		21
Safe/Healthy Food	7		2	3	6	18
No Idea			1			1
Traditional Food			1			1

ANNEX X – IMPORTANCE OF FISH AS A SOURCE OF ANIMAL PROTEIN

Reasons for the perceived importance of fish and OAA as a source of animal protein now, compared to 10 years ago.

Reasons for Importance of Fish/OAA for Animal Protein	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Affordable	9		8	7	6	30
Readily Available	7		5	5	2	19
Highly Nutritious	4	1	3	5	4	17
Increase of Population and Consumers	1		5	8	2	16
Safe/Healthy food			5	5	2	12
Readily Available	7	1	1	1	1	11
Learned from Mass Media on Health Benefits	5	1	1	1		8
Traditional Source of Protein	1		5		2	8
Affordable	4		1	2	1	8
Highly Nutritious	2	2		1	2	7
Consumer Preference	1		5			6
Declining Production			3	2		5
Learned from Medical Practitioners on Health Benefits	3		1			4
Popular Food			2	2		4
Consumer Preference	2		1			3
Safe/Healthy food			1	1	1	3
Traditional Source of Protein	1		1		1	3
Abundant			2			2
Fish are Rare					2	2
Fish/OAA Are Main Products of District	2					2

ANNEX XI – IMPORTANCE OF WILD RESOURCES FOR CHILD NUTRITION

Reasons for the perceived importance of wild resources for child nutrition now, compared to 10 years ago.

Reason of Importance and Non-Importance	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Difficult to Collect/Wild Resources are Getting Scarce	8	2	2		2	14
There are Alternative Sources/Substitutes are Available	3		2	3	2	10
More Nutritious	1	3	2	2	1	9
Healthy Food/No Chemicals			4	1	1	6
Healthy Food/No Chemicals	1		1	2	1	5
Provide Protein	4				1	5
Prevent Infection		1	2			3
Wild Resources have Declined	1			1		2
Natural Food			2			2
Readily Available			1	1		2
Do Not Hunt Regularly					1	1
Advice from Medical Practitioners				1		1
Get from Wild	1					1
Learned from School			1			1
More Nutritious		1				1
Children Do Not Want to Eat Anymore			1			1
Disallowed by Government				1		1
Prefer to Eat Domesticated Animal			1			1
Rarely Hunt					1	1
Affordable	1					1

ANNEX XII – IMPORTANCE OF WILD RESOURCES AS A SOURCE OF ANIMAL PROTEIN

Reasons for the trends in the perceived importance of wild resources as a source of animal protein now, compared to 10 years ago.

Reasons for Not Eating Wild Resources	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Proteins can be Obtained from Livestock/Domesticated Animals	17	1	9	5		32
Declining Wild Resources/Difficult to Find	11	2	7		3	23
Important Source of Food	4				3	7
Increasing Population/ Consumers	4					4
Intensified Conservation Effort of Government					3	3
More Nutritious				3		3
More Popular				3		3
Children Do Not Eat Wild Foods			2			2
Few Small-Scale Hunting/ Collecting					2	2
Food is Easy to Get				2		2
Important for Nutrition				2		2
No Professional Hunters					2	2
Not Abundant	2					2
Some People Do Not Eat Food that they are Not Familiar	2					2
Traditional Food			2			2
Natural Food	1					1
Not Hunting					1	1

Reasons for Eating Wild Resources	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Proteins can be Obtained from Livestock/Domesticated Animals	3	2	10	5		20
Declining Wild Resources/Difficult to Find	4	3	5		5	17
Children Do Not Eat Wild Foods			5			5
More Aware of Its Health Benefits	1		3	1		5
Not Abundant	3	2				5
Traditional Food			5			5
Food is Easy to Get				4		4
Important for Nutrition				4		4
Healthy			1	2		3
Important Source of Food					3	3
Intensified Conservation Effort of Government					3	3
Declining Habitat	2					2
Increasing Population/ Consumers					2	2
More Nutritious				1		1
More Popular				1		1
Natural Food	1					1
Not Main Diet		1				1

ANNEX XIII – HABITAT TYPES IMPORTANT FOR FISH

Important habitat types for fish and other aquatic animals, which people's livelihoods depend on, according to the focus groups in the five zones of the Ayeyarwady Basin.

Important Habitats (FGD Results)	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Permanent Wetland	4	4	4	4		16
Rice fields	7	3	4	2		16
Forest	2	1	4	2	6	15
Swamp	8	5		2		15
Permanent River	8	2	2		2	14
Permanent Creek	6	2	1		2	11
Bush	4	3	1			8
Seasonal Wetlands	5	3	2	2		12
Seasonally Flooded Bushes	4	2		1		7
Mountain	1	1	3	1		6
Mangrove	6					4
Agricultural Farm			2	1		3
Rain-fed Pond	1			1		2
Reservoir	1		1			2
Trees			2			2
Tributary					2	2
Vegetable Field			2			2
Bushes				1		1
Creek			1			1
Eddy			1			1

Important habitat types for fish and other aquatic animals, which people's livelihoods depend on, according to the key informants in the five zones of the Ayeyarwady Basin.

Important Habitats (KII Results)	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Creeks, channels, wetland areas and floodplain areas (Lease areas)	12	3	9	11	3	40
Forest		5	4	5	8	22
River	9	4	2	3	2	20
Paddy fields	8		10	2		20
River (Ayeyarwady)	4	2	9			15
Bushes	1		4	6	1	12
Wetland and floodplain areas (Lease areas)	2		5	5		12
Wetland	5	3	2		1	11
Wetland areas	3		6	2		11
Floodplain	6	1			2	9
Forests	2		3			5
Lakes			2	2		4
Mangrove forests	4					4
Streams			2	2		4
Cave				2	1	3
Dam Reservoir		3				3
Dry forest		1		1		2
Flood plains			2			2
Forest (Mahar Mying Forest)	2			2		2
Forest areas	2					2

ANNEX XIV – HABITAT TYPES IMPORTANT FOR WILD RESOURCES

Important habitat types for wild resources, which people's livelihoods depend on, according to the focus groups in the five zones of the Ayeyarwady Basin.

Important Habitats (FGD Results)	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Permanent Creek	2	2	1		2	1
Tributary					2	2
Permanent River	2	2	1		2	2
Permanent Wetland	2	2	2	2		2
Mangrove forests	2					2
Creeks			3			3
Seashore	3					3
Streams					3	3
Vegetable Field			3			3
Seasonally Flooded Bushes	4	3		4		4
Rice fields	3	5	4	5		4
Lagoon		4				4
Lakes					4	4
Seasonal Creek			4			4
Swamp	4	5		5		4
Mountain	4	3	5	5		4
Seasonal Wetlands	4	6	4	4		5
Bushes	4	6	7	6		5
Forest	4	3	5	5	6	5
Agricultural Farm			4	7		5
Eddy			5			5
Rivers	5					5
Reservoir	6		5			6
Mounds				6		6
Rain fed Pond	5			7		6
Trees			7			7

Important habitat types for wild resources, which people's livelihoods depend on, according to the key informants in the five zones of the Ayeyarwady Basin.

Important Habitats (KII Results)	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Deep forest		1				1
Spring Creek					1	1
Rivers	1	1	1	2	3	1
Main river					2	2
Mainstream river	2					2
Protected forests			2			2
Wetland and floodplain areas (Lease areas)			3	2		2
Mangrove forests	3					3
River banks				3		3
Tributary					3	3
Creeks	3	3	3	4	3	3
Forest	4	2	2	2	4	3
Floodplains	4	5	4		1	3
Dry forest		4		3		4
Mountain			5		2	4
Dam reservoirs		4		4		4
Wetlands	3	3	4	5	4	4
Bushes in wetland areas			4			4
Permanently flooded areas			4			4
Reservoir				4		4
Sand banks	4					4
Rice fields	3		5	4		4
Wetlands (Lease areas)	4		3	7		4
Bushes	5		5	5	1	4
Bamboo forest				5		5
Paddy fields	5		5			5
Groundnut fields	6					6
Ice capped Mountain					7	7
Cave				8	6	7
Hills			6	8		7
Lakes			7	10	4	7
Permanent wetland			7			7
Pools (like ponds (not in the river), during the rainy season water remain in this area after flooding.)				7		7
Ravine				8		8
Streams			7	9		8

ANNEX XV – MOST IMPORTANT SPECIES OF FISH AND WILD RESOURCES FOR LIVELIHOODS

The most important species of fish and wild resources for livelihoods in general, according to the focus group participants surveyed.

Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady
Tenualosa ilisha	*Sperata sp.*	*Wallago attu*	*Wallago attu*	*Tor Spp.*
Metapenaeus spp.	*Wallago attu*	*Macrobranchium rosenbergii*	*Sperata sp.*	*Bangana sp.*
Cirrhinus mrigala	*Clarias sp.*	*Lepidocephalichthys alkaia*	*Macrobranchium rosenbergii*	*Johnius coitor*
Metapenaeus spp.	*Heteropneustes fossilis*	*Sperata sp.*	*Channa striata*	*Raiamas guttatus*
Sperata sp.	*Cirrhinus mrigala*	*Monopterus albus*	*Cirrhinus mrigala*	*Garra nasuta*
Wallago attu	*Silonia silondia*	*Channa striata*	*Labeo angra*	*Pantius sp.*
Polynemus paradiseus	*Notopterus notopterus*	*Cirrhinus mrigala*	*Notopterus notopterus*	*Semiplotus modestus*
Lates calcarifer	*Macrobranchium rosenbergii*	*Mystus rufescens*	*Osteobrama belangeri*	*Oreochromis niloticus*
Macrobranchium rosenbergii	*Tenualosa ilisha*	*Mystus gulio*	*Labeo rohita*	*Wallago attu*
Penaeus monodon	*Metapenaeus spp.*	*Bagarius bagarius*	*Catla catla*	*Garra notate*

The most important species of fish and wild resources for livelihoods in general, according to the key informants consulted.

Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady
Tenualosa ilisha	*Tenualosa illsha, Tenualosa kelee*	*Amblypharyngodon mola*	*Cirrhinus mrigala*	*Tor sp.1*
Scylla serrata	Miscellaneous fishes	Cheap and small miscellaneous fishes	*Clarias sp.*	*Opsarius ef barna*
Barbonymus gonionotus	*Mystus spp*	Bamboo shoot	*Labeo rohita*	*Neolissochilus sp.*
Catla catla	Bamboo shoot	*Oreochromis niloticus*	*Oreochromis niloticus*	*Bangana sp*
Paelemonids	*Silonia silondia*	*Pangasius pangasius*	*Labeo spp.*	*Achanthocobitis aff.Botia*
Paelemonids spp.	Wild mushroom	*Mystus vittatus*	*Glossogobius giuris*	*Neolissochilus compressus*
Cirrhinus mrigala	*Clarias sp.*	*Labeo spp.*	*Cirrhinus mrigala*	*Notopterus notopterus*
Mastacembelus unicolor	*Cirrhinus mrigala*	Rat	*Silonia silondia*	*Labeo boga*
Tenualosa illsha, Tenualosa kelee	*Labeo rohita*	*Pangasianodon gigas*	*Sciaena coitor*	*Cirrhinus cirrhosis*
Polynemus paradiseus	Mushroom	*Clarias sp.*	*Catla catla*	*Tor Spp.*

ANNEX XVI – CHANGES IN THE ABUNDANCE OF SPECIES IMPORTANT TO LIVELIHOODS

Changes in the abundance of the most important fish species for people's livelihoods. Combined data from FGD and KII.

Delta

Important Livelihood Species	Decrease	Increase	Same
Nga Tha Lauk (*Tenualosa ilisha*)	6		
Ka Ka Tit (*Lates calcarifer*)	5		
Nga Dan (*Pangasius pangasius*)	4		
Nga Ponnar (*Polynemus paradiseus*)	4		
Nga-Yant (*Channa striata*)	4		
Pa Sunn Tod (*Macrobranchium rosenbergii*)	4		
Puzun seik (shrimp) (*Paelemonids spp.*)	4		
Nga-bat (*Wallago attu*)	3		
Nga-tha-lauk (*Tenualosa ilisha*)	3		
Ga nan (*Scylla serrata*)	2		1
Ka be lu (*Mugil cephalus*)	2		
Nga bat (*Wallago attu*)	2		
Nga Myin (*Silonia silondia*)	2		
Nga-dan (*Pangasius hypophthalmus*)	2		
Nga-gyaung (*Sperata sp.*)	2		
Nga-gyin-phyu (*Cirrhinus mrigala*)	2		1
Nga-khu (*Clarias sp.*)	2		
Nga-Kuu (*Clarias sp.*)	2		
Pa-Zon (*Metapenaeus affanis*)	2		
Birds	1		
Bot Chat (*Metapenaeus spp.*)	1		
Fish	1		
Ka-tha-poe (*Glossogobius giuris*)	1		
Nag Yant (*Channa striata*)	1		
Nga Kyan (*Sperata ao*)	1		
Nga Phal (*Notopterus notopterus*)	1		
Nga Poat Thin (*Johnius belangerii*)	1		
Nga poke thin (*Otholithes ruber*)	1		
Nga Ywe (*Mystus gulio*)	1		
Nga Zin yine (*Mystus Spp.*)	1		
Nga-fel (*Notopterus notopterus*)	1		
Nga-gyaung (*Sperata seenghala*)	1		
Nga-Gyi (*Heteropneustes fossilis*)	1		
Nga-kone-ma (*Barbonymus gonionotus*)	1		
Nga-Mawe-Htoe (*Macrognathus siamensis*)	1		
Nga-Phal (*Notopterus notopterus*)	1		
Nga-Phin-Ma (*Anabas testudineus*)	1		
Nga-Poke-Thin (*Otolithoides pama*)	1		
Nga-pone-nar (*Polynemus paradiseus*)	1		
Nga-sone (small miscellaneous fish)	1		
Nga-Than-Chake (*Mystus:Spp*)	1		
Pa Sunn (*Metapenaeus spp.*)	1		
Pa Sunn Kyar (*Penaeus monodon*)	1		
Pa Sunn Myini (*Penaeus Spp.*)	1		

Important Livelihood Species	Decrease	Increase	Same
Rabbit	1		
Rat	1		
Wild boar (*Taw-Wat*)	1		
Nga-gaung-pwa (*Catla catla*)			1
Nga-Htwe (*Rita sp.*)			1
Nga-kaung-pwa (*Catla catla*)			1
Nga-myint-chin (*Labeo rohita*)			2

Lower Ayeyarwady

Important Livelihood Species	Decrease	Increase	Same
Nga Tha Lauk (Tenualosa ilisha)	2		
Nga-bat (Wallago attu)	2		
Nga-Dan (Pangasius hypophthalmus)	2	1	
Nga-gyin-phyu (*Cirrhinus mrigala*)	2	1	1
Pa Sunn Tod (*Macrobranchium rosenbergii*)	2		
Honey bee	1		
Nga Khu (*Clarias sp.*)	1		
Nga Kyee (*Heteropneustes fossilis*)	1		
Nga Myin (*Silonia silondia*)	1		
Nga Phal (*Notopterus notopterus*)	1		
Nga-gyaung (*Sperata sp.*)	1		
Nga-Gyaung (*Sperata seenghala*)	1		
Nga-Gyi (*Heteropneustes fossilis*)	1		
Nga-Kuu (*Clarias sp.*)	1		
Nga-Myin (*Silonia silondia*)	1		
Nga-Nu-Than (*Ompok pabo*)	1		
Nga-tha-lauk (*Tenualosa ilisha*)	1		
Snake	1		
Bamboo shoot		1	
Cricket		1	
Inn-U (wild mushroom)			1
Mushroom			1
Nga-Gaung-Pwa (*Catla catla*)			1
Nga-myint-chin (*Labeo rohita*)		1	
Nga-Yant (*Channa striata*)		1	
Nga-net-pyar (*Labeo calbasu*)			
Nga-Gyung (*Sperata seenghala*)			

The Middle Ayeyarwady

Important Livelihood Species	Decrease	Increase	Same
Nga Yant (Channa striata)	5		
Nga-gyin-phyu (Cirrhinus mrigala)	4		
Nga bat (Wallago attu)	3		1
Nga Phal Aoung (Rohtee belangerii)	3		
Nga-bat (Wallago attu)	3		
Nga-gyaung (Sperata sp.)	3		
Birds (sparrow, dove, gyoe)	2		
Nga bae phyu (Mola)	2		
Nga luu (Liza vaigiensis)	2		
Nga Phal (Notopterus notopterus)	2		
Nga Zin yine (Mystus Spp.)	2		
Pa Sunn Tod (Macrobranchium rosenbergii)	2		
Puzun seik (Shrimp) (Paelemonids spp.)	2		
Tilapia (Oreochromis niloticus)	1	2	
Nga Shint (Monopterus albus)	1	1	
Bamboo shoot	1		
Nga Dan (Pangasius pangasius)	1		
Nga khone ma (Puntius sp:)	1		
Nga ma (Salostoma sardinella)	1		
Nga maung ma (Bagarius bagarius)	1		
Nga Mgwe Htoe (Macrognathus Spp.)	1		
Nga Myin (Silonia silondia)	1		
Nga Ywe (Mystus gulio)	1		
Nga-bel-phyu (Amblypharyngodon mola)	1		
Nga-maung-Ma (Bagarius bagarius)	1		
Nga-mwe-toe (Macrognathus zebrinus)	1		
Nga-myinn (Pangasianodon gigas)	1		
Nga-myint-chin (Labeo rohita)	1		
Nga-ohn-ton (Labeo spp.)	1		
Nga-sone (Miscellaneous fishes)	1		
Nga-tha-lel-hto (Lepidocephalichthys alkaia)	1		
Nga-zin-yaing (Mystus rufescens)	1		
Nga-zin-yine (Mystus vittatus)	1		
Pa Sunn Seik (Metapenaeus spp.)	1		
Shrimp (Paelemonids)	1		
Rat		2	
Nga khu (Clarius spp.)			1
Nga tha lae htoe (Lepidocephalichthys berdmorei)			1
Rabbit		1	

Chindwin

Important Livelihood Species	Decrease	Increase	Same
Nga-gyin-phyu (Cirrhinus mrigala)	6		
Nga-bat (Wallago attu)	4		
Nga Phal (Notopterus notopterus)	2		
Nga-gyaung (Sperata sp.)	2		
Nga-lu (Labeo angra)	2	2	1
Nga-myint-chin (Labeo rohita)	2		
Nga-Yant (Channa striata)	2		
Nga-zin-yine (Mystus vittatus)	2		
Nga Yant (Channa striata)	1		
Nga-fel (Notopterus notopterus)	1		
Nga-gaung-pwa (Catla Catla)	1		
Nga-khu (Clarias sp.)	1		
Nga-kone-ma (Puntius sophore)	1		
Nga-mwe-toe (Macrognathus zebrinus)	1		
Nga-myin (Silonia silondia)	1		
Nga-myinn (Pangasianodon gigas)	1		
Nga-pyet (Sciaena coitor)	1		
Pa Sunn Tod (Macrobranchium rosenbergii)	1		
Sambar (Gyee)	1		
Sambar (Satt) (Cervus unicolor)	1		
Tilapia (Oreochromis niloticus)	1		
Birds (sparrow, dove, gyoe)			1
Cricket		1	1
Frog (Fejervarya limnocharis)			1
Ka-tha-poe (Glossogobius giuris)			1
Nga-shint (Monopterus albus)		1	
Rat		1	3

The Upper Ayeyarwady

Important Livelihood Species	Decrease	Increase	Same
Ye-khel-ngar (Neolissochilus sp. Putao)	3		
Channa sp	2		
Nga-Hlaing (Garra nasuta)	2		
Wild product (vegetable)	2		
Nga-ga-lar (Tor Spp.)	1		1
Nga-Wine (Semiplotus cirrhosus)	1		1
Kyauk-nga-lu (Garra notata)	1		
Leaf deer (Fet-Gyee) (Muntiacus putaoensis)	1		
Nga kauk phar (Glyptothorax sp:)	1		
Nga Ni (Neolissochilus compressus)	1		
Nga tauk (Tor Tambroides)	1		
Nga tha lae htoe (Achanthocobitis aff.Botia)	1		
Nga-bat (Wallago attu)	1		
Nga-gaung-pwa (Gibelion catla)	1		
Nga-khu (Clarias sp.)	1		
Nga-nu-than (Ompok sp.)	1		
Nga-tan (Pangasius pangasius)	1		
Nga-wine (Semiplotus modestus)	1		
Nga-Yant (Channa striata)	1		
Notopterus notopterus	1		
Ompok sp	1		
Sambar (Satt) (Cervus unicolor)	1		
Seperata accicularis	1		
Wild resource animals	1		
Yae khae nga (Ice fish) (Oreinus cf.meridionalis)	1		
Yae Paw Nga (Opsarius ef barna)	1		
Yae-paw-nga (Raiamas guttatus)	1		
Bamboo shoot			1
Kyauk-nga-lu (Garra aff.dulongensis)			1
Labeo boga			1
Mushroom			1
Nga-ne (Neolissochilus compressus)			1
Nga-tauk (Tor sp.1)			1
Oreochromis nilotica		1	
Wild boar (Taw-Wat)			1

Overall (combined FGD and KII)

Important Livelihood Species	Decrease	Increase	Same
Nga-gyin-phyu (Cirrhinus mrigala)	14	1	2
Nga-bat (Wallago attu)	13		
Pa Sunn Tod (Macrobranchium rosenbergii)	9		
Nga Tha Lauk (Tenualosa ilisha)	8		
Nga-gyaung (Sperata sp.)	8		
Nga-Yant (Channa striata)	7	1	
Nga Phal (Notopterus notopterus)	6		
Nga Yant (Channa striata)	6		
Puzun seik (Shrimp) (Paelemonids spp.)	6		
Nga bat (Wallago attu)	5		1
Ka Ka Tit (Lates calcarifer)	5		
Nga Dan (Pangasius pangasius)	5		
Nga-dan (Pangasius hypophthalmus)	4	1	
Nga-tha-lauk (Tenualosa ilisha)	4		
Nga Myin (Silonia silondia)	4		
Nga Ponnar (Polynemus paradiseus)	4		
Nga-khu (Clarias sp.)	4		
Nga-myint-chin (Labeo rohita)	3	1	2
Nga Phal Aoung (Rohtee belangerii)	3		
Nga Zin yine (Mystus Spp.)	3		
Nga-Kuu (Clarias sp.)	3		
Nga-zin-yine (Mystus vittatus)	3		
Ye-khel-ngar (Neolissochilus sp. Putao)	3		
Nga-lu (Labeo angra)	2	2	1
Ga nan (Scylla serrata)	2		1
Tilapia (Oreochromis niloticus)	2	2	
Birds (sparrow, dove, gyoe)	2		1
Nga-Myin (Silonia silondia)	2		
Pa-Zon (Metapenaeus affanis)	2		
Channa sp	2		
Ka be lu (Mugil cephalus)	2		
Nga bae phyu (Mola)	2		
Nga luu (Liza vaigiensis)	2		
Nga Ywe (Mystus gulio)	2		
Nga-fel (Notopterus notopterus)	2		
Nga-gyaung (Sperata seenghala)	2		
Nga-Gyi (Heteropneustes fossilis)	2		
Nga-Hlaing (Garra nasuta)	2		
Nga-mwe-toe (Macrognathus zebrinus)	2		
Nga-myinn (Pangasianodon gigas)	2		
Sambar (Satt) (Cervus unicolor)	2		
Wild product (vegetable)	2		
Rat	1	3	3
Bamboo shoot	1	1	1
Nga-gaung-pwa (Catla catla)	1		2
Ka-tha-poe (Glossogobius giuris)	1		1
Nga Shint (Monopterus albus)	1	1	
Nga-ga-lar (Tor Spp.)	1		1
Nga-Poke-Thin (Otolithoides pama)	1		
Nga-Wine (Semiplotus cirrhosus)	1		1
Rabbit	1	1	
Wild boar (Taw-Wat)	1		1

Important Livelihood Species	Decrease	Increase	Same
Birds	1		
Bot Chat (Metapenaeus spp.)	1		
Fish	1		
Honey bee	1		
Kyauk-nga-lu (Garra notata)	1		
Leaf deer (Fet-Gyee) (Muntiacus putaoensis)	1		
Nag Yant (Channa striata)	1		
Nga kauk phar (Glyptothorax sp:)	1		
Nga khone ma (Puntius sp:)	1		
Nga Khu (Clarias sp.)	1		
Nga Kyan (Sperata ao)	1		
Nga Kyee(Heteropneustes fossilis)	1		
Nga ma (Salostoma sardinella)	1		
Nga maung ma (Bagarius bagarius)	1		
Nga Mgwe Htoe (Macrognathus Spp.)	1		
Nga Ni (Neolissochilus compressus)	1		
Nga Poat Thin (Johnius belangerii)	1		
Nga poke thin (Otholithes ruber)	1		
Nga tauk (Tor Tambroides)	1		
Nga tha lae htoe (Achanthocobitis aff.Botia)	1		
Nga-bel-phyu (Amblypharyngodon mola)	1		
Nga-gaung-pwa (Gibelion catla)	1		
Nga-kone-ma (Barbonymus gonionotus)	1		
Nga-kone-ma (Puntius sophore)	1		
Nga-maung -Ma (Bagarius bagarius)	1		
Nga-Mawe-Htoe (Macrognathus siamensis)	1		
Nga-Nu-Than (Ompok pabo)	1		
Nga-nu-than (Ompok sp.)	1		
Nga-ohn-ton (Labeo spp.)	1		
Nga-Phal (Notopterus notopterus)	1		
Nga-Phin-Ma (Anabas testudineus)	1		
Nga-pone-nar (Polynemus paradiseus)	1		
Nga-pyet (Sciaena coitor)	1		
Nga-sone (Miscellaneous fishes)	1		
Nga-sone (small miscellaneous fish)	1		
Nga-tan (Pangasius pangasius)	1		
Nga-tha- lel-hto (Lepidocephalichthys alkaia)	1		
Nga-Than-Chake (Mystus:Spp)	1		
Nga-wine (Semiplotus modestus)	1		
Nga-zin-yaing (Mystus rufescens)	1		
Notopterus notopterus	1		
Ompok sp	1		
Pa Sunn (Metapenaeus spp.)	1		
Pa Sunn Kyar (Penaeus monodon)	1		
Pa Sunn Myini (Penaeus Spp.)	1		
Pa Sunn Seik(Metapenaeus spp.)	1		
Sambar (Gyee)	1		
Seperata accicularis	1		
Shrimp (Paelemonids)	1		
Snake	1		
Wild resource animals	1		
Yae khae nga (Ice fish) (Oreinus cf.meridionalis)	1		
Yae Paw Nga (Opsarius ef barna)	1		

Important Livelihood Species	Decrease	Increase	Same
Yae-paw-nga (Raiamas guttatus)	1		
Cricket		2	1
Mushroom			2
Frog (Fejervarya limnocharis)			1
Inn-U (wild mushroom)			1
Kyauk-nga-lu (Garra aff.dulongensis)			1
Labeo boga			1
Nga khu (Clarius spp.)			1
Nga tha lae htoe (Lepidocephalichthys berdmorei)			1
Nga-Gyung (Sperata seenghala)			
Nga-Htwe (Rita sp.)			1
Nga-kaung-pwa (Catla catla)			1
Nga-ne (Neolissochilus compressus)			1
Nga-net-pyar (Labeo calbasu)			
Nga-tauk (Tor sp.1)			1
Oreochromis nilotica		1	

ANNEX XVII – CAUSES FOR CHANGES TO SPECIES ABUNDANCE

Causes for changes to species abundance, combined results from focus groups participants and key informants consulted in the Ayeyarwady Basin.

Causes of Change to Abundance	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Used Illegal Fishing Methods	74	43	64	64	30	275
Degradation and Loss of Habitats, Ecosystem and Breeding Grounds	40	26	106	34	28	234
Growing Population/Consumers	66		40	11		117
Overfishing/Overexploitation of Wild Resources	34	14	22	11	12	93
Increased No. of People Fishing	24	4	15	11	12	66
Pollution of Rivers/Creeks and Water Bodies by Mining Operation			12	23	18	53
Degradation and Loss of Habitats, Ecosystem and Breeding Grounds	4	10	6	12	12	44
Used Illegal Fishing Methods	4	8	3	16	12	43
Changing Weather Patterns	29	7		6		42
Degradation and Loss of Habitats, Ecosystem and Breeding Grounds		16	8	8	2	34
Expansion of Agriculture/Farms	9			24		33
Fishermen Use Modern Fishing Gears			10	23		33
Used Illegal Fishing Methods		14	3	10		27

Causes of Change to Abundance	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Erosion, Landslides and Sedimentation				12	12	24
Degradation and Loss of Habitats, Ecosystem and Breeding Grounds	4	18				22
Continued Fishing During Close Season	16		5			21
Pesticides from Farms	9			12		21
Wastes from Industries and Paper Factory	17	4				21
Overfishing/Overexploitation of Wild Resources	4	4	3	4	6	21
Used Illegal Fishing Methods		18	2			20
Decline of fish Population		12		6		18
Weak Fishery Law	17					17
Pollution of Rivers/Creeks and Water Bodies by Mining Operation			3	8	6	17
Growing Population/Consumers	6		3	4		13
High Demand of Fish Products					12	12
Sedimentation and Shallowing of Rivers		12				12
Overfishing/Overexploitation of Wild Resources		4	5	3		12
Increased No. of People Fishing		2		4	6	12
Expansion of Agriculture/Farms	3			8		11
Erosion, Landslides and Sedimentation				4	6	10
Declining Fertility of Animals	9					9
Increased No. of People Fishing		4	2	3		9
Growing Population/Consumers			5	3		8
Pollution of Rivers/Creeks and Water Bodies by Mining Operation			3	5		8
Fishermen Use Modern Fishing Gears				8		8
Increased No. of People Fishing		6	1			7
Fishermen Use Modern Fishing Gears			2	5		7
Pesticides from Farms	3			4		7
Wastes from Industries and Paper Factory		6				6
Burning of Bushes				6		6
Dredging/Quarrying		6				6
Fish Cannot Reach Upstream to Spawn	6					6
Illegal Fishing			6			6

Causes of Change to Abundance	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Increased No of Fishing Boats	6					6
No Research for Leasable Fishing Areas	6					6
Reduced Fish Reproduction			6			6
High Demand of Fish Products					6	6
Overfishing/Overexploitation of Wild Resources	4					4
Expansion of Agriculture/Farms				4		4
Wastes from Industries and Paper Factory		4				4
Changing Weather Patterns	1	2				3
Declining Fertility of Animals	3					3
Wastes from Industries and Paper Factory	1	2				3
Changing Weather Patterns		2				2
Erosion, Landslides and Sedimentation				2		2
Pesticides from Farms				2		2
Continued Fishing During Close Season	2					2
Continued Fishing During Close Season			1			1
Weak Fishery Law	1					1

ANNEX XVIII – CHALLENGES EXPERIENCED BY FISHERS, HUNTERS, AND COLLECTORS

Challenges experienced by fishers, hunters and collectors. Combined results from focus group discussions and key informant interviews.

Challenges for Fishers, Hunters, and Collectors	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Fishing Using Illegal Methods	12	6	5	5	3	31
Decline of Fish Population/Fishery Resources	12	1	6	6	4	29
Use of Illegal Fishing Methods	3	2	8	5	3	21
Deforestation and Forest Degradation	1	2	7	7	3	20
Pesticides Discharged from the Farms	1	2	2	3	1	9
Fishing in Prohibited Areas	6		2			8
Mining Effluents		3		1	2	6
Increased No. of Fishers/Hunters			1	1	3	5
Shallowing of River Beds Due to Sediments		3	1	1		5
Climate/Weather Change	1	1		1		3
Delayed Arrival of Monsoon Affecting Spawning	1	1	1			3
Dredging and Quarrying of the River Beds	2	1				3
Violation of the Fishery Laws	1	1	1			3
Weak law Enforcement	1		1		1	3
Armed Conflicts					2	2
Conflict Between Farmers (Water Users) Blocking the Waterways and Fishermen	2					2
Encroachment of Agriculture/Cultivations in Wild Areas		1			1	2
Factories Discharging Chemicals/Pollutants to the Rivers			1	1		2
High Lease Prices	2					2
Illegal Hunting			1		1	2
Increasing Cost of Fishing Gears	1			1		2
Laws Restricted the Fishermen from Fishing	1			1		2
Limited Fishing Area	1		1			2
Mining				1	1	2
No Market for Wild Animals		2				2
Sand and Gravel Quarry in the Rivers		1		1		2

Challenges for Fishers, Hunters, and Collectors	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Collapse of Riverbanks		1				1
Collection of Fries for Aquaculture	1					1
Conflict Between Salt Producers and Shrimp Aquaculture Operators	1					1
Conservation of the Environment					1	1
Continued Fishing During Close Season				1		1
Decline of Mangroves	1					1
Decrease of Fishing Area	1					1
Decreasing Fish sizes	1					1
Destruction of Habitats	1					1
Difficulty to Collect Firewood	1					1
Effluents from Livestock				1		1
Expansion of Agriculture				1		1
Expansion of Farms/Rice field	1					1
Extinction of some Wildlife Species	1					1
Fishing Using Modern Methods			1			1
Flash Floods		1				1
Flooding				1		1
Growing Urbanization				1		1
Higher Cost of Living	1					1
Increasing Population	1					1
Invasion of Tilapia					1	1
Lack of Investments for Livelihoods		1				1
Landslides				1		1
Limited Education of Ethnic People					1	1
Limited Knowledge on Natural Resources					1	1
Low Demand of Napa Palm Leaves	1					1
No Issue: Govt Protect the Wildlife		1				1
Scarcity of Firewood		1				1
Shallowing of Fish Lease Areas				1		1
Ships Berthing in the River	1					1
Stealing of Fish in Lease Areas	1					1
Turbid Water Due to River Gold Panning				1		1
Unavailability of Bamboos		1				1
Urban Wastes/ Effluents		1				1

Impacts from the challenges experienced.

Main Impacts from Challenges	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Decline of Fish Species	17	8	9	10	1	45
Damage of Habitats/Decrease of Spawning Grounds	11	8	7	7	2	35
Decline of Fish Abundance	12	4	2	6	10	34
Loss of Income	14	3	4	7	3	31
Decline of Aquatic Resources	3	3	8	11	1	26
Affects the Fish Reproduction	9	4	4	2	2	21
Decline in Catch/Production	6		3	1	3	13
Livelihood Difficulty	5		4		2	11
Water Pollution	2	8		1		11
Decline of Fish Fries		2		3		5
Decrease of Fish/Aquatic Productivity	1		2	1		4
Decreasing Fish Sizes	1		1	1		3
Deforestation				1	2	3
Affects All Businesses					2	2
Decline of Forest Products					2	2
Increased Expenses/Operating Cost	1			1		2
Loss of Job Opportunity	1				1	2
Modification of River Channel		1		1		2
Bamboos Became Scarce		1				1
Catch/Hunting of Wild Animals				1		1
Civil Unrest	1					1
Conflict Between Community and DoF			1			1
Conflict Between Lease Owners and Thieves	1					1
Conflicts Between Local and Migrant Fishers					1	1
Damage of Forest			1			1
Decrease of Fishing/Hunting Areas					1	1
Decrease of national Revenue			1			1
Delay in Rice Cultivation			1			1
Difficulty in Fishing		1				1
Difficulty of Firewood Supply		1				1
Government may Not be Able to Control Illegal fishing and Logging			1			1
Impacts to Health				1		1
Increase of Illegal Fishers		1				1
Increased Water Turbidity		1				1

Main Impacts from Challenges	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Less Fishing Opportunity	1					1
Limited Access of Fishing to Marginalized Fishers	1					1
Limited Developments					1	1
People Cannot Work Safely					1	1
Reduction of Fishing Area	1					1
Reduction Wild Resources			1			1
Residents Out-migrate		1				1
Restrictions by the Lease owners			1			1
Rise of Fish Prices			1			1
Sedimentation of Creeks			1			1
Soil Erosion			1			1
Unable to Buy Necessary Fishing Gears		1				1
Wild resources Migrating to Other Places				1		1

Recommendations on how to deal with the challenges and impacts.

Recommendations to Address Challenges	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady
DoF Negotiate with Department of River Mgt. on Dredging and Quarrying	1				
Establish Community Forestry	1				
Release Fingerlings in Waterways	1	1		1	
Strengthen the Auction System	1				
Conserve the Natural Resources	1		2		
conduct Tree Planting	1	5	2	2	
Intensify Law Enforcement/Patrol	1		2	5	3
Conservation of Mangroves	2				
Mangrove Replanting	2				
Impose Punishment to Violators of Fishery Law	2	2	2	3	
Open the Fishing Areas for Local Fishers	2		1		
Cooperate with the Private Sector	2				
DoF Negotiate with Ships Owner Berthing in the River	2				
DoF should Implement the Laws Strictly	2				
Enforce Conservation Laws	2	1	3		
Promote Agro-Forestry	2		2		
Promote Rice-Fish Culture	2				
Regulate the Price of Fishing Gears	2				
support Aquaculture Development	2		2		2
Provide Alternative Livelihoods	2	2	2	2	3

Recommendations to Address Challenges	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady
Conduct Awareness Raising to Local People, Hunters and Fishers	2	2	3	2	3
Foster Collaboration Between DoF, Local Administration and Relevant Agencies	3	2	2	3	1
Enforce the Fishery Law and Provide Stiffer Penalties	3	3	3	3	3
Form Small Scale Fishermen Group	3				
Lease Auction Should be Open only to Bonafide Fishers	3				
Promote Products from Nipa	3				
Control the Release of Effluents from Biogas	4				
Prevent Fishing in Closed Season	5				
Prevent Fishing in Conservation Areas	5				
Closely Supervise the Operation of Quarry Operators in the Riverbeds				1	
Control Logging					1
Develop Land Use Policy				1	
Limit the Number of Hunters					1
Provide Transportation and Road Infrastructures					1
Regulate the Waste Disposal of Mining Operators				1	
Require Licenses to Fishing Gears			1		
Sustainable Use of Natural Resources				1	
Support Access to Agricultural Technology					2
Conserve the Forest and Aquatic Ecosystem			1	2	
Control Mining Operations					2
Enjoin the Farmers to Use Organic Pesticides			2		
Provide Housing to DoF Staff			2		
Regulate the Catching of fish in Wild			2		
Regulate Use of Pesticides in Agriculture		2	2		
Require Proper disposal of Waste Materials from Mining Industry		2			
substitute Firewood with LPG		2			
Cooperate with Communities			2	5	1
Create Job Opportunity			3	2	2
Close Mining Operations				3	2
Dredge the Sediments in Waterways to Become Shallow		2		3	
Provide Capital for Fruit Orchard Development		3			2
Control Illegal Fishing Activities					3

Recommendations to Address Challenges	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady
Conduct Regular Monitoring					3
Issue Registration Cards			3		
Limit the Lease Period to 3 Years				3	
Provide lands for Bamboos		3			
Provide Market Support				3	
Regulate Extraction of Forest Products					3
Attract More Investors				4	
Conduct environmental Awareness Raising		4			
Conserve and Rehabilitate Riverbanks and Riparian Areas			4		
Construct a Modern Market Areas		4			
Control River Quarrying		4			
Disseminate Information			4		
DoF Conduct Monitoring During Closed Season				4	
DoF Conduct Monitoring in Restricted Areas				4	
Government Should Provide More support				4	
Put Up Conservation and Recreation Areas				4	
Require Industries to Put Up Wastewater Treatment Ponds		3		5	
Sand and Gravel Extraction Should Be Conducted in Suitable Areas				4	
Control Shifting Agriculture					5
Dredge the Rivers to Become shallow				5	
Government Should Construct Levees in the Riverbanks		5			
Prevent People from Gold Panning in the River				5	
DoF and Government Should Disseminate Information to Farmers			3	6	
Work Out for Peace and Order					6
Promote Peace Through Negotiation					7

ANNEX XIX – THREATS TO THE SUSTAINABILITY OF FISH AND WILD RESOURCES

Threats to the sustainability of fish and wild resources. Combined results from focus group discussions and key informant interviews.

Threats to Fish and Wild Resources	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Use of Illegal Fishing Methods	18	2	12	7	6	45
Deforestation and Degradation	5	4	4	7	5	25
Fishing During Closed Season and Closed Areas	6		5	2		13
Damaged Ecosystem	1	1	4	1	2	9
Use of Pesticides in Fishing	4	2	2	1		9
Expansion of Agricultural Areas	3	2		1	1	7
Mining Operation			1	2	4	7
Fishing with Small Mesh Sized Nets	3	1		1		5
Hunting of Animals	2		1	1	1	5
Over extraction of Forest Products		2	2		1	5
Weak Law Enforcement	1	1	1		1	4
Leaseholders Release Fries Instead of Fingerling Size to Rivers			3			3
Over extraction of Sand and Gravel	1	1	1			3
Sand and Gravel Quarrying in the River	1	1			1	3
Use of Pesticides for Agriculture	2		1			3
Armed Conflicts					2	2
Banana Plantation					2	2
Illegal Trapping/Hunting					2	2
Limited Knowledge on sustainable Use of Natural Resources		1	1			2
Poverty				2		2
Wastes from Industries and Mining			1	1		2
Wastes from Urban Areas			1	1		2
Building of Dikes Along Coastal Area	1					1
Change of River Channel			1			1
Changing Weather				1		1
Charcoal Making				1		1
Collection of Fish Larva for Aquaculture	1					1
Conflict Between Farmer and Fishermen	1					1

Threats to Fish and Wild Resources	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Conversion of Forestlands				1		1
Deterioration of River, Creeks and Lease Areas				1		1
Effluents from Urban Areas				1		1
Erosion of Riverbanks			1			1
Establishment of Pond in Leased Areas	1					1
Export of Wild Resources		1				1
Flooding and Landslides				1		1
Global Warming	1					1
Group Conflicts					1	1
High Demand for Firewood	1					1
Inaccessibility of Areas	1					1
Increased Fishing Boats/Trawlers	1					1
Lack of Open Fishing Areas for Fishers			1			1
Limited Job Opportunities			1			1
Overfishing			1			1
Poor Management		1				1
Proliferation of Aquaculture Ponds		1				1
Reduction of Mangroves	1					1
Salt Business		1				1
Sedimentation/Shallowing of Rivers/Creeks	1					1
Vegetable cultivation in Riverbanks		1				1
Waste Disposal to Rivers and Creeks		1				1
Widening Gap Between Rich and Poor		1				1

Expected impacts from the threats.

Expected Impacts from Threats	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Decline in Fish Abundance	28	7	20	10	4	69
Decline in Fish Species	17	6	10	6		39
Deterioration of Ecosystem/Natural Resources	2	3	4	7	5	21
Reduction of Feeding Grounds and Habitats for Wildlife	10	3	3	3	1	20
Reduced Fish Fertility	9	3	5	2		19
Decline of Wildlife Population	2		4	2	4	12
Decrease of Mangrove/Forest Cover	3	2	2	2	3	12
Effect on Reproduction of Fish	5		3		1	9

Change the Weather Condition	2		1	6		9
Erosion/Landslides	1		3	2	2	8
Extinction of some Fish Species/Wildlife		2	5			7
Damage to Spawning Ground and Habitats	1		3	2		6
Overexploitation of Fish/Natural Resources		3	1	2		6
Reduction of Water Quality		1	1	2	2	6
Change the River Patterns/channels	1	1	1	1		4
Decrease of River Volume/Water Flow	1			1	2	4
Fish Kills	2		1	1		4
Flooding		1		3		4
Deforestation and Degradation		1			2	3
Increased Illegal Activities	2				1	3
More hardships/Livelihoods Are Affected			2	1		3
Reduction of Forest Quality	2	1				3
Sedimentation of Rivers and Creeks		1	1	1		3
Affect the Businesses					2	2
Affect the Food Chain	2					2
Aquatic Fauna are Affected	1		1			2
Decreased of Prey					2	2
Decline of Forest Products					1	1
Decline of Living Standard					1	1
Decline of Water Resources					1	1
Depletion of the Groundwater				1		1
Difficult for Farmers	1					1
Eating of Contaminated Fish				1		1
Fish Cannot Reach Upstream to Spawn	1					1
Fish Do Not Grow to Full Maturity	1					1
Illegal Hunting and Trapping					1	1
Limited Employment	1					1
Limited Fishing Areas	1					1
Loss of Biodiversity		1				1
Migration of Wild Resources				1		1

More Restrictions to the Fishers from the Leaseholders			1			1
Obstruction of the Pathways for Migrating Fishes	1					1
smaller Fish Sites	1					1
Water Pollution					1	1
Water Turbidity		1				1

Opportunities/recommendations for limiting the impacts from the threats.

Avoiding Impacts from Threats	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Intensified law Enforcement/Implement the Law	16	6	15	7	10	54
Awareness Raising	15	2	14	11		42
Enforce Laws and Impose Penalties	18	6	7	7		38
Impose Penalty to Violators	10		7		1	18
Provide Alternative Jobs/Livelihoods	2	1	5	2	6	16
Replanting/Forest Restoration	5	1	4	5		15
Coordination Among Government Agencies	1	3	1	2	3	10
Involve the Community	1	1	4	1	2	9
Conserve the Natural Resources/Habitats	2		4	2		8
Control Mining Operation			1	1	3	5
Control Exploitation/Extraction of Natural Resources	1		1		2	4
Promote Use of Alternative Fuel/Energy	1	1		1	1	4
Control Logging	1	1			1	3
DoF should Release Fingerling-Size Fish Species			3			3
Release Larvae in the Rivers			3			3
Conduct Monitoring				1	1	2
Control Hunting		1			1	2
Control Operation of Sand and Gravel Operators			1		1	2
Develop Land Use Plan/ Policy	1			1		2
Disaster and Risk Preparation				2		2
Disseminate Information				1	1	2
Prohibit Farming in Sandbanks		2				2

Avoiding Impacts from Threats	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Require Wastewater Treatment Facility			2			2
Resolve the Armed Conflict					2	2
Strengthen Law Enforcement				1	1	2
Train on the Proper Use of Pesticides	1		1			2
Avoid Fishing During Closed Season and Closed Areas	1					1
Conduct Dredging of Waterways			1			1
Conduct Mangrove Restoration	1					1
Conserve the Forests					1	1
Control further Conversion of Forest Areas to Other Land Uses				1		1
Control Shifting Agriculture		1				1
Control the Expansion of Agriculture				1		1
Control Waste Discharges				1		1
Decrease Number of Fishing Boats/Trawlers	1					1
Delegate the Management and Development of Fishery Sector to Regional Government	1					1
Develop Sustainable Management Plan	1					1
Disallow Hunting or Collection of Gravid and Juvenile Fish/Animals				1		1
DoF Check the Use of Fishing Gears	1					1
Dredge Shallow Creeks	1					1
Establish Communal Area for Firewood Collection				1		1
Fish Restocking				1		1
Government and NGOs Identify Territories					1	1
Government Should Identify Suitable Areas for Agriculture					1	1
Open the Fishing Areas to Local Fishers			1			1
Promote Aquaculture	1					1
Promote Herbal Medicine to People					1	1
Promote Organic Agriculture			1			1
Promote Peace and Order					1	1
Promote the Use of Water Areas for Recreation				1		1

Avoiding Impacts from Threats	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Provide Funding to the Government Sector				1		1
Provide Logistical support to Patrol Teams				1		1
Reduce Use of Plastics				1		1
Regulate Banana Plantation Development					1	1
Require Permit to Fishers During Close Season	1					1
Stabilize River Embankments	1					1
Strictly Screen Mining Operators				1		1
Sustainable Use of the Natural Resources				1		1

ANNEX XX – RECOMMENDATIONS FOR MANAGEMENT IMPROVEMENTS

Recommendations for improving the management of fish and wild resources. Combined results from focus group discussions and key informant interviews.

Recommendations for Managing Fish and Wild Resources	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Control Exploitation of Fishery Resources			1			1
Control the Operation of Trawl Fishing	1					1
Delineate Forest Areas		1				1
Develop Environmental Laws		1				1
Disseminate Conservation Awareness Through Mass Media				1		1
Government Should Monitor the Site	1					1
Harmonize Government Data		1				1
Mangrove Tree Planting	1					1
Prompt Action on Illegal Fishing					1	1
Recommend Pen Culture in Lease Areas	1					1
Regulate Expansion of Agricultural Lands				1		1
Stock Fingerlings in the Waterways	1		2			2
Adopt Ecosystem Management				2		2
Control Expansion of Farms to Forest					2	2
DoF Monitor Leaseholders			2			2
Dredge the Rivers/Creeks of Sediments			2			2
Establish small Reservoirs				2		2
Identify Areas Suitable for Agriculture					2	2
Improve Infrastructure and Transport Services					2	2
Look for Alternative Energy		2				2
Organize Interagency Monitoring Group					2	2
Provide Logistical Support to Government Staff					2	2
Electro Fishing Should be Stopped	2	2	2	2	1	2
Impose penalty to Violators	2	2	2	2	1	2

Recommendations for Managing Fish and Wild Resources	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Monitor Observance of Fishing Season	2	2	2	2	1	2
Involve Fishery Organization in Monitoring and Control	2	2	2	2	2	2
Disseminate Information/Share Knowledge	2	2	2	2	1	2
Conduct Law Enforcement	2	2	2	2	1	2
Control Illegal Fishing Activities	4			3	2	2
Develop Technology for Aquaculture Production	4		2			2
Organize community Fisheries Organizations	3	2	2	2	1	2
Conduct Awareness Raising on conservation and Sustainable Use of Natural Resources	2	2	2	3	3	2
Law Enforcement and Patrolling	2		2	4	4	3
Promote Job Opportunities and alternative Livelihoods	4	3	2	2	3	3
Involve the Various Stakeholders in Conservation	3	3	3	3	3	3
Develop Plan for Conservation and Sustainable Use of Natural Resources		3	3	2		3
Conduct Reforestation	3	1	3	2		3
Awareness Raising on Relevant Laws			3			3
Collaboration of the Government and Community in the Conservation	2			2	7	3
Control Mining and Quarrying Operation	3	1	3	1	4	3
Enforce the Law in Coordination with the People	3	1	3	4	3	3
Establish Plantations beneficial to Villagers		3				3
Facilitate Access to Low Interest Loans	3					3
Promote Genetically Improved Species for Aquaculture			3			3
Provide Vocational Training to Workers	3					3
Transform Lease Areas as Fish Habitats				3		3

Recommendations for Managing Fish and Wild Resources	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Limit Lease to 3 Years	3					3
Control Logging Operation	1			4	4	3
Conservation of Natural Resources	3		4	3	7	3
Demarcate Conservation Areas	3	4				4
Look for Substitute Energy for Cooking	3				4	4
Attract Investors to Provide Employment	4					4
Disallow Establishment of Factories Near Riverbanks				4		4
Leaseholders Should Invest on Maintenance of Rivers and Creeks	4					4
Monitor the Status of Forest Restoration				4		4
Prepare disaster Management Plan				4		4
Promote Rice-Fish Culture	4					4
Provide Value Adding Technologies			4			4
Establish Wastewater Treatment to Control Discharge of Waste to Water bodies			5	4		4
Conservation of the Water bodies/Habitats	2		3	5	8	5
Regulate the Development of Banana Plantations					5	5
Assist in Value Adding/Product Development			5			5
Control Garbage Disposal to Creeks	5					5
Develop Market for Fish and Wild Resources			5			5
People Should be Prudent t in Collecting Herbs from Forest					5	5
Provide Funding to Government's Restoration Activities				5		5
Regulate and Monitor Collection of Herbs from Forest					5	5
Support Agricultural Technology	6		4			5
Provide Alternate Livelihoods					6	6
Develop Land Use Policy	6		6			6

Recommendations for Managing Fish and Wild Resources	Delta	Lower Ayeyarwady	Middle Ayeyarwady	Chindwin	Upper Ayeyarwady	Total
Improve Implementation of the Law					6	6
Monitor and Prevent Gold Panning in the River					6	6
Extend the Permits for Community Forestry to 30 years	7					7
Develop Hatchery and Fish Culture					7	7
DoF Disseminate Aquaculture Techniques					7	7
Provide Support to Government Employees					8	8