# Diversification of Livelihoods in a Region Impacted by Hydroelectric Development: A Case Study in the Lower Mekong (Mun River/Sebok River)

by

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**ABSTRACT**

Local people living along the Mun River and its tributaries, have a deep connection to this fresh water ecosystem and have longstanding knowledge, practices and norms that are critical to their fishing livelihoods. However due to the rapid development of hydropower in the Mekong Basin, fishing livelihoods are becoming increasingly complicated by environmental impacts. Many households and communities are thus diversifying their livelihoods in an effort to adapt to the associated ecological and socio-economic changes in their regions. There is a large literature on the impacts of hydroelectric development in the region, however, there has been limited research on diversifications and how they vary spatially; there has also been little research focused on community-based resource management including roles and use and how they have changed in the context of hydroelectric development. To address these gaps an exploratory case study was carried out in the nine communities of Baan Hua, Hew #11, Baan Hua Hew #4, Baan Na Choom Chon, Baan Huay Mak Tai, Baan Kho Tai, Baan Don Sumran, Baan Wangsabang Tai, Baan Thalat and Baan Doom Yai in the Mun and Sebok river areas since the implementation of the Pak Mun Dam. Twenty-six semi-structured interviews were conducted in this area in an effort to better understand historical fishing practices and diversifications in livelihoods that have taken place over the last two decades. Additionally, an examination of the rules and practices of these communities are taken into account. To better understand how households and communities are coping with changes in their livelihoods and local aquatic ecosystems, research was also carried out to learn more about rules in use; specifically, what kinds of rules and practices have been developed to ensure both social and ecological sustainability? This research, therefore, has been conducted in the hopes of providing useful and important details about community diversifications and experiences, as well as potentially contribute to the literature needed to address the lack of Local Ecological Knowledge in terms of policy change in this region.

## PREFACE

This thesis was developed for a Master of Science in Risk and Community Resilience at the University of Alberta. The aim of the research is to collect, document and synthesize existing local and traditional knowledge about social and ecological change in the Mun River area since the approval and completion of the Pak Mun Dam beginning in 1989 (Foran & Manorom, 2009). Local fishing communities and academic researchers posit that the river has undergone significant change in the past two decades because of the dam. However, due to the highly contested nature of this issue, the dam has yet to be decommissioned and those living near the river have had no choice but to adapt their livelihoods. Although there is some documentation of the combined social and ecological changes, there is not much recent study on the livelihood diversifications of the villagers and changes to their traditional ways of life.

This thesis is part of the Tracking Change Project in the Department of Resource Economics and Environmental Sociology. The aim of the project is to track ecological change across the Mackenzie, Mekong and Amazon River Basins. This thesis is an original work by Amabel D'Souza. The research project that this thesis is part of received an ethics approval from the University of Alberta Research Ethics Board, Project Name "Tracking Change in the Lower Mekong River Basin", Study ID Pro00066279, and granted on September 7, 2016.

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## ABBREVIATIONS

TEK . . . . . Traditional Ecological Knowledge

TK . . . . . .Traditional Knowledge

LEK . . . . . Local Ecological Knowledge

CBRM . . . . . Community Based Research Methods

CBPR . . . . . .. Community Based Participatory Research

EGAT . . . . . .. Electrical Generating Authority of Thailand

AoP . . . . . Assembly of the Poor

WCD . . . . . .World Commission on Dams

EIA . . . . . Environmental Impact Assessment

PMD . . . . . Pak Mun Dam

# Chapter 1

# INTRODUCTION

## 1.1 Introduction

Fishing communities in the Isan provinces of Thailand have strong historical connections to the river systems in this region including the Lower Mekong river and its' tributaries. The ethnically Lao citizens of Thailand living in the Mun River region have relied on fishing for their livelihoods for generations (Cook et. al., 2009). However, the expansion of hydroelectric development along the Mun River, and in other areas of the Mekong over the last several decades, has greatly impacted both the aquatic environment and these communities. Using case study research in nine villages on the Mun and Sebok rivers, this thesis offers a glimpse into some of the ways in communities have diversified their livelihoods in the context of hydro-electric development and are working together to manage changes in their livelihoods and the ecosystems.

## 1.2 Objectives

A variety of research questions underlie this thesis research. Among these are questions about the sustainability of livelihoods of small-scale fishers and individual, households and communities diversify the way they make a living over time in the context of large scale resource development projects. Of theoretical interest in this thesis is how livelihood diversification varies depending on geographic location and proximity to disturbance from large-scale development. A second theoretical theme relates to the community-based resource management; what kinds of local rules (i.e. social norms) are in use for ensuring the sustainability of fishing livelihoods and resources in regions affected by hydro-electric development project.
The thesis has two interrelated objectives:

> Objective 1 – To investigate the livelihood practices of fishing communities in the Mun River and Sebok River in proximity to the Pak Mun Dam;
> Objective 2 – To determine the kinds of local norms and practices developed by villages in the Mun River and Sebok river regions for ensuring the sustainability of fishing resources and their value to local livelihoods.

## 1.3. Literature Review

### 1.3.1 Fisheries and Fishing Livelihoods

There are multiple concepts and theories that inform this thesis. The first is the concept of livelihood. This thesis utilizes the definition of livelihood from Chambers and Conway:

> "A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stress and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base" (Chambers & Conway, 1991, 6).

This thesis deals specifically with small-scale fishing livelihoods; the Food and Agriculture Organization of the United Nations (FAO) Advisory Committee on Fisheries Research defines small-scale fishing livelihoods as:

> "Small-scale fisheries can be broadly characterized as a dynamic and evolving sector employing labour intensive harvesting, processing and distribution technologies to exploit marine and inland water fishery resources. The activities of this subsector conducted full-time, part-time, or just seasonally, are often targeted on supplying fish and fishery products to local and domestic markets, and for subsistence consumption. Export-oriented production, however, has increased in many small-scale fisheries during the last one to two decades because of greater market integration and globalization. While typically men are engaged in fishing and women in fish processing and marketing, women are also known to engage in near shore harvesting activities and men are known to engage in fish marketing and distribution. Other ancillary activities such as net-making, boatbuilding, engine repair and maintenance, etc. can provide additional fishery-related employment and income opportunities in marine and inland fishing communities. Small-scale fisheries operate at widely differing organizational levels ranging from self-employed single operators through informal micro-enterprises to formal sector

businesses. This subsector, therefore, is not homogenous within and across countries and regions and attention to this fact is warranted when formulating strategies and policies for enhancing its contribution to food security and poverty alleviation" (FAO, 2004, 21).

Such an inclusive definition clarifies small-scale fisheries as dynamic and heterogenous. A key question in this thesis relates to the diversification of fishing livelihoods which is discussed in more detail in chapter 3. A second key question is how local norms and practices sometimes referred to as informal rules and institutions matter to the sustainability of these fishing livelihoods (Scoones, 2009).

There is a very large literature on small-scale fisheries and fishing livelihoods. Small-scale fisheries are integral to the livelihoods, survival, culture and economy of local people who utilize their resources (Biswal, 2015). According to the Food and Agriculture Organization of the United Nations (FAO), roughly "90% of the 35 million people recorded globally as fishers are classified as small-scale and a further 20 million people are estimated to be involved in the small-scale post-harvest sector" (FAO, 2018, p. 1). Additionally, there are millions of other local people who participate in seasonal or occasional fishing (FAO, 2018). Fishing plays a vital role in the way-of-life of local communities, is embedded in social structures and fishing culture (Biswal, 2015). Riparian communities are largely dependent and impacted by the nature and health of the river system, including tributaries, drains and rice paddies that also support resources (World Bank Group, 2012). In river systems such as the Mun and the Mekong, small-scale fishing activities are implemented on tributaries such as the Sebok.

This thesis uses the term "fishers' knowledge" interchangeably with the terms "local ecological knowledge" and "traditional knowledge", referring to the "cumulative body of knowledge, practice and belief, evolving by adaptive processes and handed down through generations, and is dynamic, in that it changes in response to socioeconomic, technological and other changes" (Haggan, Neis, & Baird, 2007, p. 241; Berkes, 1999). Today, research involving fishers' knowledge is understood to be detailed, current and able to provide relevant information and benefit resource planning (Berkes & Folke, 1998). Incorporating fishers' knowledge and local ecological knowledge is also thought to strengthen CBRM (Pomeroy and Berkes, 1997).

There are several broad themes in the literature associated with fishing livelihoods. Much of this literature differentiates small-scale fishing livelihoods or "small-scale fisheries" from commercial fishing which tends to be more global in scale (Berkes, 2001). An emerging theme in the last two decades has been on the relationship between the sustainability of fishing livelihoods and climate change. Allison et. al., explains that as the planet's climate changes, "so too will populations, species and ecosystems, with profound consequences for fisheries change" (2009, p. 172). Therefore, fishing livelihoods are vulnerable to the effects of climate change, and heavy reliance of local people on fish and aquatic resources can be impacted. As fisheries are an importance livelihood resource for local communities, they tend to suffer disproportionately at the hands of climate change (Ogutu-Ohwayo, 2016). "Inland fisheries are important for nutrition, employment, and income, but climate variability and change are adding to other stressors, such as overexploitation, pollution, habitat degradation, and invasive species to threaten their productivity as well as livelihoods of fisheries-dependent communities" (Ogutu-Ohwayo, 2016, p. 498). Climate variability includes temperature, wind speed, rainfall and more that affect fishing livelihood (Ogutu-Ohwayo, 2016). This poses a threat to the survivability and health of local communities reliant on fishing.

Another stream in the fishing livelihoods literature, deals specifically with food security. Many freshwater and marine rural communities are reliant on fisheries for food (Bene, 2006) Again, the majority of global fishers are small-scale rural people and fish is their primary source of protein (FAO, 2016). Fish serves as a source of protein for roughly 1 billion people worldwide, serving as both a "nutritional safety net and a significant source of calories, protein and micronutrients" (Fiorella et. al., 2014, p. 852). Livelihood diversifications, such as aquaculture or fish stocking, help cope with threats to food security. However, as explained by Fiorella et al., these types of diversifications have shown limited nutritional value, and perhaps that "participation in food-based livelihoods may not always link directly to increased food consumption" (2014, p. 852).

This theme is interrelated with literature focused on the impacts of commercial or extractive fishing on small-scale fishing livelihoods. Persistent overfishing and overexploitation of

resources causes severe stress to rural communities. “With increased knowledge and the dynamic development of fisheries, it was realized that living aquatic resources, although renewable, are not infinite and required to be properly managed, if their contribution to the nutritional, economic and social well-being of the growing world’s population was to be sustained” (Yang, 2017, p. 1). According to Yang, an increasingly significant demand for fish since the 1950s has led to an increase in commercial catch rates, causing serious pressure on biodiversity and human access (Yang, 2017). Southeast Asia relies heavily on fish for income and food security, making it a critical resource in the region (Yang, 2017).

Another broad theme is the study of women’s roles in fishing livelihoods (Ram-Bidesi, 2015). Women play a critical role in small-scale fisheries. They work as fishers themselves, processing and selling fish, making fishing gears and traps and cooking local food. This stream notes that there can be a generalization that men are the only ones fishing, while women are processers and sellers. Additionally, as noted by Ram-Bidesi, women’s contributions are often undervalued (2015). However, “this generalization has also made fisheries governance blind to women’s other valuable inputs to the sector” (Lentisco & Lee, 2015, p. iv). Therefore, much scholarly work on women and fishing livelihoods aims to change the perception of women as solely processers and sellers, and recognize them as fishers, creators, cooks and more, giving women more agency in resource management and decision-making (Lentisco & Lee, 2015). In recent times, with more attention being given to local knowledge, more literature has been making women’s roles more visible. FAO explains that to fully involve women in resource management, they must be given a more active role in decision-making at all levels (Lentisco & Lee, 2015). Matthews et al. explains that there has been a failure in engaging women in management efforts around the world, leading to lost opportunity to utilize their knowledge and make improvements in conservation and ensuring secure livelihoods (2012). This stream of research also encourages helping women improve their income generation and bargaining power throughout the fisheries value chain (Matthews et al., 2012).

There is another stream that deals with the linkages between fishing livelihoods and poverty. Rural communities bear much of the burden in terms of climate change, threats to food security and resource development because they are critically dependent on fisheries for food, income,

employment and livelihood (Ogutu-Ohwayo, 2016). According to Béné, since the middle of the 1990s, there has been a noticeable effort in international organizations such as the United Nations to alleviate poverty (Béné, 2006). He also mentions that small-scale fisheries in developing nations "represent some of the most disadvantaged parts of rural societies" (Béné, 2006, p. 62). This stream of research sometimes coincides with the gendered research. For example, "many of the landless women in the Mekong region are the 'poorest of the poor' in global fisheries" (Matthews et al., 2012, p. 15). This thesis includes an interview with two women from the village of Baan Huay Mak Tai, who are both landless and poor. They mentioned that it is very difficult for them to survive on fishing livelihood alone. Therefore, the linkages between fishing livelihoods and poverty is relatively large and aimed towards data collection and poverty alleviations.

This thesis contributes to the literature on fishing livelihoods related to two other themes. Specifically, the work is synergistic with the literature that speaks to the impacts of resource development (ex: hydroelectric development) on fishing livelihoods as well as the previous research on the importance of CBRM as the basis for ensuring the sustainability of fishing livelihoods.

### 1.3.2 History of Fishing Practice in the Region

> "Fisheries as a term covers the catching, collecting or aquaculture of fish, as well as other aquatic animals, including shrimps, crabs, mollusks, insects, reptiles and amphibians. Fisheries also include the processing, transporting, and marketing of products, and support many associated industries such as boat-building, the making of fishing gears, and the provision of ice and salt" (Hortle, 2009, p. 198).

Fish has long been a staple food in the diets of local people in the Lower Mekong Basin. This history extends as far back as 5000 years, when small groups of hunter gathers harvested wild fish, and other aquatic life such as mollusks and crustaceans (Hortle, 2009, p. 198). After rice farming developed, the "rice-fish" diet "has been the norm for at least 2000 years in the Mekong Basin" with many local people harvesting both fish and rice to sustain their livelihoods (Hortle,

2009, p. 198). Such a long history of traditional usage contributes to knowledge about fish, and other fishing practices that have been passed to younger generations.

Local people have been utilizing resources from the Mekong basin for centuries and the richness of the basin has been documented historically. For example, European records of exploratory missions during the nineteenth century include accounts from "Louie De Carne, Francis Garnier and Paul-Marie Néis – and Englishmen such as James McCarthy", about the rich ecology of fisheries in the Mekong region and its tributaries. (Bush, 2008, p. 334). In Thailand this includes the Tonle Sap-Great Lake system, the Mun and Chi Rivers (Hortle, 2009, p. 198). These are the first European records of fisheries in the Mekong basin that show the importance of fishing livelihoods to riparian communities, as well as the historical abundance of aquatic resources. However, it is clear that prior to these accounts, local people largely utilized Mekong resources.

During the twentieth century, the population of the Lower Mekong Basin increased from "about 5 million in 1900" to 70 million presently (Hortle, 2009, p. 198).

> "Direct impacts of population growth include increasing catches for local consumption, competition for water by other industries, particularly agriculture, modification of hydrology and water quality by dams, and clearing of forests" (Hortle, 2009, p. 199).

As well as this, development for commercial fisheries also contributed to fishing pressure and tension between government and growing local populations (Bush, 2008, p. 335). In 1925, the first advisor to the Royal Department of Fisheries, Hugh McCormick Smith, provided a set of recommendations for the improvement and conservation of both freshwater and marine fisheries (Bush, 2008, p. 335). Smith also noted the importance of aquatic resources to subsistence fishers and how the promotion of resource management could protect fisheries (Bush, 2008, p. 335). In 1930, Chinese entrepreneurs owned almost 90% of the fishing in the area (Bush, 2008, p. 335). It was at this time that Smith recommended policy change that advocated for the rights of subsistence fishers, as well as measures such as stocking and aquaculture that could reduce pressure on fisheries (Bush, 2008, p. 335).

It is believed that aquaculture has been practiced in Thailand for a long time and may have been in practice as early as 1961 (Tarnchalanukit, 1974). It is likely that utilizing rice paddies during the wet season created more opportunity to harvest fish. Historically this would have been wild catch fish, however, since the beginning of the century, aquaculture has developed significantly, in particular pond and rice-field culture (FAO, 2005, p. 1). "The development of freshwater aquaculture started in 1922 after the import of Chinese carp for culture around Bangkok" (FAO, 2005, p. 1). According to Bush, the beginnings of aquaculture are also attributed to His Majesty King Bhumiphol, and some interviewees stated that fish such as tilapia are a "gift from the King" (Bush, 2008, p. 336, D'Souza & Parlee, 2016). In 1965 Nile Tilapia was first introduced to Thailand and is now one of the nation's most commonly eaten freshwater fish (FAO, 2005, p. 2). Royal policy and intervention are still commonplace today, an example being continued fish stocking.

It was also in the 1960s that the "Mekong Project", created by the United Nations, began to commission and plan for hydroelectric development in the Lower Mekong basin (Hortle, 2009, p. 199). Hydroelectric dams were purported as a source of electricity, irrigation and flood control (Hortle, 2009, p. 199). Studies at the beginning of the Mekong Project include "surveys of fish distribution, standing crop, fish migration, and general observations on fishing activities and aquaculture throughout much of the basin and in the sea off the mouth of the Mekong" (Hortle, 2009, p. 199). According to Hortle, these studies were typically general and lacked much concrete information about the distribution and migration of aquatic life and did not include all parts of the Lower Mekong Basin (2009). This could have led to underestimating the size of the fishery as well as its resources. There was a definite lack of traditional knowledge in these assessments, as well as other assessments that could have provided more information about the fisheries before the implementation and development of hydroelectric dams. However, at this time there was little consideration of the importance of traditional knowledge in general, and centralized bodies, such as EGAT and the Thai Government, did most of the decision-making regarding natural resources. While traditional knowledge is considered important in the research of today, this was not always the case.

Further to this Northeastern Thailand saw a major devastation to inland freshwater fisheries in the 1970s. A massive outbreak of ulcerative disease syndrome (UDS) destroyed native stocks including the Snakehead and Walking Catfish (Bush, 2008, p. 337). Local riparian communities who relied on fisheries were greatly impacted by the outbreak, and this may have contributed to the beginning of livelihood diversification towards agriculture.

Around the mid-1980s, an important breakthrough in aquaculture occurred with the production of mono-sex Tilapia. In contrast to mixed-sex fry, mono-sex fry's are bred for optimal growth (Belton, Little, & Grady, 2009, p. 16). This also helps to control the rate of breeding. In female tilapia, "there is a greater reallocation of metabolic energy towards reproduction", and therefore breeding males ensures that metabolic energy is channeled towards growth for a better and faster-growing yield (El-Greisy & El-Gamal, 2012, p. 60). Raising mono-sex tilapia is now "prevalent in small-scale rural aquaculture systems across Southeast Asia" (Bush, 2008, p. 337).

The 1980s and 1990s also saw rapid development of hydroelectric dams, leading to an increase in the reliance of agriculture as a primary source of income for local communities due to unreliable wild fish capture. The long historical usage of fisheries in the Lower Mekong means that local people are severely impacted by rapid hydroelectric development. However, assessments of the Lower Mekong Basin tend to "reflect the perspective of national governments" and not the perspective of local people (Hortle, 2009, p. 201). Presently there is a need to consider the impact of rapid damming on fisheries and local communities. A decentralized method to resource managing, such as community-based resource management (CBRM), explained below), could be beneficial to address the needs of local people. Indeed, hydroelectric development in the upper and lower Mekong is progressing at a rapid pace, affecting the environment, wildlife and surrounding communities. With at least 77 new dams expected to be operating by 2030, there will be serious environmental and social consequences to this type of rapid development (Baran et al, 2015).

Additionally, the population of this region of Thailand is increasingly significantly and so too are harvest pressures on local fisheries. The Mekong basin is currently known as the world's largest

inland fishery, with over 2.1 million tonnes of freshwater fish harvested annually (Baran et al. 2015).

The governance of fisheries resources and fishing livelihoods of the lower Mekong is a complex challenge, owing to the large number of actors, region socio-political contexts, cultures and economies. The question of how resources and their benefits are distributed is increasingly complicated by upstream practices of resource development including hydroelectric development.

An increase in population of people, coupled with the effects of industrialization and development no doubt leads to more usage of resources. Nielsen et al. (2004) posit that an increasing population in Southeast Asia imposes pressures leading to the overexploitation of resources in freshwater environments (p. 151). In the Lower Mekong Basin, water and fisheries resources are essential to community livelihoods and any loss of resources results in adverse effects to communities.

### 1.3.3 Impacts of Hydro-Electric Development on Fishing Livelihoods

Conflicts around fisheries resources put rural communities at risk. Their reliance on fish for survival means many communities are vulnerable to environmental changes that impact the diversity, population or migration of fish as well as fishers' access to fish resources. Within this context, there is a significant body of research about the impacts of hydroelectric development on fishing livelihoods around the world. This literature can be understood in a few different streams or categories. The first being more of an anthropological stream, discussing the impacts of hydroelectric development and attachment to place. The concept of place and sense of place coincides with the impacts of hydroelectric development. This concept relates well with geography and humanistic geography and implies a "strong emotional tie between a person and a particular location" (Windsor & McVey, 2005, p. 147). This also extends to communities, where place is an integral part of their identity, providing security and a sense of control (Windsor & McVey, 2005). Part of this literature also addresses the problem of having place defined by outsiders (Windsor & McVey, 2005). There is a long standing and deep-rooted connection

between local peoples and their place. Large-scale water resource projects, such as hydroelectric dams, typically involve drastic impact or changes to the place of local peoples. This includes environmental degradation such as flooding and relocation of local communities. According to Windsor and McVey, the flooding or "drowning" of communities is one of the most effective methods of "ensuring place annihilation" (Windsor & McVey, 2005).

There have been multiple communities in Canada that have experienced a loss of place due to hydroelectric development. For example, the Site C Dam in British Columbia has sparked controversy because communities will have to be relocated due to flooding once the dam is in operation. The Site C dam is one of several major dam projects that have been proposed since the mid-1950s (Mettler, 2016). The first of the dams, known in Canada as the W.A.C. Bennett Dam, displaced many members of the Tsay Keh Dene First Nation, also flooding over 350,000 acres of land (Mettler, 2016). Although the subject of much debate, in 2017 it was announced by B.C. Hydro that plans to go ahead with the construction of Site C, much to the disappointment of local peoples (McElroy, 2017). Similarly, this thesis has interviewed the communities of Baan Hua Hew #4, Baan Hua Hew #11 and Baan Na Choom Chon**,** all of which have been relocated due to flooding and experienced a loss of their home and sense of place. Arlinghaus explains that conflicts may also be amplified due to loss of place (2005). Further to this, it also amplifies the idea that communities are not being heard by centralized bodies in terms of their needs and their connection to the land is not understood.

There is also much literature that speaks to the physical or geographical changes on sites, communities, ecosystems (such as flooding), displacement, sediment buildup and more. Hydropower is associated with loss of wild fisheries and other aquatic life, due to blockage of fish migration and changes to water flow. Flooding causes changes to sediment, loss of habitat and fluctuating water levels (Sivongxay, 2015). This can affect local fishers by washing away gear or making it more difficult to fish.

Much attention is focused on communities that have been resettled. Infrastructure such as dams, particularly large-scale dams, usually involves relocation of those living in projected flooding; reservoir and infrastructure areas (World Commission on Dams, 2000). Large-scale dams

account for 63% of the projects involving displacement that have been financed by the World Bank (World Commission on Dams, 2000). According to Baird et al. (2017), there has been little attention given to the impact of hydroelectric dams on downstream communities of the Mun River. This is shown in this thesis in analysis and data collection from communities who live along the Sebok River (Mun River tributary), who have not received compensation, and little has been done in their interest. This is typically due to being in less proximity to the dam, and thus, little consideration as to the impact of water flow or changes to ecosystems that may affect these communities. According to Richter et. al. (2010) there are about 427 million downstream people that are likely to have been impacted by hydroelectric development.

At the worldwide scale, there has been reported research of impoundment of water that has reduced sea levels by 3 cm, "and the concentration of reservoirs built in the last 40 years at high latitudes has caused the earth to spin faster" (Rosenberg et. al., 1997, p. 27). All these physical and geographical impacts have implications for both freshwater and marine fishing communities. There are significant costs at both the local and global level that accrue due to hydroelectric development.

Another common and multidisciplinary stream of research on hydroelectric development and fishing livelihoods is that of food security. A key threat to food security for many local communities is pollution and water contamination, more specifically methylmercury bioaccumulation. There has been extensive research in both Canada and Finland that shows elevated levels of mercury in predatory fish such as the Walleye (Rosenberg et al., 1997). Research shows that methylmercury is a by-product of flooding and bioaccumulated by fish. "Land flooded to the final surface area of the reservoir produces higher methylmercury levels than when a low proportion of the surface area is flooded by land" (Rosenberg et al., 1997, p. 31). Therefore, fish living in certain reservoirs are prone to being contaminated by methylmercury. In Canada, for example boreal wetlands that have been flooded are larger sources of methylmercury that come from flooded vegetation and peat, that in turn effect the fish. According to Berkes and Folke (1998), about one-third of wild food harvested by local people, specifically Cree, is fish. Therefore, contaminated fish populations are both unhealthy and a threat to food security. There is also further literature discussing the relationship between

store bought food and access to wild food. When access to food is impacted, there is more of a reliance on store bought or market foods, and less usage and creation of traditional foods. This can also be seen in the research within this thesis, where community members have no access to wild fish due to the PMD and must rely on market food to accommodate their need for fish.

This thesis speaks to a stream of literature on the impacts of hydroelectric development and fishing livelihoods. The controversial nature of the PMD and its impacts to fishing communities means that there is much existing literature in academia. This literature extends from understandings of fishing livelihoods, resource management, traditional knowledge, resilience, community and sustainability. From the beginning of this thesis, the work by Dr. Ian Baird and Dr. Kanokwan Manorom has been instrumental in both the literature review and the development of the discussion sections. The chapter "Pak Mun Dam: Perpetually Contested?" in *Contested Waterscapes* by Tina Foran and Kanokwan Manorom (2009) provides much of the overall historical context for the Pak Mun Dam.

Baird et al. (2017) adopts a political ecology perspective for the research done on the Sebok River, which considers both ecological and political economy factors. Fisheries decline is often based on more than scientific factors, but also political, as "resources and their management have long been central in all political processes" (Baird et al., 2017; Howitt, 2002, p. 3). Additionally, it is noted in this thesis that community members are often unheard, and decisions are made by the government without much consultation. The argument in Baird et al. (2017) is that those along the Sebok have been impacted by both the PMD and the Ban Ot and that their concerns are legitimate and need to be taken seriously. There is the suggestion of getting community members involved in research and thinking about the dams more seriously. As well as this, the study is valuable because it indicated the importance of Local Knowledge and qualitative fish catch data, providing an overall indication of the fish species and quantities. Again, driving home the idea that community members deserve to have a voice in discussions of the PMD.

Lastly, there is research on hydroelectric development and agricultural change, as well as the significance of this change on communities. Hydroelectric development gives rise to new agricultural conditions that may impact communities in differing ways (Rosenburg et. al., 1997).

In terms of adverse impacts, Pease-Smith mentions that hydropower affects productivity, degrades natural resources, reduces land, creates flooding, decreases fertility due to the reduction of natural nutrients, increases the loss of forested land and reduces the availability of clean freshwater (2012). Additionally, communities that are displaced from hydroelectric development may also experience less agricultural productivity (Lacombe et al., 2014). However, hydropower also has the potential to provide irrigation to communities, making it easier to farm rice and other crops. The growing demand for both food and energy in the Mekong region is leading to centralized policy-makers looking to irrigation from hydropower (Lacombe et, al., 2014).

There is a large literature on the impacts of the Pak Mun River Dam; this research builds on that work by specifically describing how the experiences of people living in different areas of the Mun River and Sebok River regions have diversified their livelihoods in recent years since the construction of this major hydro-electric project.

### 1.3.4 Community-Based Resource Management and Fishing Livelihoods

Research around fishing livelihoods in Southeast Asia and elsewhere is tied to common-pool resources literature and community-based resource management (Berkes, 2006, p. 45). The literature on CBRM suggests that flexible norms and practices are necessary to ensure sustainability of fisheries and other livelihood resources (Allison and Ellis, 2001). However, many centralized systems of resource management are rigid and are thus often in conflict with the more adaptive practices of local communities (Berkes, Colding, & Folke, 2000). As explained by Berkes et al. (2000), “adaptive management can be seen as a rediscovery of traditional systems of knowledge and management” (p. 1260). Fostering a balance between centralized governing bodies and communities shows major promise in resource management.

Conflict over resource management exists in all nations throughout the world, including Thailand and the Lower Mekong Basin. CBRM, by definition, is that “communities, defined by their tight spatial boundaries of jurisdiction and responsibilities, by their distinct and integrated social structure and common interests, can manage their natural resources in an efficient, equitable, and sustainable way” (Blaikie, 2006, p. 1942). The norms, practices and rules are

informed by long histories of use, as well as accumulated knowledge about the river and surrounding ecosystems. As explained by Fabricius, "the focus of community-based natural resource management is not merely the wise management of natural resources" (Fabricius, 2009, p. 37). Management must be integrated and holistic, allowing communities to develop, self-govern and create local institutions for the management of common resources (Fabricius, 2009, p. 37). Broadly speaking, CBRM emphasizes that involving local communities in resource management is necessary to ensure proper management, environmental sustainability, development efficacy and social justice (Menon et al., 2007, p. 2).

The term "resources" is defined by Howitt "not as pre-existing substances or things, but in terms of functions and relationships" (Howitt, 2002, p. 3). Acknowledging resources as dynamic and complex shows that they are fundamentally more than just things, and understands resources as deeply connected to the way-of-life of local communities. The ability to manage those resources recognizes the knowledge that local people cultivate throughout generations of usage and experience.

Agrawal and Gibson also address the term "community" as a complex entity, "containing individuals differentiated by status, political and economic power, religion and social prestige, and intention" (Agarwal & Gibson, 2001, p. 2). Communities are not homogenous but are dynamic in their way-of-life, dynamics, resource management, traditions and livelihood diversifications. This definition of community is important when discussing the heterogeneity among and within communities, especially from the geographic perspective adopted by this thesis. This definition shows that communities are flexible and have the capability to survive and cope with stresses on their livelihoods. It is the governing practices among and between communities that protect common-pool resources. Therefore, communities must also be seen as those who wish to work together, towards shared resource management and conservation. In fact, local people should have the loudest voice in terms of resource management because they are the largest stakeholders and often the most at risk.

"Fisheries experts now recognize that resource conflicts can be diminished and resources better managed when fishers and other resource stakeholders are more involved in management, and

access rights are distributed more effectively and equitably" (Pomeroy, 1995, p. 143). CBRM is useful because centralized decision makers are generally disconnected from local communities and their needs. Local people care about their resources for livelihood security, environmental conservation, preservation of tradition and more. Notably, one of the major reasons they care is because of their children. Preserving resources for the next generation is important to communities and, as seen in some of the interviews, many of the older generation worry that these resources will not be sustained for the next generations. CBRM is based on the fact that local people have a greater interest in preserving and protecting resources, have invaluable knowledge regarding the environment and are able and willing to manage their resources.

According to Armitage, CBRM is characterized by four commonalities. The first is seeing CBRM as a strategy to address socioeconomic and environmental conflicts and goals, "and to balance the exploitation and conservation of valued ecosystem components" (Armitage, 2005). Second, proper CBRM must allow communities to have some agency and power in managing their own resources (Armitage, 2005). Therefore, communities must be allowed agency to make their own institutions and management practices. Thirdly, proper CBRM address issues related to control over common-pool resources by local people (Armitage, 2005). According to him, CBRM efforts should be based on the idea that local people are more connected to these resources, utilize them in their daily lives, observe and are flexible to changes, and foster sustainable resource use and the knowledge necessary to do so correctly (2005). Lastly, the appeal of CBRM approaches comes from its ability to link community concerns, traditional rights advocates and political reformers (Armitage, 2005).

A major stream of thought in regards to CBRM is the idea of development planning and the state's disregard for local communities being involved in the process (Menon et al., 2007, p. 5). Menon et. al., for example, posits that the failure of many development projects is a "result of an overly centralized, bureaucratic and technocratic approach to development" (2007, p. 5). In the case of the PMD, there is much contention as to the success of the project, where EGAT and the Thai government maintain that the PMD is both a good source of electricity and irrigation. This is in opposition to local people, who argue that there have been significant negative environmental and socioeconomic impacts. This is also in opposition to the counter research

approach undertaken by villagers, known as “The Thai Baan Research”. Thai Baan exemplifies a wealth of information shared by local people about feeding, migration, spawning and breeding habits of fish and other aquatic life. This research showcases the monumental negative impacts of the PMD on the Mun River’s ecology. Proponents of Thai Baan state that “if the developers had followed a process of consultation like Thai Baan research at the early stages of project design, the waste of money, losses to livelihood, and political conflicts might have been avoided” (Vaddhanaphuti, 2005, p. 9). Simply put, CBRM management does not call for a retreat of the state completely, but rather, external support and greater control to local people (Menon et al., 2007, p. 5).

A second stream of thought involves CBRM and common property. Commons theory, in the past, considered the “tragedy of the commons” as a simplistic model to describe local management practices (Berkes, 2006). However, a stream of thought that expands the scope of commons theory into CBRM theory is encouraging local people in “devising rules for self-governance, monitoring mechanisms, and sections that rely neither on government control nor private property rights” (Berkes, 2006, p. 45; Berkes, 2005). The research is in CBRM and common pool resources with the intent to understand if this research can be applied to larger-scale communities. This discourse also draws attention to the importance of the community level, similar to Agarwal, in that communities are complex systems that are embedded in larger systems (Berkes, 2006; Agarwal & Gibson, 2001). Therefore, community is actually integral to avoiding the “tragedy of the commons” because it is an important starting point, working bottom up towards inclusive resource management (Berkes, 2006).

Another discourse within the CBRM literature deals with adaptive capacity. Scholars such as Armitage (2005), state that some CBRM strategies perform better than others because of social actors acting collectively and responding to changing social circumstances, building a capacity for management. Adaptive capacity is defined here “as a critical aspect of resource management that reflects learning and an ability to experiment and foster innovative solutions in complex social and ecological circumstances” (Armitage, 2005, p. 703). Adaptive capacity refers to the ability for communities to diversify and survive in adverse environmental and socioeconomic conditions. Armitage also posits that CBRM is assumed as “overly simplistic” by those who are

in support of more centralized resource management practices (Armitage, 2005). However, it is again explained that CBRM does not necessarily mean zero involvement from outside institutions, it means that community organizations should play a lead role, and other organizations can undertake certain tasks (Armitage, 2005). A better understanding of the relationship between adaptive capacity and CBRM could help actors better manage resources under changing circumstances.

There are some limitations to CBRM that need to be acknowledged. Scale is an important issue in terms of CBRM. Challenges that community members face in terms of scale are ones they have no control over. CBRM approaches are often seen as overly simplistic (Armitage, 2005). However, as explained previously, this is due to the common viewpoint of communities as homogenous, with access to the same resources and the same goals and values (Agarwal, 2001). According to Ostrom, one of the main draws to CBRM is that it is simplistic in nature, involving self-organization and self-governance (Ostrom, 1990, p. 29). This, in accordance with the recognition that communities are heterogeneous in nature, completely changes the idea of CBRM. Communities should be seen as flexible and capable of devising their own management practices and institutions.

Another critique is that CBRM is useful only in smaller-scale communities. For larger-scale problems, like hydroelectric development, there are both upstream and downstream issues or stresses that communities have no control over. Recognition of scale is important to the communities of Baan Thalat and Baan Doom Yai, for example, who have not received compensation for their loss of livelihood from the PMD. Little research has been done about their suffering, the project by Baird et al. (2017) mentioned in the previous chapter being one of the first. These communities are located farther away from the PMD, which is the main reason why they have yet to receive any compensation. However, they are affected, living along the Sebok tributary and in need of resources from the Mun River.

It is also important to consider the idea of community enforcement of norms and rules. During the course of this project, it was mentioned by interviewees that there are village Headman, who take the role of mitigating issues within and between communities. Since communities and

individuals are interacting on a daily basis, they belong to a tightly webbed system. The Headman takes a lead role in this system that community members are subscribed to.

Typically, traditional rules are flexible, dynamic and continuously adapted and informed by what is going on in the environment. Before there was a dam there may have been different rules that communities have had to change.

### 1.4 Setting and Background

Fishing communities in the Mun River region are primarily rural. Rural communities, especially those in close proximity to largescale hydroelectric dams, face burdens to their livelihoods (Chandy, Keenan, Petheram, & Shepherd, 2012). In addition to environmental impacts, local communities can suffer disproportionately from economic losses including diminished subsistence resource access and use, loss of cultural resources (e.g., sacred sites), relocation and resettlement, lost employment opportunities, disruption of economic life and more (Rosenberg et. al., 1997). In the Mekong River basin, these impacts are experienced by many thousands of villagers of Thai and ethnically Lao peoples (Tilt, Braun, & He, 2009; Foran & Manorom, 2009). The driver of much largescale dam development in the Mekong is the upstream jurisdiction of China, with outsourced projects in neighboring countries and transboundary rivers (Urban, Siciliano, & Nordensvard, 2017). Such development is likely to increase in the coming decades and in ways that might be increasingly unsustainable; foreign investment in hydropower provides incentives for governments to expedite projects, often cutting corners in the process. In addition to the impacts of construction and the ongoing operation of dams, catastrophic impacts can occur as was the case in 2018 collapse of the Xe Pian Xe Namnoy dam in Laos (VOA, 2018).

The Pak Mun Dam has been a source of tension and conflict between local villagers and the government-owned Electricity Generating Authority of Thailand (EGAT) since its approval in 1989 (World Commission on Dams, 2000). The initial goal of the dam project was to generate electricity, however it is now known as a ‘run-of-the-river’ dam that provides irrigation to some villages. The dam was in operation by 1994 without a detailed environmental impact assessment during the construction process and limited consultation with villages affected by the dam. Since

it has opened, the dam has affected the seasonal migrations of fish populations, river flow, river ecology and river bank ecology, food availability and more.

The ways in which communities have coped and diversified to the ecological changes and impacts of hydro-electric development has been the focus of critical study in the Mekong and other river basins in Southeast Asia (Baird et al, 2017; Kuenzer, 2013; Beck, Claassen, & Hundt, 2012); inspired by this research, this thesis investigates various aspects of livelihood diversification of those living in the Mun River basin.

The research was carried out in the nine villages of Baan Don Sumran, Baan Kho Tai, Baan Wangsbang Tai, Baan Huay Mak Tai, Baan Thalat, Baan Doom Yai, Baan Hua Hew Hew #4, Baan Hua Hew #11 and Baan Na Choom Chon, who were substantially impacted by the PMD in the Isan Province of Thailand.

### 1.4.1 Culture of the Lao-Isan People

Those living in the Northeastern region of Thailand are known as the "Isan People" and the province is referred to as the Isan Province. Typically, Isan people refer to themselves as "Khon Isan", meaning Isan People or Northeasterners (McCargo and Hongladarom, 2004, 219). They also refer to themselves as "Lao-Isan" but nowadays they are even more likely to refer to themselves as "Thai-Isan", even though they are ethnically Lao  Almost 80% of the population of Isan is ethnically Lao (Grabowsky, 1995). However, ethnically Khmer, Thai, Thai Khorat, Phu Tai, Chinese and Vietnamese people also reside in Isan (Grabowsky, 1995; McCargo and Hongladarom, 2004), although not many in the study area for this thesis. In 1997, Charles F. Keys categorized the Isan people as an "ethno-regional group", noting that the region contains cultural differences that "have been taken to be characteristic of a particular part of the country rather than of a distinctive group of people" (Keyes, 1997, p. 213). Indeed, who the Isan people are is a mixture of different ethnicities that have migrated over decades or have been posted there by "ministries or companies" (McCargo & Hongladarom, 2004, p. 221). The term ethno-regional refers to the cultural differences that make Isan a distinct group from the rest of Thailand (McCargo & Hongladarom, 2004). It was only during the 20$^{th}$ century that Isan was cemented as

a part of Northeastern Thailand, in a process known as “Thaification”, introduced around the time of the Siamese Coup d’état in 1933 and encouraged the assimilation of Central Thai culture, particularly through an implemented standardized school system (Sims, 2015). Isan was separated from Lao, and Isan is considered a part of Thailand. However, in a resistance to this assimilation, some people prefer to call themselves Lao-Isan or Lao, instead of Khon Isan (Sims, 2015).

McCargo and Hongladarom explain that this distinction partly comes from Isan being the most populated and poorest region of Thailand, “producing their sense of being disadvantaged when compared to central Thais” (2004, p. 221). Despite making up a third of Thailand’s population, the “combination of economic deprivation, ethnic minority status and seasonal resistance patterns serves to enhance the self-image of Isan people as a marginalized and disadvantaged group which has missed out on the benefits of Thailand’s remarkable growth since the 1960s” (McCargo & Hongladarom, 2004, p. 221). As explained later on, many Isan people migrate to larger cities such as Bangkok to join the labour force, sending money home to their families and sometimes returning a few times a year to help farm. It was interesting to see during the interview process how some of the interviewees mentioned the differences between Isan and other provinces. For example, Mae Lamtian Pinthong from the village of Baan Don Sumran explained that she felt out of place in Bangkok due to her “dark skin”. Often Interviewees mentioned the importance of formal education, so their children will be able to cultivate better lives for themselves.

This does not mean however, that the region does not have a strong sense of ethno-regional pride (McCargo & Hongladarom, 2004). The Isan province is rich in culture, history, traditions, food, dance, literature, music and more that people enjoy and take part in. For example, Isan people have distinctive foods that are shared during family and community meal times. Whilst living in the village of Baan Don Sumran, I was able to try Gaeng Naw Mai, a bamboo shoot curry, and Som Tum, a traditional papaya salad dish that are distinct to the Isan region. As well as this, Khao Niew or glutinous rice, more commonly known as “sticky rice”, is eaten with every meal. Lastly, a fermented fish dish known as Paa Daek (Lao) or Plaa Ra (Thai), is a famous traditional dish made with rice bran and salt, fermented in a container for at least six months. Mae Lamtian

Pinthong, who hosted me for ten days, showed me a large container of Paa Daek that she had been fermenting for roughly eight months.

It is common for villages to have a Buddhist temple or Wat, that serves both for religious ceremonies as well as for community halls. In the village of Baan Don Sumran, I participated in a Sai Sin ceremony, where scared white thread is tied around the wrists of participants. The thread is accompanied with well-wishes by those who tie it on the wrist. Isan people also engage annually in "Songkran" the Thai New Year's festival on April 13$^{th}$, characterized by the tradition of pouring or splashing water on one another as part of a cleansing ritual. However, there are festivals that are distinct to Isan that were mentioned by some of the interviewees, including the Candle Wax Festival held in Ubon Ratchathani in July. This region is rich with dance and music, and traditional dress is commonly worn at these festivals.

When asked about fishing, local people are generally proud of their ability to fish and noted their strong skills in catching different fish and navigating the river. Interviewees often mentioned that it takes knowledge and experience to be a great fisher, and that these skills are taught to them from the time they are children. As well as this, a few of the interviewees were accomplished boat makers, not only utilizing traditional materials, but also modern materials such as fiberglass. Por Tanom Tongnoi from Baan Don Sumran mentioned that people from other villages come to purchase his boats.

Although there are histories of marginalization and poverty, Isan people remain kind, friendly and open to academic research. There are clear values in family and community, where they share often and include each other in meals and events. It was clear that the best method of research would be to conduct the interviews in Lao with the aid of translators. This was both the best way to bridge the communication gap, as well as the most respectful way to acknowledge the Lao ethnicity and engage with local people.

### 1.4.2 Geographic Region: Isan Province

The research for this project takes place in the Northeastern Isan Province of Thailand (Fig 1.1),

specifically in the area of Ubon Ratchathani. Geographically, Isan is congruent with the Khorat Plateau, covering approximately 170,000 km$^2$ (Grabowsky, 1995). This province is the most populated area of the country with over 18 million people, more than one-third of the Nation's population, and predominantly contains ethnically Thai, Lao and Khmer people (Grabowsky, 1995).

**Figure 1.1: Map of Northeastern Isan Province of Thailand**
**Adapted from: http://thailandforvisitors.com/isan/**


One of the main sources of food in this province is fish and local riparian peoples have utilized fish for thousands of years (Hortle, 2009). Fish are important to the livelihoods of the Isan people, providing a source of food and income. Isan people get their fish from the rivers, aquaculture, fish ponds, trade and at markets. In recent times, people have been getting less wild

catch fish and rely more on aquaculture fish, such as Tilapia (Plaa Nin) for their food. The stress of the PMD on fish migration has had a great impact on the availability of food in the Isan province:

> "Before construction of [the] Pak Mun Dam, Ubon Ratchathani and Warin Chamrap had the finest freshwater fish markets anywhere in Thailand. They were paradises for fish consumers, with a special variety of high-quality fresh fish available around the year (personal observation, June 1985 – June 1993)" (Roberts, 2001, p. 190).

In addition to fishing, many people living in Isan are rice farmers. Owning fields near their homes, they harvest rice during the rice season and are able to use the fields for other crops on the off-season. Wild catch fish are often eaten daily with rice and other grown vegetables, making wild food a necessity to their diets. "Since the kingdom's early years, the daily meals of the people throughout the country have consisted of rice and fish" (Loha-Unchit, 2000). Wild catch in this province are freshwater fish that come from rivers, lakes, ponds, steams, as well as rice fields during the wet season.

In terms of economy, poverty "continues to be concentrated in the Northeast and North of Thailand" (Government of Thailand 2017, p. 14). Chapter 3 discusses that local people have turned to agriculture to sustain their livelihoods instead of fishing, however, it is still difficult to make ends meet as farmers. Many people choosing instead to move to Bangkok and other metropolitan areas for work. In comparison to the Gross Regional Product (GRP) of 280.734 Baht in Central Thailand, the Northeastern region has a GRP of only 74,532 Baht (Government of Thailand 2016).

Typically, many local people are in debt because they must borrow money to survive (Thai World View, 2009). As mentioned later, some villages received 90, 000 Baht in compensation for their loss of livelihood due to the PMD. However, interviewees for this project mentioned that they were still in debt because they needed to take out additional loans from the bank to survive. This exemplifies the importance of fisheries to riparian communities, especially when that resource is degraded and less available.

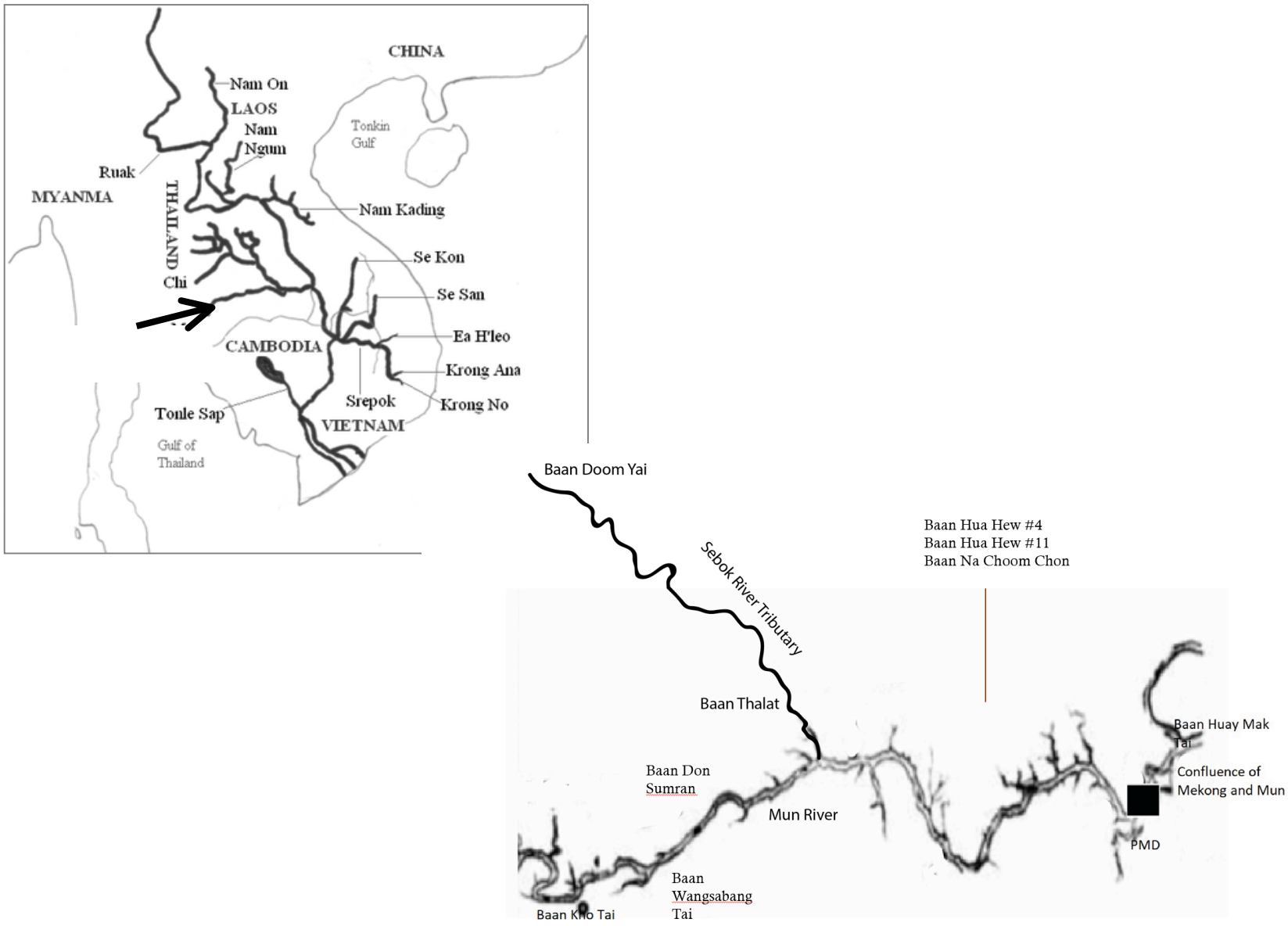



**Figure 1.2: Research Area**
(Adapted from: Jutagate et al., 2007, p. 88) 25

### 1.4.3 Mun River and Sebok Rivers

The Mun River flows through Northeastern Thailand, beginning in Nakhon Ratchasima Province and flowing 750 kilometers to Ubon Ratchathani into the Mekong river (Mekong Watch, 2004). The Mun River is home to rich aquatic resources and the "main source of livelihood for villages located downstream" (Mekong Watch, 2004, p. 3). As well as this, recent research from Baird et al. (2017) shows that those living upstream of the river also utilize its freshwater resources. The Mun River is also an important source of irrigation water for rice growing throughout the five provinces of Nakhon Ratchasima, Buriram, Surin, Sisaket and Ubon Ratchathani (Champoosri, Chanatachon, & Phaensoi,, 2014). According to Champoosri et al. (2014), there are traces of prehistoric communities along the Mun, showing that the river has been vital to the livelihoods of riparian societies for over 3500 years.

"The Pak Mun villages fall within the Khong Jiam, Phiboon Mungsahan and Sirindhorn districts, of Ubon Ratchathani province" (Manorom & Hall, 2008). Prior to the dam's construction, people heavily utilized fisheries resources. The freshwater fish provided income, food, and culture in communities. Parts of this area are also rocky and unsuitable for rice farming. Those living without rice fields have a greater historical reliance on fishing. The Mun River is known as the "lifeblood of local communities over the course of history" (Champoosri et al., 2014). Generations of fishers have caught fish on the river and taught their children to do the same. Thus traditional knowledge is rich in this area. Knowing how to fish, make traps, cook and use boats are just a few of the ways people are connected to the river.

Many interviewees recalled living near the river with great fondness. They spoke of times where children played along the riverbanks, women fishing together, trading fish with each other and more. All of the fishers interviewed were knowledgeable of hundreds of different types of fish and methods of fishing. They knew which fish could be caught in deep pools or rapids, and they knew what time of year or even what time of day is best for catching specific fish. The knowledge is passed on through usage and generational teachings. However, modernization and industrialization has contributed to the decline in

freshwater fish and as a result the usage and transmission of traditional knowledge has also declined.

The Sebok River begins North of the Mun River and flows South for about 100 km from its origin in Amnat Chaleun Province, until it reaches the Mun River upstream from the reservoir of the Mun River (Baird et al., 2017). There has been little research done on this tributary, the Baird et al. (2017) research project being one of the first. There are believed to be roughly 60 villages living along the Sebok tributary that utilize the river for fishing (Baird et al., 2017).

### 1.4.4 Pak Mun Dam

The Pak Mun Dam is located in Northeastern Thailand approximately "5.5 km upstream from its confluence with the Mekong in the province of Ubon Ratchathani" on the Mun River (World Commission on Dams, 2000). The dam was constructed from 1990 to 1994 and is 17 meters high, 300 meters wide and possesses eight radical gates that can be opened to release water (Foran & Manorom, 2009). The Electricity Generating Authority of Thailand (EGAT) built the dam with support from the World Bank. The dam was approved in 1989 and in operation by 1994 (Foran & Manorom, 2009). Prior to the opening of the PMD, villagers in the Mun River area mobilized to protest the environmental and social impacts of the dam. A movement called "The Assembly of the Poor" (AoP) emerged in opposition of the dam, creating an opportunity for local people to voice their concerns and share knowledge about their experience of these impacts (e.g., disappearance of some species downstream). However, regardless of these protests the Pak Mun Dam was commissioned and opened at an approximate cost of $260 million USD (World Commission on Dams, 2000). Within the first year of operation the Mun River saw serious impacts to fish migration.

Thailand seasons are commonly split into the seasons of "wet" and "dry", distinguished by the amount of rain. November to May is known as the "dry season" and May to November is known as the "wet season". Any local fish would tell you that fish migrate

during all times of the year, however, EGAT maintains that fish only migrate four months of the year, from June to September. Pressure from the AoP and Government of Thailand encouraged EGAT to concede to opening of the dam during these months. “This decision was controversial as many activists and academics argued that only a year-round free flow could restore the health of the ecosystem” and the Mun River would need more than a few months per year to regain its ecology (Manorom & Hall, 2008). The 2001 decision to open the dam for four months per year is only a small victory for local peoples. Their livelihoods are negatively impacted from being restricted to fishing for only four months of the year. Further to this, EGAT has closed the dam early in the past, cutting down fishing opportunity even more. In 2004, a request from the AoP to the Thaksin government to open the dams from May to August was approved (Foran & Manorom, 2009). However, this opening policy is not always followed correctly.

Once the dam was completed, some of the affected people and villages were compensated. However, the compensation was minimal at 90,000 Baht, where 60,000 Baht was given in the form of a loan and expected to be paid back. Only 30,000 Baht was offered as compensation not in the form of a loan. A study by Manorom and Hall (2008) states that the actual loss in income felt by 6176 households was closer to a total of 489,540,000 Baht. Therefore, the compensation offered by EGAT is not enough to compensate loss of fishing income, loss of property and homes, loss of occupation, loss of land plots and more. There are many issues with the Pak Mun Dam that are not as predicted. Manorom and Hall (2008) also mention that the predicted number of displaced households was 241, while the actual number was 1700 households. Villagers along the dam needed to relocate due to flooding of the area, another reason for loss of property. Many interviewees mention that although they received compensation, they are still heavily in debt because it simply was not enough to support them indefinitely. Local people believe that the PMD is a major source of stress on communities and the river system.

Local people also believe that their suggestions and opinions were not taken seriously by the government or EGAT. Arguments such as “the dam had already been approved,

construction had started and therefore, the dam must proceed" were virtually impossible to defeat (Foran & Manorom, 2009, p. 63). The PMD was perpetuated as a powerful project that would generate energy and capital. However, the amount of electricity generated does not make up for the loss of fishing livelihoods in the area. As well as this, the Pak Mun does not provide electricity to surrounding villages and irrigation to only minimal communities. In 2000, the World Commission on Dams released a study showing that the dam only delivered 21MW (megawatts) instead of the intended 75MW (Foran & Manorom, 2009). "In 2008, Thailand's instantaneous peak demand was less than 21,395 MW. Pak Mun running at 136MW would have lowered it by 0.6 per cent, equivalent to the peak demand of two large commercial buildings in Bangkok" (Foran & Manoram, 2009. 76). In sum, the PMD has made a slim contribution to energy security in Thailand (Foran & Manoram, 2009).

The intended use of the PMD was to generate electricity. However, it is now known as a "run-of-the-river" dam and "generates electricity from the river flow without significant impoundment" (Kaunda et. al., 2012, 6). These types of dams have little reservoir area and are susceptible to changes in seasonal flows, making them a somewhat unreliable source of energy. "Water flow in the river depends on precipitation, groundwater flow and runoff: these parameters may have substantial daily, monthly, or seasonal variations" (Kaunda, Kimambo, & Nielsen, 2012, p. 6). Thus, it is difficult to generate consistent energy without a dependent water flow.

Conversely, an advantage of run-of-the-river type dams is that the size of the dam can be smaller, so their environmental impact is less. The idea is that fish can migrate easier, especially with the implementation of fish ladders. This is not the case for the Pak Mun Dam, where the addition of a fish ladder was only hurriedly done to appease protesters. A 1981 Environmental Impact Assessment (EIA) did not consider the erection of fish ladders necessary for the Pak Mun Dam and the hastily constructed fish pass was not completed with enough planning or knowledge by EGAT (World Commission on Dams, 2000). Instead, the dam itself acts as a barrier to both downstream and upstream fish, the current fish ladders unable to reroute fish migration effectively.

One of the most noticeable flaws in the PMD fish ladders is the slope that the fish need to move through. The design of the PMD fish ladders is geared towards that of leaping trout and salmon in mountain rivers but is ineffective for the species of fish that migrate in the Lower Mekong (World Commission on Dams, 2000). “This gradient is substantially greater than naturally encountered by fish species anywhere in the middle and lower parts of the Mekong basin except in some waterfalls and mountain tributaries” (Roberts, 2001, p. 202). Simple observation of the fish ladder on a trip to the PMD in 2017 shows how angled the slope is and how difficult it may be for fish to migrate. Research shows that “only 61 native species [are] able to climb all the way to the top of the Pak Mun fish ladder (Pholprashith et. al., 1997). “This number represents scarcely one-fourth of the [approximately] 258 native fish species inhabiting the Mun River before the construction of the PMD” (Roberts, 2001, p. 202). This creates significant strain on the fish and those reliant on fishing as a source of food and income.

Furthermore, of the two constructed ladders, only one seemed to be functioning during two separate visits in November 2016 and February 2017. Of the two ladders, one was completely dry and not running at all. After many protests from the local villagers, in 2001 the Thai government allowed the sluice gates to be completely opened. During this time there was “partial revival of the plants on the banks of the river during dry season and the return of migrating fish was observed, signaling the potential to restore the environment to the way it was before the construction of the dam” (Mekong Watch, 2004). Unfortunately, in 2002, EGAT and the Thai government decided that the dam would only be open for four months during the year. According to local interviewees for this project, four months is insufficient for ecological restoration and the period of opening does not fall on the best time for fish migration. The hastily constructed fish ladders being especially unhelpful in aiding fish species to migrate.

However, it must be also noted that the cumulative impacts of the Pak Mun Dam and developments such as deforestation, fisheries, and increased agriculture likely all contribute to the disappearance of fish species.

In Southeast Asia, hydroelectric development and other forms of industrialization is leading to large-scale environmental, socio-economic and cultural impacts on the surrounding areas and local people. The Mekong Basin in particular is expected to have at least 77 new dams in operation by 2030. There are significant concerns for the health of the river system as well as the livelihoods of those living in the area (Baran, Guerin, & Nasielski, 2015). The Mekong is a large river system spanning approximately 4800 kilometers, beginning in the Tibetan Plateau and ending in the South China Sea (Adamson, Rutherfurd, Peel, & Conlan, 2009; Pearse-Smith, 2012).

Nine different communities are included in this project, and are classified by their geographic location. The following table shows the geographic area-type of all interviewed villages, further explained in the methodology chapter (2):

### 1.6 Overview of the Thesis

This thesis consists of five chapters and follows the format of a paper based thesis. Chapter 1 presents an introduction to the project, the thesis, objectives, significance of the study, strength and limitations and a literature review. Chapter 2 presents the methodology utilized for this project including data collection, semi-structured interviews, travel, language training and work with other research projects. Chapter 3 presents the different livelihood diversifications that have been implemented by local people along the Mun and Sebok Rivers to cope with the impacts of the PMD. Chapter 4 explains the impacts of hydroelectric development and the PMD on the norms and governance of fishing livelihoods. The final chapter consists of recommendations and conclusions made by this researcher.

# Chapter 2

# METHODOLOGY

## 2.1 Methodological Approach

The research was carried out with the aim of understanding the unique experiences of individual fishers as well as their observations of changes in the Mun and Sebok rivers. This was based on the assumption that, although there have been larger scale studies which have used quantitative data to measure and assess social, economic and ecological conditions in this region, local villagers' voices are critical to our understanding of local experiences of change. The work is inspired by other kinds of research in the region which is community-based and community-driven (Foran & Manorom, 2009; Jutagate et. al., 2003) For example, villagers have created their own opportunities to document and share their knowledge about changes associated with the Pak Mun river dam through the "Assembly of the Poor" (Baker, 2000) The thesis approach is also inspired by other academic work in the region related to fishing livelhoods as well as the impacts of the Pak Mun river dam (Pomeroy 1995; Missingham 2005; Baird et. al., 2017; Manorom & Hall, 2008, Jutagate et. al., 2005).

### *Case study Approach*

A case study method of inquiry was determined to be the best approach for addressing the research questions. Case study research is "is a 'systematic inquiry into an event or set of related events which aims to describe and explain the phenomenon of interest" (Bromley, 1990). Case study research was consider useful given it allows for research on phenomenon that are highly complex and varied without the requirement for comprehensive data collection and a conclusion of generalizability. The approach is more exploratory than explanatory case study research (Yin 1981) given that the limited amount of time in the field limited the depth of data collection and insights into the experiences of fisheres in the Mun and Sebok region. Multiple sources of material howeer, including participant observation (experiential learning of the researcher in the community), review of previous research and interviews with villagers, the case study

approach does offer some insights into the phenomenon of change in fishing livelihoods in the context of hydro-electric development.

Given the limited time and funding available for a Master's project, it was not possible to work with all villages in the Mun and Sebok rivers; nine communities were identified that reflected a cross-section of experiences of the Pak Mun river dam (i.e., upstream, downstream, tributary, relocated). This selection of communities, although not providing in-depth insight into one particularly ecological context, provided the opportunity to understand the breadth of experience of fishers. The aim was not to generalize, predict, nor objectively define livelihoods in each of these geographies (in a positivist sense), but to create an opportunity for sharing and learning about opinions, perceptions, observations, values and nuanced experiences of individuals about their own lives and local environments. As such we recognized each interviewee as an expert which valuable knowledge to share related to the research. In addition to this approach providing an opportunity for fishers to have a voice in the research and its outcomes, the case study approach was considered a useful learning tool for the researcher.

***Place-Based***

The research was also carried out in each of the villages rather than in a central setting. All but the relocated communities are located on the Mun or Sebok river. By doing place-based interviews in each of the communities, it was not only possible to hear the voices of individual fishers but to experience and observe many aspects of the fishing livelihoods discussed in each interview. A significant amount of time was spent in the community of Baan Don Sumran (10 days); a home stay with the family in the region created significant opportunities to hear, see, experience, feel and understand key aspects of the stories of fishers in that community.

## 2.2 Scoping

***Review of Secondary Data***

A literature review was carried out related to each of the objectives of the thesis with aim of understanding what work had been previously been carried out, to identify research

gaps as well as to critically understand appropriate methods for research on these themes and in this cultural context. Much was learned through this literature review (See chapter 3, and 4) about the impacts of the Pak Mun river dam, an important consideration in this cross-cultural setting related to language (i.e., Thai and Lao dialects, relevant terminology and the value of understanding the spatial distribution of impacts experienced for the Pak Mun dam. As a result of this literature review, consideration was given to carrying out research in more than one community.

The research problem was defined through discussions with Dr. Brenda Parlee and Dr. Kanokwan Manorom, who ultimately worked with me and helped guide me towards what my exact thesis would be. Once a topic was narrowed down, we began the research process and preparing for interviews.

***Collaborative Planning with Partner Organizations***

The project was funded by the Tracking Change SSHRC grant. "Tracking Change" is a project at the University of Alberta "funded by the Social Sciences Humanities Research Council of Canada, the Traditional Knowledge Steering Committee of the Mackenzie River Basin Board, the Government of the Northwest Territories and many other valued partner organizations" (Tracking Change 2015). In working with Tracking Change, connections were made with Dr. Kanokwan Manorom and Dr. Ian Baird, who are both involved in the Lower Mekong area of the project. Through them, interviews took place at the University of Ubon Ratchathani with Dr. Tuantong Jutagate and Dr. Chaiwut Grudpan on December 13$^{th}$, 2017, which were helpful in terms of gaining more knowledge about the study topic. Experiential learning opportunities were facilitated through working with Dr. Kanokwan Manorom who invited the researcher to participate in a ten-day homestay in the village of Baan Don Sumran as part of a fieldtrip for the International Watershed Program at The University of Queensland in November 2016.

## 2.3 Interview Approach

### *Ethics Requirements*

Ethics procedures were used consistent with the University of Alberta Ethics Approval (Appendix D). Interviewees were identified by face-to-face communication based on the recommendation of the translators or previous researchers working in the region. The majority of the interviewees had been previously interviewed by researchers from or associated with Ubon Rathchathani University and thus understood many aspects of the research process.

Once introduced, a plain language summary of the purpose of the research was communicated to potential interviewees through the aid of a translator. Terms for consent were introduced to ensure that the interviewee understood they were under no obligation to participate in the interview and that outcomes would be shared with their community. For this project oral consent provided by interviewees is adequate and more culturally appropriate. Additionally, consent for all photography and recording was provided orally by interviewees. Oral consent was recorded.

Oral consent to record was provided by those who wanted to participate in the interview. If the interviewees did not consent to a recording I did not count them in the semi-structured interview number or use the data. However, those people were still helpful to me in pointing me towards people who did want to be formally recorded. Of the 31 potential participants identified, all but 3 agreed to be interviewed. Two interviewees under the age of 18 (15 years and 16 years) were inappropriately interviewed, however, their data has been excluded from the thesis and the recordings/transcripts destroyed. Therefore, a total of 26 interviews are included in this project.

### *Semi-Directed Interviews*

The semi-directed interview technique was considered useful for this research given it allows for flexibility and learning during the course of the interview such that

interviewees and emphasize the kinds of research themes and issues of most relevance to them. As a result the outcomes of the interviewees included a broad range of themes and sub-themes (Appendix C). A total of 26 interviews with individuals over the age of 18 were carried out in nine villages. Effort was made to interview an equal number of men and women and across a diverse number of age ranges 18 – 77. Many of the interviewees spoke about some of same issues with transmission of traditional knowledge, rural-to-urban migration, education and laboring being the most common. However, the material is not homogenous; many themes and sub-themes were identified. As a result of this heterogeneity in the data, its' generalizability beyond the interviewees and for each case study community is limited. Each interview lasted between 30 to 45 minutes. All interviews were carried out using a translator who undertook to do simultaneous translation. The interviews were all audio recorded and transcripts were made of each of the interview outcomes. Verification of the interview outcomes could not be completed which is a limitation of the thesis data.

**Analysis of the results of Semi-Directed Interviews**

Once transcribed, themes were identified based on careful reading of the transcript material. The first phase of thematic coding attempted determine the breadth and depth of discussion on fishing practices as well as food security; it as determined that insufficient material had been documented related to food security to warrant further coding on this theme. An alternative frame and thematic coding related to aspects of community-based resource management was subsequently developed.

Material relevant to the theme of fishing practices was subsequently coded into sub-themes (Appendix C). All material was organized by geographic location as well as according to categories of historical and contemporary issues or observations. Material related to community-based resource management was also organized by geographic location but was not sufficiently detailed in relation to historical or contemporary perspectives. The analysis revealed much emphasis in the stories about contemporary fishing practices; these stories were often told in relation to what had happened in the past (before the development of the Pak Mun River dam). Although many interviewees

spoke about the Pak Mun dam having a causal effect on many aspects of their livelihoods, the narratives were not analyzed with the aim of describing specific cause-effect relationships.

Relevant excerpts from each of the sub-themes of the transcripts are found in Appendix B; examples of quotes related to many sub-themes being offered in Chapter 3 and Chapter 4. Best attempt was made to include discussion about all sub-themes in the chapters. The emphasis in the material of chapter 3 and 4 are on those themes that were most common.

**2.4 Limitations**

There are some limitations of this project. One of the first limitations to this data is that the small sample size. As mentioned in the previous chapter, it is difficult to make conclusions based on the interviews of only 26 community members. Another limitation is the amount of time spent in Thailand. Interviews and observational research was conducted on two separate trips to Thailand. Unlike Dr. Baird and Dr. Manorom, I do not have longitudinal data of my own, I only have that data from secondary resources. This may pose some limitation to the length of the research, however it is hopefully mitigated by consistent scholarly literature throughout the chapters.

Language is another limitation of this study. I was able to speak some Thai to connect with my interviewees, but they traditionally speak Lao or Isan dialect in this area. This was mitigated by translators helping to conduct the interviews in Lao and Isan, keeping the language as close to traditional identity as possible.

Further to this, there may be some limitation using semi-structured interviews and translators. The first being that face-to-face interviews with a researcher who is not part of the community may affect the responses of the interviewees. An example of this was some mixed data on the sharing of fish throughout the community. I noticed that some interviewees would mention that wild fish sharing was still a prominent practice, and

others would mention that they only shared wild fish when fish were plentiful. It is unclear if those answers are because my presence affected their responses, or if there is a large difference in fish sharing from household to household.

Due to the language barrier and challenges of translations the quotes from each individual are quite short.

## Chapter 3:

## FISHING LIVELIHOODS AND DIVERSIFICATIONS IN THE MEKONG RIVER BASIN IN THE CONTEXT OF THE PAK MUN

### 3.1 Introduction

Fishing is the backbone of the cultures and economies of many freshwater systems including those of the Mekong River Basin (Lynch et al., 2016). As in other regions of the world, fishing livelihoods are changing significantly in the Lower Mekong as a result of many kinds of stresses including hydroelectric development (Molle, Foran, & Kakonen, 2012). In addition to changes to local and regional ecosystems, (e.g., decreased water quality, alteration of water flow) the livelihoods of local fishers are under stress and changing in different ways. The purpose of this chapter is to explore livelihood practices of fishing communities in different geographic areas of the Mun River and Sebok River in the region considered impacted by the Pak Mun River dam. Due to the highly contested nature of this issue the dam has yet to be decommissioned and those living near the river have had no choice but to diversify their livelihoods. Documentation and analysis of narratives from 26 fishers in nine communities reveals how socio-economic position and ecological conditions affect diversification opportunities in a region under stress.

### 3.2 Objective

The research aims to contribute to the growing body of literature related to livelihood adaptation and diversification in the lower Mekong river basin. Specifically, we explore the question, how does geographic location of those living in the vicinity of the dam affect the kinds of livelihoods that are developed and maintained over time? Through research in nine communities near these rivers, the results demonstrate how households and communities in proximity to the Pak Mun Dam diversify their economies according to differences in socioeconomic and ecological conditions.

### 3.3 Literature Review

"Small-scale fisheries are frequently characterised as "the occupation of last resort" and fisher-folk as "the poorest of the poor" (Allison and Ellis 2001; 377). Pressures from resource development and climate change on freshwater ecosystems are also thought to be exacerbating poverty within fishing communities (Allison & Horemans, 2006; Young et al., 2012). Diversifying away from fishing and engaging in other kinds of livelihood activities and practices to support household subsistence is thus a pattern in many regions of the world including Southeast Asia.

Diversification refers to different socio-economic dynamics of change. Much of the work on diversification emerges from the field of development studies including that dealing with rural poverty, household economy and social relations within households (Ellis 2007). Much empirical work has been that tied to agriculture and income diversification in Africa (Barrett et al. 2001). In economic terms livelihood diversification is a means of offsetting or limiting risk to specific or multiple stressors. In simple terms, people diversify their economies to create redundancies in where and how they secure their means of subsistence.

Livelihood diversification can be considered a normative expression of security including food insecurity (FAO) or can also be defined quantitatively (i.e., how many strategies of generating income or subsistence does each household employ). This chapter, which is based on qualitative data, approaches the issue of diversification more normatively. Rather than counting various livelihood strategies or using quantitative measures (e.g., income, employment statistics), readers can learn more about the observations and experiences of individual fishers.

There is much diversity in the literature about both the meaning as well as determinants of diversification; while in some cases, diversification is an intentional strategy, in other cases it is considered an "involuntary response to crisis" (Ellis 2007:2). Disentangling these dynamics and drivers can be problematic. While intentionality or "choice" as an expression of agency can be measured in some circumstances, in other cases, the rationale and decision-making process is more obscure or ambiguous. Diversification like other aspects of economic adaptation can also

occur over different time scales; while some kinds of changes in economic practice may seem to occur quickly in response to stress, other kinds of diversification occur over longer time scales.

Diversification is a concept related to such notions as adaptation, adaptive capacity and resilience. These concepts have tended to consider both the individual and household capacities and capabilities to change their social, economic and related practices (e.g., norms) to ensure they meet the needs of themselves, families and communities. Diversification may be thus viewed both positively and negatively. Scholars such as Ellis and others have been clear in suggesting that although there are many benefits of livelihood diversification (e.g., risk reduction), when involuntary and a means of coping with stress, diversification may be valued negatively.

Longitudinal data about diversification is limited; panel studies in regions affected by hydro-electric development are extremely important in understanding individual and household level impacts, responses, choices, however, are difficult to develop and sustain. The "lack of comparable evidence across intervals of time means that it is rarely possible to state firmly whether household livelihoods are more diverse now than they were, say, ten or twenty years ago" (Ellis 2007: 5). In the absence of longitudinal data, retrospective studies of a qualitative nature, based on local knowledge of individuals, can help elucidate how livelihoods have diversified over time. It on this assumption that this study developed and involved interviews with fishers about both the historical and contemporary socio-economic activities.

The spatial dimensions of diversification are also an important area of the literature. Early scholars in economics and geography including those associated with the literature on environmental and geographic determinism, attempted to calculate and quantify the extent to which a diversity of resources in one geographic location contributed to a greater or lesser capacity for economic growth and self-sufficiency. Popular authors such as Diamond (1997) have attempted to simplistically define a linear relationship between resource conditions and economic outcomes. For example, it is theorized that communities, regions or nations endowed with abundant and diverse natural capital (resources) have a comparative economic advantage over others with a greater potential for diversifying their economies. The resources curse

literature among others has shown that natural capital is not the only determinant of growth or diversification and that other socio-economic and cultural factors mediate this relationship.

Within that literature is the niche related to livelihood diversification. Some studies, for example have examined how different livelihood strategies (e.g., livestock production) vary at very large scales (e.g., regional ecosystems, nations) (Gerber et.al. 2005). The relationship between livelihood diversification and geographic location is also understood to be multi-dimensional and dynamic; in addition to the ecological conditions shaping the kinds of livelihoods that are possible, people also shape these ecological conditions over time (Rigg et al. 2012).

In this thesis, it was assumed that socio-economic and cultural factors (e.g., compensation from government) are important to present livelihood conditions. We also sought to understand whether geographic location of communities within the Mun and Sebok Rivers and their proximity to the PMD is a determinant of their contemporary livelihood strategies including the extent to which they have diversified since the period prior to the construction of the dam.

### 3.4 Setting

The research took place in the Lower Mekong Basin with villages of Baan Huay Mak Tai, Baan Don Sumran, Baan Hua Hew #4, Baan Hua Hew #11, Baan Na Choom Chon, Baan Thalat, Baan Doom Yai, Baan Wangsabang Tai and Baan Kho Tai. The Mekong river system is large, spanning an estimated 4350 KM, and running through China, Myanmar, Laos, Thailand, Cambodia and Vietnam (Liu et al., 2009). The Mun river flows through Northeastern Thailand, beginning in Nakhon Ratchasima Province and flowing 750 kilometers to Ubon Ratchathani into the Mekong river (Mekong Watch, 2004). The Mun River is home to rich aquatic resources and the “main source of livelihood for villages located downstream” (Mekong Watch, 2004, p. 3). As well as this, recent research from Baird et al. (2017) shows that those living upstream of the river also utilize its freshwater resources (Baan Thalat and Baan Doom Yai are included in this thesis). The Mun River is also an important source of irrigation water for rice growing throughout the five provinces of Nakhon Ratchasima, Buriram, Surin, Sisaket and Ubon Ratchathani (Champoorsri et. al., 2014). According to Champoorsri et al. (2014), there are traces of

prehistoric communities along the Mun, showing that the river has been vital to the livelihoods of riparian societies for over 3500 years.

The Sebok River begins North of the Mun River and flows South for about 100 km from its origin in Amnat Chaleun Province, until it reaches the Mun River upstream from its reservoir (Baird et al., 2017). There has been little research done on this tributary, the Baird et al.Co, research being some of the first. There are believed to be roughly 60 villages living along the Sebok tributary that utilize the river for fishing (Baird et al., 2017).

The story of each community changes according to its geographic location. Current literature on the impacts of the PMD does not necessarily focus on different communities in different areas. This project seeks to offer a new perspective on the importance of geographic location in terms of hydroelectric impact. Different communities are affected in different ways based on their location. As well as this, a longitudinal study including the voices of community members.

### 3.5 Methods

Research questions related to the livelihood practices were developed in collaboration with partner organizations in the region (Ubon Ratchathani University). An initial set of interviewees were identified through the recommendations of scholars already working in the region and in the communities of Baan Hua Hew Village #11, Baan Hua Hew Village #4, Baan Na Choom Chon, Baan Wangsabang Tai Village, Baan Kho Thai, Baan Toom Yai, Baan Thalat, Baan Huay Mak Thai, and Baan Don Sumran. Subsequent interviews were identified through snowball sampling (i.e., interviewees recommending other interviewees). Interviewees were conducted from November 2016 – December 2016, with the majority of interviews taking place in Baan Don Sumran during a 10-day homestay. A total of 14 men and 12 women were interviewed (n=26). The small sample size is due to only having a short time in Thailand to conduct research.

The age range of interviewees most is commonly ranged between 45 – 65 years of age, however the total range is 18 – 77 years of age. Two interviewees were excluded from the analysis as they were under the age of consent (18 years of age). There were also other community members who

spoke to the researcher but declined to participate in a recorded interview. While not included in the data itself, those community members were still helpful in directing the researcher to those who would consent to an interview. A translator was employed as all interviews were conducted in the local Lao/Isan dialect. All interviewees provided oral consent to participate in the project and to be interviewed according to the terms of the University of Alberta Ethics Approval (Pro00066279). Additionally, oral consent was provided by community members for all photography.

Audio recordings and written notes were transcribed by the lead author. A thematic analysis was subsequently undertaken with major themes and sub-themes being identified. The results section points to 29 themes in the kinds of strategies employed by fishers and their families to maintain and build their livelihoods (Appendix C). The thematic analysis was also conducted with a temporal lens to better understand the degree to which livelihoods had changed from historic periods (prior to the construction of the PMD) and after the dam. A spatial analysis was subsequently undertaken to compare how diversifications varied geographically. Specifically, four categories of geographic location (upstream, downstream, tributary and relocated) suggests the varied and diverse ways in which hydro-electric development can impact on the livelihoods of fishing peoples.

### 3.6 Results

The results are presented around three themes: i) historical fishing livelihoods prior to the dam; ii) observations and experiences of dam impacts; iii) contemporary fishing livelihoods and iv) alterative economic activities. To better understand geographic differences in these themes, the data is offered by geographic location relative to the PMD: lower reservoir area, higher reservoir area, Sebok river and relocated communities.

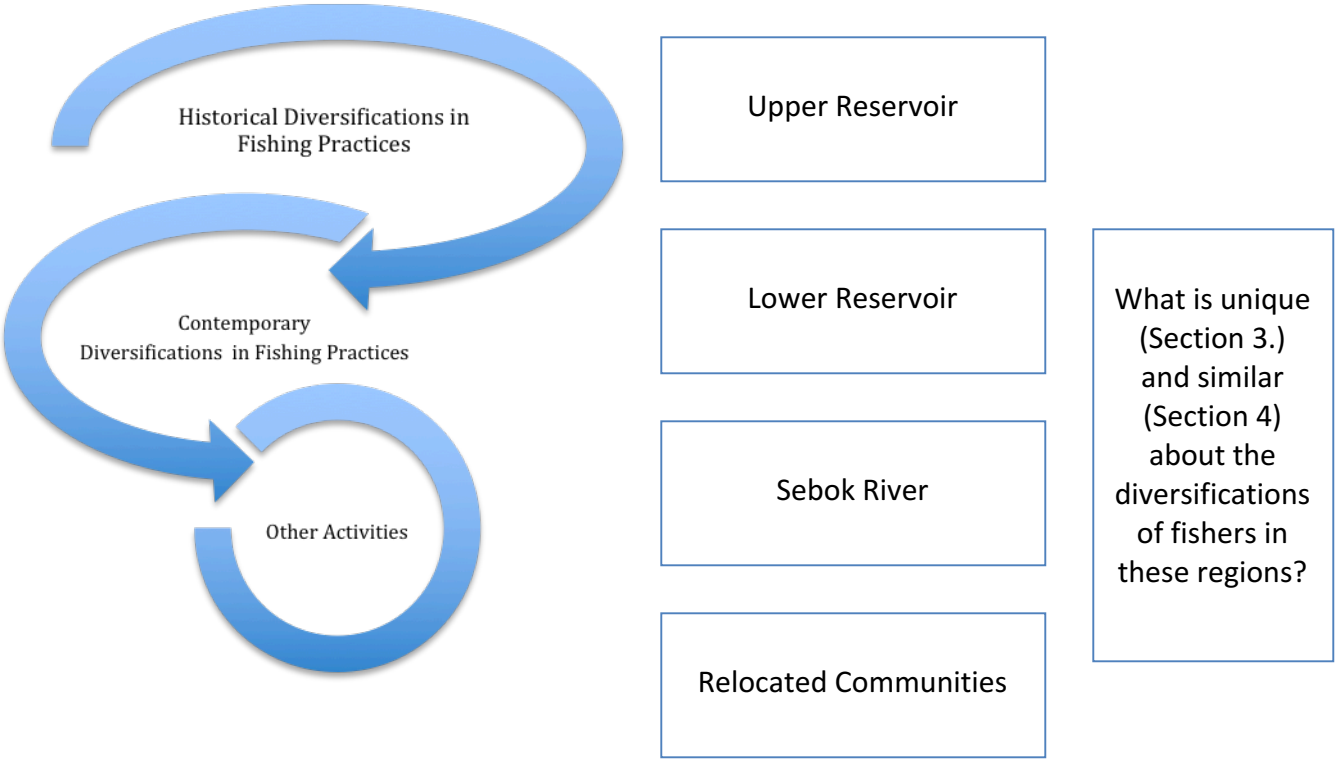



**Figure 3.1: Organization of Results and Analysis**

### 3.6.1 Lower Reservoir Communities

A total of 16 interviews were conducted in the lower reservoir in the villages of Baan Don Sumran, Baan Kho Tai and Baan Wangsabang Tai comprising the majority of interviews for this project. Most of the interviews for the lower reservoir area took place in the village of Baan Don Sumran due to the researcher participating in a 10-day homestay in that particular community.

*Historically Significant Local Fishing Practices*

Villagers from these communities live directly along the Mun River and fishing is a large part of their livelihoods. For example, Wittaya Thongnoi from Baan Don Sumran explains, "I wanted to be a fisher because I saw it as part of the livelihood of Don Sumran" (December 3rd, 2016). The lower reservoir was home to many people in the older generation (aged 50+) who remember when fishing was a regular day-to-day activity that everyone in the community participated in, nearly everyone learning to fish from a young age. Por Charlie Wae Wong, also from Baan Don

Sumran states “my parents and grandparents taught me how to fish, I learned by watching and following them to the river” (Baan Don Sumran, December 2016). It was also not uncommon for people to share gear, as explained by Wittaya “different families would share boats, three or four different families would all go out on one boat to fish together” (Baan Don Sumran, December 3rd, 2016).

At the time fish was plentiful and food sharing was common. Three interviewees mentioning that prior to the PMD, food sharing was a common practice. For example, Mae Mii Santaweesoong explained that “in the past, there were lots of fish and a big catch. Our relatives would ask for fish and we would give to them for free. Now people don’t ask for fish because people don’t catch that many fish” (Baan Don Sumran, 2016).

*Changes that occurred as a result of the Dam*

As well as this, the embankment prevents people from wading into the river from the riverbank. Local people used to wade into the river and set up nets or traps for the fish, sometimes even standing in the water and holding the nets themselves. They used to help each other trap fish and this type of practice is social as well as practical. Now people are unable to wade into the river because the embankment covers the riverbank. The river becomes deep almost immediately, and it is unsafe to be standing too deep in the river, and therefore, wading areas are almost nonexistent. Interviewees also expressed that they no longer allow their children to be close to the river because it is now too deep for them to play safely. This also contributes to less transmission of traditional knowledge to the younger generation.

Another major impact mentioned is the loss of rapids in this area. Specifically, the rapids known as “Hin Nak”, “Hin Soon” and “Hin Len” have disappeared from this area:

> “The rapids ‘Hin Nak’, ‘Hin Soon’ and ‘Hin Len’ were important rapids because we could go there and get our food immediately. It was quick and easy to get fish. Now the rapids are submerged. Today instead of the sounds of the rapids, we only hear the sound of the mobile market. My husband used to say, ‘cook the rice, boil the water and I’ll be

back in a few minutes with the fish.' It was that easy" (Pratim Kamparat, Baan Wangsabang Tai, December 11, 2016).

During the construction of the Pak Mun, these rapids were blasted out of the water, and when the dam is closed, the water is too high for the rapids to appear. Rapids are an important area for catching fish, and therefore, the loss of the rapids means that people can no longer get fish there.

*Current Fishing Practices*

The dam creates different kinds of challenges for fishers, but there are a variety of adaptations, such as innovations in fishing gear, that have been developed by fishers in the lower reservoir area. While some gear is purchased, much is homemade or fashioned out of different materials that are recycled or reused. For example, interviewee Mae Mii Santaweesong from Baan Don Sumran created a shrimp trap out of plastic soda bottles. Her invention has made her fish trap more effective in the stagnant water of the Mun during months where the dam is closed. "We have to adapt, and it has been difficult because sometimes we cannot catch fish at all" (Mae Mii Santaweesong, Baan Don Sumran, December 12th, 2016).

Other fishers in the community commission Mae Mii to make traps. However, she is reluctant to teach others how to create the traps because she is generating income from the production and sale.

In addition to these practices, other kinds of fishing activities have developed to compensate for the lack of wild fish. For example, many villagers in Baan Don Sumran make use of personal ponds on their property to raise fish for either income or sustenance. Many different kinds of fish are raised. One of the interviewees, Somchit Phathong, explained that her pond is not common in the village because she raises "Climbing Perch" or Pla Mor (Thai) instead of Tilapia. The fishpond gives her a side income as well as something to do. At the time of her interview in November 2016, she had owned the fishpond for only four months and had already sold around 40 – 50 kgs of fish. She does this through word of mouth and asking around the village if anyone is interested in purchasing Pla Mor. When someone is interested in purchasing fish she pumps the water out from her pond and picks out the largest ones for the customer. Interestingly, Som

Chit also owns a rice paddy, creating a sustainable livelihood as well as a source of income for her household. She explains, “I eat fish from my fishpond and rice from my rice fields” (December 3rd, 2016). Further to this she states that fish farming is a family activity. She states, “the fishpond is a family activity, and they help me with it. My son used the tractor to make the pond, and my daughters help sell the fish” (Baan Don Sumran, 2016).

Securing and sustaining livelihoods is somewhat precarious in this region. Although people work and support one another when needed there is some competitiveness and perceptions that this support has changed from previous years. For example, there is some reluctance in sharing knowledge, food, and livelihood practices because it may impact the success of individual households. Por Setun Kongkaew from Baan Wangsabang Tai explains that “people can borrow fishing gear, but others don’t really like lending out their fishing gear because it can get broken easily” (December 11th, 2016).

Consequently, a new fishing practice that has appeared in this area since the implementation of the Pak Mun Dam is the fiberglass boatmaking program. During the research process, Baan Don Sumran was the only village where people were actively engaged in fiberglass boatmaking. In Baan Don Sumran, local people have the opportunity to participate in a program at the Tessaban that teaches them how to make fiberglass boats. This program is open to those in other villages, however it was not witnessed in any of the other interviewed villages. Por Tanom Tongnoi (Baan Don Sumran) is one of the interviewees who participated in the fiberglass program, and states that “fiberglass boats are light and fast. They are made because the Shorea trees have been used for boats and houses and there are not many left” (December 3rd, 2016). The program seems to have been well-received by Baan Don Sumran, Por Paliwat Pinthong stating that “the policy of the Tessaban is to survive the fishermen. Programs like the fiberglass fishing program are good because they allow people to make boats and make a bit of money” (Baan Don Sumran, 2016).

As explained by Somchit Phathong, “the Tessaban does have a program for raiding Tilapia”, as well (Baan Don Sumran, 2016). The Tessaban also offers a fish-raising program that helps people learn how to raise fish in their own personal fishponds. Some local people already have rice paddies where they can raise fish and utilize this program to learn efficiency and proper fish

culture. This is another helpful program offered by the Tessaban to assist people in diversifying their livelihoods, as well as helping to ensure that they have a source of protein.

Por Charlie Wae Wong also diversified his fishing livelihood by becoming a Tiger Fish trader. For the past eight years, he has become a liaison between fishers in the area and exotic fish purchasers. In order to facilitate this interesting diversification, he states, "I 'invented' the 'baht' fishing method, using the net for fishing in the twigs. You don't have to use bait because tiger fish like to be in dark places with lots of plants" (Baan Don Sumran, 2016).

*Alternative Economic Activities*

Por Saman Tongnoi from Baan Don Sumran explains "I used traditional farming in the past. Now I have a tractor and don't have to do it by hand. My wife and eldest son help me. The old technique involved my wife gathering and sowing seeds" (Baan Don Sumran – December 3rd, 2016). Prior to this mechanization, villagers were plowing their rice paddies using water buffalos, a tiresome and grueling process.

As previously mentioned, not all villagers have access to a rice paddy or fishpond. In Baan Don Sumran in particular, some locals do not have access to either. For the most part, those who do not own land are renters. Mae Mii Santaweesoong and Por "Charlie" Wae Wong are examples of people in Baan Don Sumran who are land renters and still rely on fishing as their main source of income.

A common practice in Baan Wangsabang Tai is that of broom-making. All of the three interviewees mentioned that this village is known for their brooms. Pratim Kamparat explained that broom making arose due villagers being unable to fish: "We were affected. We cannot find fish, so we started making brooms" (December 11th, 2016). Pratim used to be a fisherwoman and still fishes when the dam gates are open once a year. She primarily uses gill nets during this time of year. "The way people are fishing has changed. Now there is too much water to use small nets. You can really only use gill nets in flowing water, or when the dam is open" Pratim Kamparat (Baan Wangsabang Tai, December 11th, 2016). According to her, it is more reliable

than attempting to catch from the Mun. Por Petch Najaan from the same community agrees; “most people in this village raise fish, raise crickets, make brooks, baskets and farm rice” (Baan Wangsabang Tai, 2016).

### 3.6.2 Upper Reservoir (Rocky Areas)

Higher Reservoir villages are located closer to the confluence of the Mekong and the Mun near Baan Khong Chiam. Two women from the village of Baan Huay Mak Tai, Mae Tessanee Chiangam and Mae Ora Boontun, gave their accounts of life after the Pak Mun Dam. Baan Huay Mak Tai is located near the embankment of the Mun River. This village is so near to the confluence that Lao can be seen in the distance.

*Historically Significant Local Fishing Practices*

Mae Ora Boontun from Baan Huay Mak Tai explains that “this area is rocky, so only a few people had rice farms” (2016). Fishing was the main source of income for the area, and therefore, as noted by Mae Tussanee Chiangam, trade for rice and other resources was prevalent. “When my Grandpa was fishing, he fished. He didn’t have to sell the fish, he just traded and brought the rice home” (Mae Tussanee Chiangam, Baan Huay Mak Tai, 2016).

Mae Tussanee Chiangam also mentioned, “I have been fishing all my life”, similar to many people in Baan Huay Mak Tai, who have been fishing from a young age.

*Changes that occurred as a result of the Dam*

The construction of the PMD means that the upper reservoir and lower reservoir are now disconnected into areas known as “in front of” the dam and “behind” the dam. Baan Huay Mak Tai is in a somewhat middle position, where local people do not necessarily know which area is best for them to fish in. Many people gather directly in front of the dam to catch fish migrating from the Mekong. Locals from Baan Huay Mak Tai often fish there, however because of the amount of people “camping” in that area, sometimes it is difficult to find spots to fish or set up

fishing lings. As Mae Tussanee Chiangam explains “there are no ‘rules’ but we are considerate about where others fish. People already have nets set up and there is no room for us” (December 12th, 2016).

At this time, Mae Tussannee Chiangam only fishes nearer the Mekong, “behind” the dam. This is the easiest place for her to catch fish that have been able to migrate up the fish ladder. Prior to the dam, she used to fish closer to the confluence, however the dam prevents her from moving closer to that area. In order to travel closer to the Mekong she would need to bring her boat out of the water and drive it to the other side of the dam. She does not own a vehicle and does not have the expendable income to hire someone to move her boat. The dam has stopped her and other local people in similar situations from being able to travel along the river and catch fish.

*Current Fishing Practices*

Similar to the other interviewed villages, less people from Baan Huay Mak Tai are fishing in general. Those who do fish have had to make changes to their fishing habits. One of the major changes in this village is people no longer share fish amongst each other unless they have a particularly good catch. The reason for this is that wild catch fish generate more income and therefore people prefer to sell them. The Mekong River fish are described as “more delicious” and are therefore more expensive. Since this area is so close to the Mekong people are able to fish both “in front” and “behind” the dam if they have transportation to move their boats. This may help to catch more wild fish; however it is more practical for households not to share fish with each other and sell the wild catch fish instead. It is also less likely for people to share fishing gear due to the fact that they usually need to purchase it from the market and are fearful of it being damaged. People do still share locations for fishing, but often the good places for catching fish are taken in the early morning. There are also a lot of fishing traps in a smaller area making it harder for people to catch fish.

Fish trade is also impacted in this area. Less wild catch fish means that locals of Baan Huay Mak Tai do not have as many fish to trade for rice with other villages. As well as this, people from other villages who are in ownership of rice paddies are choosing to raise fish, such as Tilapia,

themselves and are no longer in need of wild catch fish as their daily source of protein. Rather than trade, those from Baan Huay Mak Tai often need to purchase their rice, or work harvesting other people's fields in exchange for rice. Mae Tussanee Chiangam notes "when my Grandpa was fishing, he fished. He didn't have to sell the fish, he just traded and brought the rice home" (December 12th, 2016).

*Alternative Economic Activities*

Those who are unable to fish consistently must pick up laboring jobs to make money. "Our main source of income comes from fish and laboring" (Mae Tussanee Chiangam, Baan Huay Mak Tai, 2016). Again, as mentioned by Mae Ora Boontun, "this area is very rocky, so only a few people have rice farms" (2016).

Additionally, many locals in Baan Huay Mak Tai, including those interviewed, had to incur debt to sustain their households. Although they received compensation for loss of fisheries during the construction of the dam, the amount was not enough to sustain people through permanent loss of fishing livelihoods. Mae Tussanee Chiangam explains, "I lost my family and our living condition, because we don't make enough. Money is an important factor. We don't get enough money from fish catch family we don't even make the lowest estimated [household] income in Thailand (supposedly 100K Baht/year)" (Baan Huay Mak Tai, December 2016).

### 3.6.3 Sebok River Tributary

Similar to the other three geographical areas, local fishing practices play a large role in the livelihoods of upstream people. The major difference in this region is that the Sebok is a tributary of the Mun, meaning that fish must travel farther in order to reach these villages. The Sebok is an important geographical location because it showcases that those who are not as closely situated to the dam are also impacted. Those living in Baan Thalat and Baan Doom Yai have not been compensated because there has been a lack of research and literature on the impact of the Pak Mun Dam on upstream communities. It would seem as though these villages are often forgotten and impacts of the Pak Mun in this area are not taken as seriously. There has been

much literature and research done on villages in the lower reservoir and along the Mun, however because Baan Thalat and Baan Doom Yai are not in close proximity to the dam, little research has been done on their behalf. The idea that the Pak Mun has impacted local people in this area has barely been acknowledged, and those living on the Sebok have not received much consideration. The inclusion of the Sebok River and its people in this project is important in contributing to a newer literature and research on upstream impacts. As well as this, those of the Sebok have the right to a voice in terms of their livelihood (Baird et. al., 2017).

*Historically Significant Local Fishing Practices*

This project does not have much data on the historically significant fishing practices of the Sebok river due to only having a small amount of time in Baan Thalat and Baan Doom Yai.

*Changes that occurred as a result of the Pak Mun Dam*

This project does not have significant data about how the PMD had affected the Sebok communities. However, the aim of the Baird et al. (2017) research is to document fish catch data for three villages, including Baan Thalat and Baan Doom Yai. More data about the Sebok is however, included below.

*Current Fishing Practices*

It seems as though while people are still sharing boats, there is less sharing of gear such as nets. Suphan Chansawang from Baan Thalat mentions that utilizing store bought gear makes it easier to catch fish; “We used to use cloth nets, but now we use ‘Mong Eng’ (Nylon) because the fish cannot see nylong” (2016). However, because people want to keep their nets in working condition, they might be less likely to share them. “We share boats, but not nets because nets are delicate. If you are careful with your net it can last up to 3 years” (Weera Surirach, Baan Doom Yai, 2016).

Two interviewees mentioned less cooking of traditional foods. Weera Surirach from Baan Doom Yai explaining that "before the dam, we used to eat raw fish, but now we cook them. We no longer make Goy Paa" and Suphan Chansawang from Baan Doom Yai stating "I sell more fish than I cook" (2016). There is a chance that in the future few people will know how to cook Goy Plaa, because lack of use can lead to lack of transmission of the recipe.

*Alternative Economic Activities*

Interviewees in the Sebok area are cultivating rice, however, Weera Surirach from Baan Doom Yai was the only interviewee to mention utilizing fertilizers and other chemicals to get a better crop yield. He states that "the fish that are raised in rice fields are raised with chemicals, fertilizers and pesticides", as well as the following:

> "Some government officials say that we should use less fertilizer, however the people know they will get more product if they use it. The government also warns about live diseases from eating too many toxins in the fish or getting too many toxins from the water. They have health proportions that inform the people about fish parasites."
>
> Weera Surirach (Baan Doom Yai, November 19, 2016)

### 3.6.4 Relocated Communities

This project had the opportunity to interview communities that were relocated as a result of the PMD. Relocation is an expensive and invasive process that forces communities to uproot their lives in exchange for another. Often, traditional ways of life are negatively affected due to loss of materials, loss of access to fish, loss of proximity to the river, and inevitably loss of traditional practices due to lack of use. Most interviewees expressed that they were reluctant to locate during the construction of the PMD. However, the flood risk from the dam meant that their villages would be submerged, and the embankment would make the riverside deep and inaccessible for growing plants. Therefore, local people had no choice but to relocate.

*Historically Significant Local Fishing Practices*

Much like those who currently live along the river, their way of life was centered on fishing livelihood. Most people fished and knew how to fish, as their parents passed the knowledge down to them. Traditional knowledge is generational and passed down through practice and teachings. In the past it was second-nature to fish and, as explained by Por Jumrut Sanorwatee from Baan Na Choom Chon, "even 6-year-old kids can fish. Young kids would go with nets and fishing rods" (2016).

As well as this, the riverbed was utilized: "People used to grow plants along the river that could make rope for fishing nets, people didn't have to buy fishing gear because they could make it out of Hemp or Thuringia" (Mae Charoen Gongsuk, Baan Hua Hew #11, 2016).

*Changes that occurred as a result of the Dam*

According to the initial assessment done by EGAT, the projected number of relocated households was estimated to be about 241, however the realized number was closer to 1700 households (Manorom & Hall, 2008). Residents of Baan Hua Hew #4, Baan Hua Hew #11 and Baan Na Choom Chon were forced to relocate. Most of the old village areas were flooded when Pak Mun opened. Mae Charoen Gongsuk explaining that during the relocation process it was explained to her that her "rice farm was close to the river and it would be flooded and affect all living things on the riverbank" (Baan Hua Hew #11).

Those who were forced to move used their compensation to cover the cost of moving and rebuilding. Therefore, the compensation provided was not beneficial to any of the villagers because it was utilized during the relocation process and there was nothing left for after resettlement. Por Junrut Sanorwatee from Baan Na Choom Con explained, "we only got enough compensation to move our belongings" (December 13$^{th}$, 2016). The family had to incur the cost of rebuilding their home themselves. According to him, not every household received the same amount of compensation or at the same time. Therefore, some households moved at their own

expense, acquiring debt because they had no other choice or time to make other plans  For those affected by the loss of fisheries this was detrimental, as they barely had enough money to support their families.

Mae Charoen Gongsuk from Baan Hua Hew #11 stated that EGAT and the government hosted community meetings prior to the dam's construction to educate people on the project and gather the opinions of local peoples. The project was purported to be advantageous for local people and for development in Thailand. However, there was no mention of disadvantages to the project and when asked, representatives dismissed her misgivings as being adverse to development. She explains that government officials were sent to her house after the meeting in hopes of convincing her of the dam's advantages, and when she did not agree with them they threatened her:  "I said 'if you want us to speak up why are you trying to scare us?'" (Baan Hua Hew #11 – December 13th, 2016).

*Current Fishing Practices*

Current fishing practices in these villages seem almost nonexistent as people live so far from the river that there is less opportunity for adults to take their children to learn. The younger generation is no longer being taught to fish because fishing is less utilized in this area as a primary source of income.

Due to the lack of use and necessity, transmission of traditional knowledge about fishing livelihoods is dying in these areas. Por Junrut Sanorwatee explains that "some people still fish, but now we are very far from the river! Our livelihood is not the same. We live so far from the Mun there is no point in teaching our children to fish" (Baan Na Choom Chon, 2016). He also explains that the transmission of traditional knowledge also extends to practices such as gear-making, "last year I only made one net. Today people don't learn about the things that our grandparents taught us, there is no learning" (December 13, 2016).

*Alternative Economic Activities*

Interestingly, during the course of interviews one villager had actually worked to construct the Pak Mun Dam. Boonluan Mingboon (Baan Hua Hew #4) explained that he took the job at Pak Mun because laboring is a way that people generate more income for their households. During construction periods, dams require many unskilled workers and new jobs are generated during this phase of development (World Commission on Dams, 2000). However, he also explained that he feels guilt for laboring on a project that brought many negative impacts to his community, including forced relocation: "The dam affects me a lot because I built it. I did not support the dam, but I needed the money, so I had to just do it" (December 13th, 2016).

Understandably, community members must take on extra labour jobs to generate income. Those who have been resettled have lost their proximity to the river and their farms and are forced to labour to pay for the debt they have incurred from a loss of livelihood. Although EGAT and the government offered them compensation, it was gone almost immediately after being used to resettle, and many people went into debt in order to sustain their households. Taking on a job at the Pak Mun site may have been the most convenient option for people at the time. Extra laboring is a type of livelihood diversification that is necessary, especially for relocated communities.

### 3.6.5 Fishing diversifications seen among multiple communities

There are some examples of similar fishing diversifications that are being employed by communities from multiple geographic locations. Those who continue to fish daily since the implementation of the PMD mention changes in their gear, whether homemade, purchased or modified. For example, Por Seetun Kongkaew from Baan Wangsabang Tai explains "I have to adjust nets from the market because they need to fit this environment. Sometimes they need to add weight to weigh the nets down. I make my own nets [too]" (2016).

Three interviewees mentioned that less sharing of gear is occurring between people, possibly due to purchased gear being more expensive and not wanting it ruined. Mae Tussanee Chiangam from Baan Huay Mak Tai explaining "fishing equipment is expensive and sometimes the equipment gets washed away and it is not worth it to fish" and "everyone feels considerate, so

they don't really want to borrow gear from each other, like gill nets. People might borrow cast nets though because they are more durable" (2016).

Those who are still fishing daily seem to have a preference for selling fish instead of eating or sharing it. A total of eight interviewees expressed this preference. Suphan Chansawang from Baan Thalat states "I sell more fish that I cook", and Por Seetun Kongkaew from Baan Wangsabang Tai explaining that "we catch fish and make money, especially from tiger fish" (2016). Five interviewees spoke about fish stocking. Boonluan Mingboon, for example, stating "I want the government to release more fish and prawns" (Baan Hua Hew #4).

In addition to selling fish, two interviewees mentioned that they purchase store bought fish. Pim Davong from Baan Kho Tai explaining that "people today buy ready-made fish from the market. They days of fish cooking are done" (2016).

Finally, the theme of less sharing of fishers' knowledge was mentioned by twelve of the interviewees in twenty of the research quotes from Baan Don Sumran (5), Baan Wangsabang Tai (1), Baan Na Choom Chon, Baan Thalat (1), Baan Doom Yai (1), Baan Hua Hew #4 (1), Baan Kho Tai (1) and Baan Hua Hew #11, which is all but one of the communities. Primarily the quotes are comprised of interviewees expressing their concern that because there are less fish, people are fishing less and there is a lack of usage and transmission. For example, Boonluan Mingboon states "if I don't have more children my knowledge might disappear. I knew my knowledge of fishing my entire life, I would be sad to lose it. But we have a different way of life now" (Boonluan Mingboon, Baan Hua Hew #4, 2016).

Additionally, Por Tanom Thongnoi from Baan Don Sumran explains:

> "Yes, I am worried about the loss of culture because as a father, if I cannot catch that many fish, I don't feel confident to teach my children to fish. It cannot be their career. I feel bad that culture is being lost. When my dad taught me there were lots of fish, now the wisdom is lost" (2016).

### 3.6.6 Non-fishing diversifications seen among multiple communities

This section discusses alternate diversifications employed by the communities that are not related to fishing. The most common being rural-to-urban migration, education and rice farming.

Eight interviewees from the communities of Baan Don Sumran (2), Baan Wangsabang Tai (2), Baan Hua Hew #4, Baan Hua Hew #11 (1), Baan Huay Mak Tai (1) and Baan Doom Yai (1) mentioned that rice farming is an important aspect of their livelihoods:

> "There have been more adaptations. We can't rely on fish anymore. We have rice fields, cassava and rubber plantations. Fish in the fishing season, rice in the rice season and construction in any other season" (Boonluan Mingboon, Baan Hua Hew #4, 2016).

> "People like to fish, but they also have other things to do. If the fish come from the Mekong they taste better. The flesh is softer because the river is flowing, and the fish get more exercise and the taste is delicious. Fish in the Mun are bland because the water is stagnant. Most people in this village fish, raise, crickets, make brooms, baskets and farm rice" (Por Setun Kongkaew, Baan Wangsabang Tai, 2016).

The above quotes also demonstrate that local people take part in other types of farming when not growing rice. Por Saman Thongnoi explains "I plant eucalyptus, mango trees, woods and rice. Now I have a tractor and don't have to do it by hand", adding the additional diversification on utilizing mechanized farming equipment instead of cattle (Baan Don Sumran, 2016). Weera Sururach from Baan Doom Yai also states that people are utilizing fertilizer in their farming and "some government officials say they should use less fertilizer; however, the people know they will get more product if they use it (2016).

As well as growing other crops, some interviewees stated that they also sell food as a means of income. Mae Mii Sam Dii from Baan Don Sumran, who owns a mobile market states "almost all the fish I sell is aquaculture fish. I come to villages everyday and people buy meat and vegetables" (2016).

Three different interviewees commented on the mobile market itself as another diversification, where local people no longer need to go to the market to get their food, although it appears that the existence of the mobile market is deemed as a loss of local way of life for some interviewees:

> "In the morning there is a mobile market and people buy eggs. Today people don't learn about the things that our grandparents taught us, there is no learning. I am worried about the future because they do not know any fundamental knowledge about learning" (Por Jumrut Sanorwatee, Baan Na Choom Chon, 2016)

> "The rapids 'Hin Nak', 'Hin Soon' and Hin Len' were important rapids because we could go there and get our food immediately. It was quick and easy to get fish. Now the rapids are submerged. Today instead of the sounds of the rapids, we only hear the sound of the mobile market. My husband used to say 'cook the rice, boil the water and I'll be back in a few minutes with the fish'. It was that easy" (Pratim Kamparat, Baan Wangsabang Tai, 2016).

The previous quote from Boonluan Mingboon from Baan Hua Hew #4 also mentions construction work as a diversification. Four interviewees mentioned taking on laboring jobs as an additional source of income. Mae Tussanee from Baan Huay Mak Tai states, "our main source of income here comes from fishing and laboring" (2016) and Mae Mii Santaweesoong from Baan Don Sumran explains "people hire me to cut cassava" (2016). Therefore, laboring is a diversification being employed by multiple communities.

Working in different cities or, rural-to-urban migration, is another more commonly mentioned theme where nine interviewees explained that people often leave the communities to work in urban cities such as Bangkok and Chon Buri. For example, Por Saman Thongnoi states "We don't see the teenagers because they study in different cities and they work in different cities, once you are done school you can work in the factory" (Baan Don Sumran, 2016).

Another example is mentioned below:

> "I lost my family and our living condition, because we don't make enough. Money is an important factor. We don't get enough money from fish catch and we don't even make the lowest estimated [household] income in Thailand (supposedly 100K Baht/year)" (Mae Tussanee Chiangam, Baan Huay Mak Tai, 2016).

Some of the older interviewees also mentioned that while their children may have migrated to urban centers, they sent their grandchildren back to the communities. Por Saman Thongnoi explains "we have a nephew that was sent back to live with us at six months" (Baan Don Sumran, 2016). In turn, the practice of sending money back to parents in the communities for grandchildren and other necessities is also mentioned by interviews. Mae Mii Santaweesoong states "children support their parents financially now" (Baan Don Sumran, 2016).

Lastly, a push for education was mentioned by seven interviewees, where there is an emphasis on doing well in school in order to have a better life and potentially look after your older parents. "Education brings a lot of changes. Today, young people move to larger cities and older people look after the grandchildren. The kids send money back to their parents for their grandchildren" (Por Saman Thongnoi, Baan Don Sumran, 2016). It was also mentioned by one interviewee, Mae Mii Santaweesoong, that perhaps education should take precedence over fishing: "Children can learn to fish in their free time but studying is more important" (Baan Don Sumran, 2016).

### 3.5 Discussion

The research investigates the livelihood practices of fishing communities in different geographic areas of the Mun River and Sebok River in proximity to the Pak Mun Dam. Through research in nine communities near these rivers, the results demonstrate how households and communities in proximity to the Pak Mun Dam diversify their economies according to differences in socioeconomic and ecological conditions. The limited data means that it is not possible to draw a linear relationship between the PMD and livelihood diversifications noticed in the nine communities. As shown in the results table (Appendix C), there is no data saturation throughout the themes and therefore no concrete statements can be made about the research. However,

narratives help to holistically illustrate local knowledge and diversifications in the absence of longitudinal data. Therefore, the results present interesting insights, narratives, issues and discussion presented by local communities.

In terms of the data in this project, the most common themes are less sharing of fishers' knowledge, rural-to-urban migration, rice farming, education and laboring. Diversifications reduce risk, however, if they are responses to stress, these diversifications could be a problematic change in the basin. There are differences between what may be viewed as positive and negative diversifications for the communities. For example, rice farming is a diversification that might not necessarily be viewed as negatively because it provides households with a more reliable source of income. Additionally, it appears that people are engaging in rice farming regardless of the dam, meaning that people have made the decision to diversify in this way because they view it as a positive activity.

Consequently, commonly mentioned theme mentioned is the practice of rural-to-urban migration, which may be viewed as a negative response to stress by community members. The migration of young people also contributes to the lack of transmission of traditional knowledge as well as a lack of relationship building between parent and child. Some parents end up working in larger cities and sending their children back to the villages to be looked after by their grandparents. It is easier for the parents to continue working in factories and sending money home to their families. However, it does mean that there is a disconnect between knowledge transmission along the three generations, where the grandparents are unable to transmit knowledge to their children because they have migrated, and the parents are unable to transmit knowledge to their own children because they are not in the same city. It appears that interviewees missed their families, and that migration is a means of coping with stress that community members did not view positively. This practice may be exacerbated by the PMD, but it is impossible to draw a linear relationship.

While this project does not have much data on the Sebok tributary, other work has been done by Baird et al., 2017 to discuss some of the ideas surrounding Baan Thalat and Baan Doom Yai. For example, there is discussion about the existence of the 'Ban Ot' Dam, an irrigation dam that was

constructed to help provide irrigation for surrounding communities and adds another stressor on those communities (Baird et. al., 2017). The existence of Ban Ot means that fish and other aquatic life that are attempting to migrate into the Sebok have a second obstacle to pass in order to reach these people. The Baird et al. research showcases how difficult it is for fish to migrate into the Sebok. It must be noted however, that surprisingly people in Baan Doom Yai have somewhat better access to fish. Specifically, the data points to a smaller dam built in the 1970s that resulted in a large year-round floodplain near the village. The floodplain is not deep and resulted in a wetland that is able to sustain fish and other aquatic life. Therefore, the local people in Baan Doom Yai have more access to fish than some of the other Sebok communities (Baird et. al., 2017). However, as noted in the study, this is not a typical occurrence for small dams.

The Baird et al. (2017) research showcases how difficult it is for fish to migrate into the Sebok. It must be noted however, that surprisingly people in Baan Doom Yai have somewhat better access to fish. Specifically, the data points to a smaller dam built in the 1970s that resulted in a large year-round floodplain near the village. The floodplain is not deep and resulted in a wetland that is able to sustain fish and other aquatic life. Therefore, the local people in Baan Doom Yai have more access to fish than some of the other Sebok communities (Baird et al., 2017). However, as noted in the study, this is not a typical occurrence for small dams.

It also appears that there is a difference in diversifications based on the locations of the communities. For example, those in Baan Huay Mak Tai appear to have less ways of diversifying due to their location. Practices such as rice farming, farming other crops and fish ponds are mostly unavailable, and therefore rural-to-urban migration and laboring is more likely to take place. Fishing is a critical dimension of the livelihoods of people of the Mekong River Basin. In the Mun River and Sebok river regions, which have been impacted by the development of the PMD for more than two decades, many aspects of fishing practices are changing and other resources and opportunities for livelihood diversification are becoming increasingly important. However, the patterns of diversification on unique, depending on their location and the ecological and socio-economic position.

### 3.6 Conclusion

The nine communities of Baan Don Sumran, Baan Huay Mak Tai, Baan Hua Hew #11, Baan Hua hew #4, Baan Kho Tai, Baan Doom Yai, Baan Thalat, Baan Wangsabang Tai and Baan Na Choom Chon face challenges in coping with stresses, including that of hydroelectric development. While these results are only a snapshot of what is happening in this region, they illustrate some of the diversifications taking place, as well as highlight that diversifications differ from geographic location because communities are not homogenous and cope differently to stressors based on their needs. Communities are highly flexible, and therefore diversifications are important in helping enhance livelihood security. The results also show that multiple livelihood diversifications are being employed at once by local people and when one practice, such as fishing becomes more difficult, other practices, such as rice farming will become the more widespread alternate economic activity.

The community's perspectives and experiences are highlighted in this chapter to illustrate the types of livelihood diversifications that are occurring in the Mun and Sebok areas. Additionally, the quotes are also helpful in understanding the community attitudes to issues such as loss of fishers' knowledge, rural-to-urban migration, education and more. Diversifying away from fishers' knowledge, a pattern in communities in Southeast Asia, seems to be occurring in this area. The results in this section help to shed further light on this issue, as well as present local narratives surrounding livelihood diversifications.

# Chapter 4

# COMMUNITY BASED MANAGEMENT AND FISHING LIVELIHOODS IN THE MUN RIVER REGION OF THAILAND

## 4.1 Introduction

The sustainability of freshwater fisheries is an urgent problem around the world. As pressures on these systems grows from climate change, commercial fishing, hydro-electric projects and other forms of development (e.g., mining), questions about how to ensure conservation of freshwater resources increases (Arlinghaus et. al., 2015). Equally important to questions of ecological conservation are those about the continued sustainability of fishing communities.

Research over the last several decades has demonstrated the value of many kinds of community-based resource management (CBRM) systems for ensuring both ecological and socio-cultural sustainability. CBRM systems, which have developed over many generations in many parts of the world, have proven to be highly effective at protecting many kinds of species, ecosystems and biodiversity while at the same time sustaining local livelihoods and well-being (Berkes 2006). Like other societies whose cultures and economies are intertwined with a local resource base, many of the community-based resource management systems of the Mekong are based on well-developed local knowledge, practices, beliefs and institutions that date back generations (Jianping & Van Der Horst, 2014).

This paper explores, what kinds of institutions (rules-in-use) have developed by and are in use in villages along the Mun River and Sebok Rivers in the lower Mekong Basin and what rules may be changing or emerging to cope with the impacts of hydro-electric development in the region. These villages are not isolated from other kinds of systems of resource management in other regions of the Mekong and at larger scales; the paper therefore also considers the fit between rules in use by different villages along the Mun River and Sebok River and those formal rules created and enforced by governments.

## 4.2 Literature Review

### Terminology

"Informal institutions" are norms of behaviour, conventions, self-imposed codes of practice, conduct, and their enforcement characteristics (North 1994). Such institutions sometimes described just as "the way we do things" tend to be decentralized and self-enforced despite the lack of centralized or outside government enforcement (Berkes, 1989; Knight, 1992; Colding & Folke, 2001). One can understand these informal institutions in juxtaposition to formal institutions or the written rules, laws, and constitutions and are highly associated with the structural complexity of western, industrialized and highly centralized formal governments (North, 1990). "Informal" is not however, a euphemism for unorganized or unsophisticated. Many informal institutions or rule systems are highly complex and adaptive to ecological complexity and variability and are considered more responsive and sensitive to ecological conditions than centralized institutions (Berkes & Folke, 1998).

Local fishers' rules or norms around fishing are based on generations of knowledge which can be referred to as "fishers' knowledge" or "local ecological knowledge" (Haggan et al., 2007; Johannes et al., 2000). Such knowledge includes in-depth observations and experience about the fish, aquatic life, water flow, river system and more (Haggan and Baird, 2007; Johannes et al., 2000). "While it is generally recognized within the scientific community that fishers have a large amount of Local Ecological Knowledge (LEK), there has been little research specifically documenting the way local people use their LEK for fisheries management purposes, or how LEK can be adapted in order to improve the management of wild capture fisheries" (Johannes, 2001 in Baird 2007, p. 87).

## 4.3 Setting

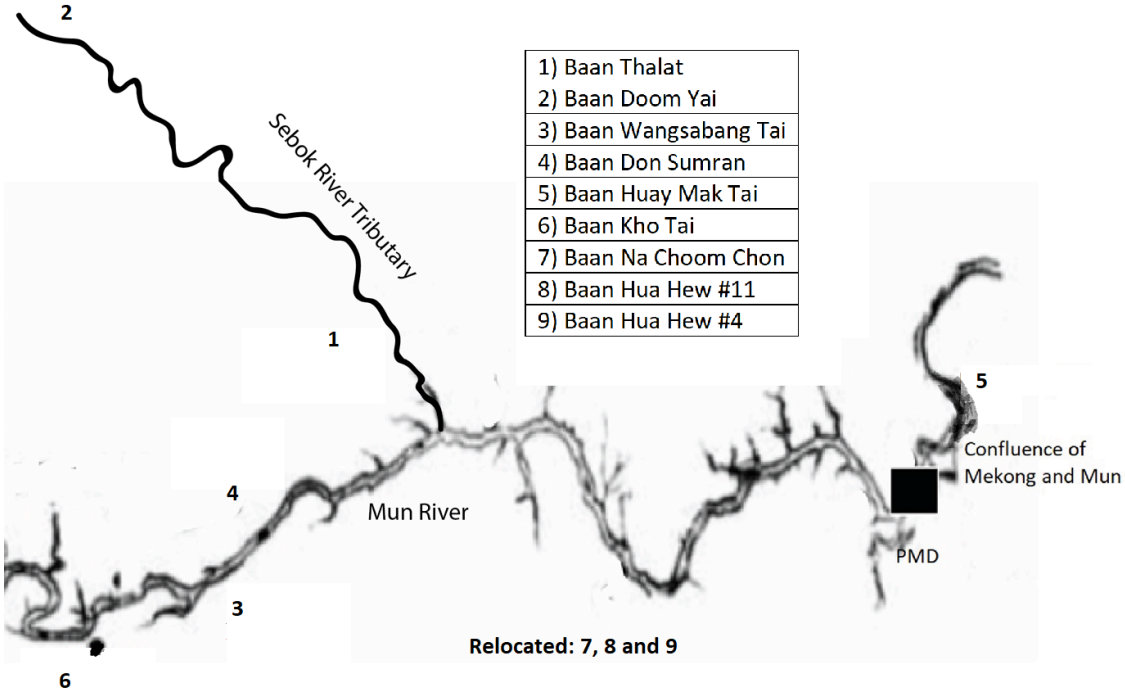
Research for this paper was carried out with nine villages along the Mun River and Sebok Rivers (Table 4.2). Villages in this region are Lao speaking and have livelihoods that are heavily dependent on small scale fishing (subsistence fishing) in these smaller rivers of the lower Mekong Basin. The Mun River and Sebok rivers are located in the northeastern region of Ubon Ratchathani province. Many villages continue to fish using centuries-old traditional practices such as boating, trapping, fishing, hunting, gear making, cooking and more (Chapter 2).

The construction of the Pak Mun Dam in 1992, at the confluence of the Mekong and the Mun River significantly altered both the ecosystems and economies of the region. The Electrical Generating Authority of Thailand (EGAT) is responsible for the operation of the dam and has, over the last twenty-six years dealt with a variety of questions, concerns and protests of local villages including those in the Sebok and Mun River regions (Manorom & Hall 2008) For example, the Assembly of the Poor (AoP), born out of protest to the Pak Mun Dam convened in Bangkok in 1997 in an effort to convince the Government and EGAT to open the sluice gates for a period of one year (Manorom & Hall 2008). The AoP has been established since 1995 and is still active today, meaning that local people still have unaddressed concerns over two decades later (Manorom & Hall 2008).

Government in the region also plays an active role in the management of fisheries in the region. The Department of Fisheries (DoF) and the Department of Marine and Coastal Resources implement national fisheries policies of management and development.

Other kinds of changes in the region have includes agrarian reform and rapid industrialization There are many other drivers of change to people's relationships to land and resources. It is in this context, that this paper explores what kinds of rules are in use by local villages that contribute to both ecological and social sustainability and the fit between these rules and those of the state.

**Figure 4.1: Geographic Locations of Communities**




This chapter also mentions Kaeng Tana National Park, which is located in Khong Chiam District, and home to Baan Huay Mak Tai.

## 4.4 Conceptual Framework: Knowledge and Rules in Community-Based Resource Management

"Resources and their management have long been central in all political processes" (Howitt, 2002, p. 3). Conflict over resource management exists in all nations throughout world including Thailand and southern Mekong. However, also throughout the world is the recent recognition of traditional knowledge in academia, management and decision-making. The involvement of local people in decision-making is now being seen as a right, and important in sustainable ecological management (Natcher & Hickey, 2002, p. 350).

Community based resource management (CBRM) by definition is that "communities, defined by their tight spatial boundaries of jurisdiction and responsibilities, by their distinct and integrated

social structure and common interests, can manage their natural resources in an efficient, equitable, and sustainable way" (Blaikie, 2006, p. 1942). Rules, norms and practices of communities are informed by long histories of use, as well as accumulated knowledge about ecosystems. The benefits of a community-based approach to ensuring the sustainability of fishing resources and fishing livelihoods is well established by academics around the world including in the lower Mekong (Baird et al., 2017; Berkes, 2001)

For the purposes of this chapter we must consider what is meant by the terms "resources" and "community". Howitt approaches the term "resources" as more than just materials of the natural environment. He posits that, "resources themselves need to be understood not as pre-existing substances or things, but in terms of functions and relationships" (Howitt, 2002, p. 3).

Acknowledging resources as dynamic and complex shows that they are fundamentally more than just "things" (Howitt, 2002). Resources are connected to the political, environmental and socio-cultural relationships in our societies. In terms of this chapter, the Mun River is exponentially more than just a natural resource. For centralized bodies such as EGAT and the Thai Government, the Mun is a source of electricity, irrigation and ultimately wealth. However, to local riparian people, the Mun River is a source of food security, tradition, access and rights. When the resource is deeply rooted in the historical narratives of a community it becomes more than just a "thing".

As well as this, the notion of "community" must also be addressed. According to Agarwal and Gibson, "communities are complex entities containing individuals differentiated by status, political and economic power, religion and social prestige, and intentions (Agarwal & Gibson, 2001, p. 1)".

Communities are not homogenous, and their needs and relationship with resources may differ from each other. As well as this, their rules for governance of these resources will not be homogenous. The knowledge of fishers, their fishing practices and the local institutions (i.e., social norms) governing fishing are interrelated. As seen in the previous chapter, the nine interviewed communities, while sharing some similarities, display differences based on geographical location and other factors. The way they have diversified their livelihoods are

different. Their opinions on the Pak Mun Dam differ as well. It is this heterogeneity among and within communities that generates the traditional knowledge we utilize in academic research today. It is the sharing between individuals and groups about what works and what does not, through flexible and changing practices that give communities the ability to survive on sustainable livelihoods. It is the governing practices among and between communities that protect common pool resources. So perhaps community can be seen as those who wish to work together towards shared resource management and conservation.

Consequently, we should be most interested about how local communities would deal with management, simply because they bear the majority of the burden because they rely on the environment. If a government makes a poor decision, they are the most at risk. Therefore, they should have the loudest voice.

> "Current fisheries management approached based on centralized government intervention have proven inadequate to deal with these issues and meet almost any reasonable set of objectives including preventing stock depletion, resolving user-group conflicts, increasing profitability and preventing social disruption. Existing institutions within fishing communities are not able to cope with these rapidly developing pressures either. The communities are in effect disempowered relative to emerging, stronger and in many cases distant stakeholders." (Nielsen et al. 2004, p. 151)

It is a well-established argument in the literature on community-based resource management that those living at local scales are more intimately connected to changes in their ecosystem and are more responsive and adaptive to variability and change. It follows that rules that emerge at this scale are more useful that those of more centralized institutions. "Community members understand their own situations better than outsiders do and can devise and administer regulatory mechanisms that are often more appropriate than those imposed by external regulations" (Kristofferson & Berkes, 2005).

> "They are informal rules, implicit in the day-to-day running of a society, and we learn these rules by observing others and through a long process of trial and error, repeating

those strategies that appear to have successful outcomes" (Minato, Allan, & Allan, 2010, p. 383)

Lastly, CBRM is useful because centralized decision makers are generally disconnected from the people they are making decisions for. Local people care about their resources for livelihood security, environmental conservation, preservation of tradition and more. However, one of the major reasons they care is because of their children. Preserving resources for the next generation is important to communities, and as seen in some of the interviews many of the older generation worry that these resources will not be sustained for the next generations.

## 4.5 Methods

The research undertaken is part of a larger network of research on freshwater ecosystems. In the Mekong region, collaboration with Ubon Ratchathani University led to the development of a project on the impacts of the Pak Mun Dam on fishing livelihoods. During fieldwork for this project, 26 interviews were conducted along the Mun River and the Sebok River. Traditional Knowledge is most closely associated with oral histories about the land, water and wildlife in specific regions. As a consequence, much Traditional Knowledge documented to date in the region has been focused around understanding the distinct worldview, values and way of life of Indigenous peoples. In order to attain local knowledge and narrative, semi-structured interviews were carried out in nine communities of varying size and location relative to the dam itself and the nature of its effects. A total of 14 men and 12 women between the ages of 18 – 77 years of age were sampled (n=26). However, most interviewees fell within the range of 45 – 66 years of age.

## 4.6 Results

### Local Practices and Rules for Fishing Livelihoods

The rest of this section outlines some of the observed local management practices amongst the nine communities. Many of these norms are also mentioned in the previous chapter. Important considerations include:

**Table 4.3: Norms and Governance implemented by Baan Don Sumran, Baan Huay Mak Tai, Baan Wangsabang Tai, Baan Thalat, Baan Doom Yai, Baan Na Choom Chon, Baan Hua Hew #4, Baan Hua Hew #11 and Baan Kho Tai.**

| **Fisheries Norms and Governance** |
|---|
| "Before you fish, you must learn to paddle" - Por Tanom Tongnoi (Baan Don Sumran) |
| Use appropriate fishing gear for the season |
| Adapt your gear to the dynamics of the year (season-to-season, location-to-location and year-to-year) |
| Learning about locations to fish – Mun River, Rice Fields, Pak Mun Dam, Deep Pools etc. |
| Fishing in rice farms, wetlands and tributaries |
| Teaching fishing practices to younger generations |
| Continuous observation of dynamics of the river and fish including population, size, species, diversity, migration routes, spawning areas etc. |
| Rules about Sharing Food and Gear |
| Sharing Fishing Areas but not Fish |
| Respect of the Boundaries of the National Park |
| No Fishing on Buddhist Holy Days (Baan Huay Mak Tai) |
| Trading of Fish for other resources |
| Sharing Wages from Urban Employment |
| Enforcement and Support from the Village Headman |
| Working with the Government – Tessaban |
| Preserving Traditional Practices through the Traditional Knowledge School |
| Lobbying the Government through Community Networks: Assembly of the Poor |

### 4.6.1 "Before you fish, you must learn to paddle"

The above heading is a quote from Por Tanom Tongnoi from Baan Don Sumran explaining that learning to row a boat is one of the first essential skills necessary to fishing (2016). The ability to navigate rivers and tributaries, balance the boat and understand changes in the water are all characteristics of an experienced fisher. The full quotes is as follows:

> "My father taught me how to fish. Before you learn to fish however, you must learn to paddle the boat. The next step is to use the nets. You learn to expand the net properly and cast it into the river. After you learn which seasons require certain types of fishing gear, and when you will get the most fish" (Wittaya Thongnoi, Baan Don Sumran , 2016).

On large rivers such as the Mekong or the Mun, or at times during the wet season when the water is high and flowing, fishing is risky and difficult. The wet season is influenced by Monsoons and includes heavy rainfall. Some of the interviewees mentioned that during the wet season it is not safe to go out and fish due to weather conditions. However, others, such as Wittaya Thongnoi from Baan Don Sumran, are confident in their boating abilities and able to fish during the wet season. Suphan Chansawang from Baan Thalat echoes this statement that the "rainy season is better for catching fish than the dry season because less people are fishing in the rainy season" (2016).

### 4.6.2 Using appropriate Fishing Gear for the season, Adapting fishing gear to the dynamics of the year (season-to-season, location-to-location and year-to-year)

Differentiating between different fishing gears is another essential skill of fishers. There are over 150 types of fishing gear in use in the Lower Mekong Basin, all designed for specific river conditions, time of year, location, habitat of fish, fish behaviors and species of fish (Mekong Watch, 2004, p. 22). Traditional fishing gears are typically made from materials such as bamboo or vine which are locally available and easily accessible (Mekong Watch, 2004, p. 22). These different types of gears have been developed through generations of fishing knowledge. The "bud" (pictured below), is an interesting example of a traditional type of fishing gear utilized by interviewees.

**Figure 4.2: Example of the "Bud" Trap**

> "What gear you use depends on the season. Sometimes the river changes and you need to adapt your net. 'Nam Tao', fishing gear, you can use it from May to August. However, I am the only one in the town who uses it. 'Can (Jan)' fishing gear to use near the riverbank in during May to July" (Wittaya Thongnoi, Baan Don Sumran, 2016).

The ability to utilize multiple different fishing gears, both traditional and new, in balance with river ecology and fish makes for an experienced and successful fisher. It is important to note that interviewees who mentioned adapting gears are knowledgeable and have a deep understanding of how each different type of fishing gear worked.

### 4.6.3 Learning about locations to fish – Mun River, Rice Fields, Pak Mun Dam, Deep Pools etc.

Most commonly mentioned by interviewees is fishing in either rapids or deep pools. The practice of learning and sharing locations for fishing is mentioned by four interviewees:

> "First we tell our children good locations for good rapids. Teach them fishing methods and location of the fish and where the fish are. Also, ideas about when the fish migrate

upstream for breeding and choose which equipment to use" (Por Tanom Thongnoi, Baan Don Sumran, 2016).

"Rapids and deep pools appear alternatively in the river", and local people learn the locations of these areas and tailor their gears to fit (Mekong Watch, 2004). For example, a fisher will be able to spot the location of a deep pool and therefore may utilize a gill net as his gear. This knowledge comes from sharing through generations, and long-term experience as a riparian fisher.

### 4.3.4 Fishing in Rice Paddies, Wetlands and Tributaries

As mentioned in the previous chapter, local people are also fishing outside of the main areas of the Mun and Mekong. Those who have access to rice paddies can catch fish without having to go to the river. This can be convenient since it is easier to obtain fish using gear such as a cast net. However, Weera Surirach from Baan Doom Yai mentioned that "the fish that are raised in rice fields are raised with chemicals, fertilizers and pesticides" (2016).

### 4.3.5 Continuous observation of dynamics of the river and fish including population, size, species, diversity, migration routes, spawning areas etc.

Community members possess continuous observational knowledge about the dynamics of the river and fish. Their extensive experience as fishers means that even the slightest change is noticed. Six interviewees mentioned that they kept track of the seasons, dynamics of the river and other ecological changes to ensure the best fish catch.

> "In the wet season, I will wake up at 5:00 AM and then fish until 7:30AM, then fish again from 4:30PM to 7:30PM. Dry season from January until May, the water level is lower, I will fish from 3:30AM until 8:30AM. During this time the fish will migrate and lay eggs, you will catch more fish in the dry season when the fish are migrating" (Wittaya Thongnoi, Baan Don Sumran, 2016)

### 4.3.6 Sharing (Rules around Food/Gear Sharing)

Although people work and support one another when needed there is some competitiveness and perceptions that this support has changed from previous years. In the past you could ask each other for fish. It's not like that anymore, people no long talk to each other because they do not fish together, and their boats are farther away from each other" (Mae Mii Santaweesong, Baan Don Sumran 2016). For example, there was some reluctance in sharing knowledge, food, and livelihood practices because it may impact the success of individual households.

### 4.3.7 Sharing Fishing Areas but not Fish

According to interviewees, there are no rules involved about limiting fishing areas to those living near them. Two interviewees mentioned sharing locations to fish, but not the fish themselves. For example, Mae Tussanee Chiangam from Baan Huay Mak Tai states, "we share the areas but we don't share the fish. We don't share, only sell" (2016). Additionally, Suphan Chansawang states "people don't usually share nets anymore, but they do share places to fish with each other" (2016).

### 4.6.8 Respect of the Boundaries of the National Park

Baan Huay Mak Tai is located within Kaeng Tana National Park, established on July 13th, 1981. The National Park Act B.E. 2504 of Thailand states that the land is not owned or legally possessed by any public body, meaning that those living within the national park are not land owners and have no land rights (Thai Law Forum, 2010). "Our village has been here for over 200 years and we have no land" (Mae Tussanee Chiangam, Baan Huay Mak Tai, 2016).

> "This area is very rocky, so only a few people have rice farms. Because it is also a national park area, officers can tell us when to stop fishing or growing. They have also passed a rule on not fishing on Buddhist Holy Days" (Mae Ora Boontun, Baan Huay Mak Tai, 2016).

### 4.6.9 No Fishing on Buddhist Holy Days (Baan Huay Mak Tai)

In addition to the rules implemented by the Department of National Parks, Wildlife and Plant Conservation, a change implemented by the Government of Thailand in this area is that it is illegal to fish on Buddhist holy days. Three interviewees total mentioned this rule. For example Por Seetun Kongkaew states, "in recent times (about 2 – 3 years ago), people have decided not to fish on holy days or during Buddhist lent. This is to let the fish migrate to their habitat and spawn" (Baan Wangsabang Tai, 2016).

> "They passed a rule on not fishing during Buddhist Holy Days. If you don't fish then they can migrate and breed. But it's not so good because they can't make income. For 8 days they get 0 Baht instead of 200 – 300 Baht" (Mae Ora Boontun, Baan Huay Mak Tai, 2016).

Although some fishing may still be happening on Buddhist Holy Days,

### 4.6.10 Sharing Wages from Urban Employment

When community members migrate to larger cities for work, they are contributing to preserving their fishing livelihood by sending money back to the community. Decreasing use of fishing as a primary source of income is driving young adults to migrate to urban centers to make a living. This is a "labor-diversification-based livelihood strategy", and usually people remain connected to their villages by visits, communication, sharing wages and remittances and sometimes through children (Amare, Ohfeld, Jitsuchon, & Waibel, 2012, p. 1). This project interviewed a few community members who were taking care of their grandchildren while their children worked in urban centers. Rural to urban migration is a common practice in the Isan region.

There are mixed impacts of rural to urban migration on households. The remittances sent by urban workers to their families are helpful in sustaining their households. In terms of fishing, some of this income goes towards the cost of gear, which in turn is used to catch fish, generating more income and food for the household. This diversification is a coping strategy to increase

household welfare after a stress on the community (Amare et al., 2012, p. 14). For rural communities this type of diversification is helpful.

As for negative impacts, interviewees mainly stated that this practiced migration also broke up their households, and they missed their children (Chapter 3). Some of them stated that they wished they could all live together comfortable in the village, while others stated that they wanted their children to grow up, go to school and be successful. School is highly encouraged by older generations who want their children and grandchildren to have a better life, which likely contributes to migration for better opportunities.

### 4.6.11 Headman

Village Headman plays an important role in conflict resolution and rule enforcement both within and between communities. Thai society places great value on family and community, and typically if there is a problem, people will depend on a respected superior community member to solve that problem (Thongpoon, 2012, p. 3). The Village Headman collaborates with the Tessaban system (mentioned below) to help govern local communities. This is an elected role, considered to be one of the first forms of democratic government in Thailand (Thongpoon, 2012, p. 3).

However, the role of the Headman is defendant on the complexity of the problem and what is needed to resolve an issue (Thongpoon, 2012, p. 3). One of the main roles of a Headman is to resolve an issue without the need to go to court, instead using local government. This is usually done with the participation of community members. For example, if someone is accused of using a boat that is not his or hers, it is the responsibility of the Headman to resolve that conflict. A more serious action, such as stealing, is known as a “no-tolerance norm”, one that most members agree is unacceptable, and will always be escalated to the village headman (Whittaker & Shelby, 1988, p. 261).

The Headman also acts as a liaison or representative for the communities and brings forth certain issues to higher governing bodies. As well as this, the Headman works with the Tessaban to implement policies and orders from the central government (Thongpoon, 2012, p. 3).

While interesting, only one interviewee mentioned the existence of the village headman regarding the PMD:

> "During this time, some people were compensated differently, which created some conflicts in the village. The asked the headman to make a survey about who has what fishing equipment, but it wasn't correct because everyone fished, so it should have been equal compensation" (Mae Lamtian Pinthong, Baan Don Sumran, 2016).

### 4.6.12 Working with the Government (Example: Tessaban)

It should also be noted that there are some municipal government institutions that have been successful in working with local communities in preserving fishing livelihoods.

In 1934 Thailand established the "Tessaban Organization Act" which was the implementation of a Tessaban, a municipality or local governing body of a village or town (The Royal Gazette, 2008). The role of Tessaban is varied, from helping provide villagers with free classes to liaising with higher government. Local people participate in the election of the Tessaban members and are able to bring forth their complaints or concerns to their representatives (Rohitarachoon & Hossain, 2012). Since the members are usually elected from the communities they have a connection to the area and the people.

While all the villages have a Tessaban, Baan Don Sumran is the one village where community members consistently referred to the Tessaban and working with the Tessaban.

The most noted programs by community are the tilapia raising program and the fiberglass boat-making program. Interviewees in Baan Don Sumran stated that the Tessaban offers these programs for people to start their own sustainable home businesses. Por Tanom Tong Noi is one

of the interviewees who participated in the fiberglass program: “Fiberglass boats are light and fast. They are made because the Shorea trees have been used for boats and houses and there are not many left” (Baan Don Sumran, 2016).

Wittaya Thongnoi, mentioned that “there should be more programs for fishermen” (Baan Don Sumran, 2016). It would seem that local people in Baan Don Sumran are willing to work with the Tessaban and appreciate the programs being offered.

### 4.6.13 Preserving Traditional Practices through the Traditional Knowledge School

Mae Charoen Gongsuk from Baan Hua Hew #11 mentioned that she ran a “Local Wisdom” School for the children in her village. “If they have wisdom they can make a living for a long time, but if you just give them money they will spend it right away. You live longer with more wisdom” (Mae Charoen Gongsuk, Baan Hua Hew #11, 2016)

Twelve interviewees for this project expressed fear over loss of fishers’ knowledge, however Baan Hua Hew #11 is the only village that possesses a Local Wisdom School.

Yet during the course of this project, this was the only noted local wisdom school that was taught by a community member. Interviewees from other communities mentioned that they do not think they could teach knowledge due to lack of use. For example in Baan Don Sumran, Por Tanom Tong Noi mentioned that part of the reason why he doesn’t teach others to fish is because he doesn’t believe he teach them well. If he cannot catch enough fish to sustain his household, how can he be confident enough to teach his children? “Yes, I am worried about loss of culture because as a father, if I cannot catch that many fish I don’t feel confident to teach my children to fish because it cannot be their career” (Por Tanom Tong Noi (Baan Don Sumran)

### 4.6.14 Lobbying the Government through Community Networks: Assembly of the Poor

The most prominent NGO in regards to the issue of the Pak Mun Dam is the Assembly of the Poor (AoP). The AoP emerged in opposition of the dam, reflecting the opinions and disagreements of the local peoples. However, regardless of these protests the Pak Mun Dam was

commissioned and opened at an approximate cost of $260 million USD (World Commission on Dams, 2000). Within the first year of operation the Mun River saw serious impacts to fish migration. The AoP mobilized local people and encouraged them to protest in defense of their livelihoods, and the organization is still in operation today. Three interviewees mentioned being involved in the AoP, including Por Charlie Wae Wong from Baan Don Sumran; "I was a member of the AoP, no position, just an activist" (2016).

NGOs serve in the interest of the communities, empowering them to voice their concerns and opinions. Amporn Chaitadum from Baan Kho Tai explains that he "provide[s] fish quality data to NGOs but the government doesn't seem to care" (2016). Regarding fisheries management, NGOs play a prominent role in the "institutionalizing of community-based co-management" (Wilson, Nielsen, & Degnbol, 2003, p. 149). NGOs such as the Assembly of the Poor, promote the assistance of fishers in resource management. Therefore, potential collaboration with national government would be beneficial to all involved.

### 4.7 Discussion

Previous research in the Mun River region has evidenced the deep and intimate knowledge that fishers have of river system dynamics (e.g. flood patterns) and how these dynamics have been altered since the construction of the Pak Mun river dam (Manorom & Hall, 2008). Isan people of the region also have their own cultural and linguistic taxonomy of fish species and a well developed understanding of their ecology (e.g. spawning habitats) (Mekong Watch, 2004). Such knowledge is not simply useful data but informs and is informed by their daily practices of fishing. In addition, fishing families and villages have their own systems of management (i.e., social norms) related to access, use and care of the fish species and their habitats that may be critical for conservation and sustainability of local livelihoods. This chapter attempts to build on this literature by evidencing different kinds of rules (i.e., social norms) of importance to fishers in the Mun River and Sebok rivers.

Norms and practices influence community life. The literature on CBRM suggests that flexible norms and practices are necessary to ensure sustainability (Tompkins & Adger, 2004). This is

particularly true in the context of fishing livelihoods since fresh water ecosystems such as the lower Mekong and Mun River are highly variable and complex systems. The added stresses of resource development in this region has increased the necessity for adaptive and flexible norms and practices. Some examples of norms for fishing in this region include learning how to paddle a boat before learning to fish, moving to urban centers to work, fishing in rice farms, wetlands and tributaries, and more. Along with the diversifications from the previous chapter, these norms and practices by the community have changed over time along with the ecology of the river. Community members govern the resources that they have access to with each other, but they must adhere to the centralized rules of the government. However, as seen in the results section of this chapter, local people are willing and able to work with the government and other agencies to co-manage fisheries.

Each community is different, and therefore have different norms and practices which might work better with certain types of management. The difference in each community means that for CBRM to be successful, it needs to work with that community, and there likely is not a universal way of governance. For example, the role of the Tessaban seems to be well received by local people in Baan Don Sumran in terms of working together for a common purpose. The incorporation of free classes for local people is helpful in allowing for more ability to manage resources. It is also helpful in terms of cultivating participation from communities, where they are provided with the knowledge of how to manage resources and able to have an opportunity to be involved in the process of management. Community norms and practices can help to facilitate resource management by acting as a guide (Agrarwal & Gibson, 1999). Utilizing community norms and practices can be helpful in collaborative decision-making both within the communities and with centralized governing bodies.

As suggested by Pomeroy, national governments typically overestimate their abilities to manage resources, and in turn communities are underestimated in their ability to co-manage. “When left to their own devices, communities of fishers, under certain conditions, can regulate access and enforce rules through community institutions and social practices to use fisheries resources sustainably” (Pomeroy, 1995, p. 144).

When working with NGOs there seems to be somewhat of a power struggle between the government and the NGO (Wilson et al., 2003, p. 149). This could be because governments tend to protect their decision-making power. However, this negates the idea of co-management where there must be equal power between all who are involved. This also means that the agenda of the NGO must not be more important than the community's needs. As purported in Wilson et al. (2003), NGOs can exist as potential facilitators of co-management (p. 149).

### 4.5 Conclusion

Local communities living along Thailand's Mun River and its surrounding tributaries have long histories of community-based management of fisheries that have ensured the sustainability of their fishing resources for many generations (Mekong Watch, 2004). Local norms for respecting and managing fish habitat, stocks and harvest, as well as engaging in related livelihood resources and practices are evident in many communities including those living in Baan Don Sumran, Baan Huay Mak Tai, Baan Wangsabang Tai, Baan Thalat, Baan Doom Yai, Baan Na Choom Chon, Baan Hua Hew #4, Baan Hua Hew #11 and Baan Kho Tai. These local norms, when recognized and supported by regional and state level regulations and systems of governance, have the potential to improve environmental sustainability as well as the fishing livelihoods of local peoples.

This chapter has highlighted several key contributions around the flexibility and adaptiveness of fishing livelihoods in the context of the Mun river hydro project. We must re-think resource management and attempt to alleviate the tension between top-down and bottom-up approaches to resources (Howitt, 2002). During the research process in the nine villages it was clear that local fishers were eager to learn more about the research and give researchers information that could be applied in a meaningful way. As stated in the previous chapter, it is sometimes the case that local people do not feel comfortable expressing themselves and that an added role of the researcher is to act as a voice for the people. Local people are already employing their own management practices, and perhaps if taken more seriously by centralized governing bodies, they can have more agency in management.

# Chapter 5

# CONCLUSION

## 5.1 Summary of Thesis

This thesis presented the issue of the Pak Mun Dam in the Isan province of Thailand, in the lower Mekong Basin. The Pak Mun Dam is a good case study to understand the impacts of long-term hydroelectric development on fishers' livelihoods and community well-being. Since the commission of the dam, over twenty years ago, communities have been suffering from its effects. The nine interviewed communities for this project provided qualitative data that speaks to their own narratives. The literature reviewed in this thesis provided an overview of the circumstances surrounding the Pak Mun and its development in the region. The literature also provided theoretical overview of key themes throughout the thesis, such as CBRM, rules, norms and other facets of the conceptual framework, as well as a broader overview on the Lower Mekong.

Additionally, examining the results from a geographic perspective provides a spatial component to the analysis of the data. Through research in the communities in this river basin, the results demonstrate how households and communities in proximity to the Pak Mun River Dam diversify their economies according to differences in socioeconomic and ecological conditions. As mainly outlined in Chapter 3, geographic location has a great influence on how communities diversify in regard to stressors. For example, those in Baan Huay Mak Tai are typically unable to own rice paddies due to the rocky terrain.

The longitudinal observations provided by community members gives an in-depth perspective on the impacts of hydroelectric development, community livelihood diversifications (Chapter 3) and changing governance practices over time (Chapter 4). Some local people expressing in their interviews that they perceived the PMD as a "lesson" in terms of what *not* to do. Local people possession years of observations and generational knowledge that offers an thorough perspective on the ecological changes that have happened since the implementation of the dam.

The communities expressed their interest in participating in this project. Interviewees were found with assistance from Dr. Ian Baird, Dr. Kanokwan Manorom, translators for this project, as well as the community members themselves. In general, local people are concerned about the well-being of their resources, the environment and their communities, both presently and in the future.

All of the interviewees expressed that the Pak Mun Dam had changed their livelihoods and throughout the years they have diversified in order to survive (Chapter 3). Chapter 3 outlines the different livelihood diversifications being practiced by interviewees living in the Lower Reservoir, Upper Reservoir, Sebok Tributary and Relocated communities of the Mun River. These diversifications exist because people have to cope with the stress of the Pak Mun Dam and issues arising from its development. It is enlightening to see what people are doing now, and how these diversifications have changed their way-of-life. Chapter 4 examines local rules, practices and governance from the nine communities after the PMD. In doing so the hope is to contribute to the literature and highlight key ideas about local communities being flexible and able to diversify. The literature on CBRM suggests that flexible norms and practices are necessary to ensure sustainability (Tompkins 2004). The discussion in both Chapter 3 and 4 provides a comparative analysis of the nine communities, as well as discussion over *why* these changes are occurring.

### 5.2 Recommendations

The majority of the community members recommended the decommissioning of the PMD, so as to allow for the opening of the dam year-round. While EGAT maintains that the dam is beneficial, there are apparent negative impacts that create stresses on communities. Therefore, the main recommendation of this study is to echo the sentiments of community members and have their voices heard. Should that not be possible, the study by Baird et. al. (2017), states that fishers would at least like to see the dam to be open from mid-May to the end of July, allowing for the majority of fish to migrate as far as the Sebok. It is also important to note that fishers on the Sebok mention that the Ban Ot Dam should also be open the full-year (Baird et al., 2017).

Additionally, those living along the Sebok River have yet to be compensated for their loss of livelihoods, or have their voices heard in an inclusive way. Should this thesis contribute to the literature on Mun River tributaries, it could be beneficial in getting local people in this area the compensation they deserve.

Another recommendation is to strengthen the communication between government, academics, community members and other stakeholders. Multiple interviewees mentioned that they were scared to speak for themselves because they did not believe they were smart enough. However, many community members expressed interest in participating in research. Even throughout this project, it was easy to ask local people to participate. Including community members in decision-making process regarding their homes and resources is important and listening to their recommendations is also important. Local people simply should not be afraid to voice their concerns. More communication between local people and other stakeholders would likely produce positive results and strengthen relationships.

### 5.3 Further Research

Hydroelectric development in the Lower Mekong basin impacts riparian communities fishing livelihoods. The Pak Mun Dam case describes the longitudinal impacts of dams on communities. As well as this, this thesis documented only a snapshot of the local practices and traditional rules implemented by community members. There has been some research on local knowledge in this area, however it requires further investigation. Local knowledge is important in academic research because it gives new perspectives and deeper understandings of communities and their experiences. More work in this field would prove useful when working with communities and possibly create the potential for cooperative research projects and more.

### 5.4 Practical and Policy Implications

The thesis research aims to highlight the importance of local knowledge, voices and experiences of the Isan people of the Mun River region and improve public understanding of the complex ways in which fishing livelihoods are impacted by hydroelectric development.

The Pak Mun Dam is one of the most controversial hydroelectric dams in the Mekong Basin. The communities in this area rely on fisheries as their main source of income in the past, however today it is simply not possible for many people.

While much information exists on the PMD, there could be more insight and perspectives from community members. As further explained in Chapter 3, some community members believe they will not be taken seriously if they voice their concerns. The main significance of this study is to draw attention to the voices of those living in Baan Don Sumran, Baan Kho Tai, Baan Wangsbang Tai, Baan Huay Mak Tai, Baan Thalat, Baan Doom Yai, Baan Hua Hew Hew #4, Baan Hua Hew #11 and Baan Na Choom Chon, who are greatly impacted by the PMD.

Guided by the literature on community-based research, the thesis offers additional perspective on the effects of hydroelectric dams based on the observations and experiences of villagers in Thailand who are often little heard in decision-making in the region. This includes villagers dependent on the Sebok River living in the communities of Baan Doom Yai and Baan Thalat, who have not yet received compensation for the loss of their livelihood due to the PMD. This project is important because it increases awareness about the impact of hydroelectric development on tributaries and how those living farther away from the dam itself can still be affected.

The other seven communities received compensation for their loss of livelihood, however the amount of 90,000 Baht is simply not enough to cover the expenses of their daily lives. The PMD example provides us with longitudinal information on the environmental and social impact of hydroelectric dams on communities. The PMD is currently still in operation, and perhaps this thesis will further contribute to the literature that recommends the decommission of the dam completely.

Lastly, the thesis may encourage researchers, academics, government bodies and others, think more holistically about the impacts of dams and the importance of learning from the knowledge of peoples most affected by these projects. While international agreements and protocols call for

increased recognition of local and traditional knowledge, such recognition has been relatively limited in respect of hydroelectric development in Southeast Asia. There is value in the knowledge of fishing livelihoods as seen through this project and the various other projects regarding fisheries in the Mun River and its tributaries. It is important to consider the point of view of local people to help influence development in the area so as to not negatively impact fishing livelihoods further. This is especially important not just in Thailand, but in Southeast Asia and the Mekong Basin as a whole due to the rapidly growing hydroelectric industry. There must be forethought brought by all perspectives in order to conserve and protect the basin and those who survive off its resources.

As Mae Charoen Gongsuk from Baan Hua Hew #11 mentioned in an interview, it is important for researchers to help spread community members' knowledge and stories, so that other communities can learn from their experiences. Therefore, other communities, academics, centralized governing bodies and more can approach development in a more inclusive manner.

There is a growing need to address multifaceted management issues by adapting policy. As such CBRM is becoming recognized as a vehicle for change (Minato et al., 2010). Local people who voluntarily seek involvement in natural resource management can facilitate substantial awareness, knowledge and management skills (Minato et al., 2010).

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## Appendix A

## LIST OF INTERVIEW QUESTIONS

The following is a list of the semi-structured interview questions I utilized while gathering data. Due to the flexible nature of these interviews, the conversation may not have followed this exact pattern.

- *Do you think hydroelectric development in this area is beneficial to community members?*
- *Do you think hydroelectric development in this area is beneficial to the ecosystem?*
- *What do you expect will happen with further hydroelectric development?*
- *Will hydroelectric development be dangerous for those living near the dam?*
- *What other risks do you believe will be involved in hydroelectric development?*
- *Has hydroelectric development affected food sharing between communities?*
- *Have certain types of foods become unattainable for some reason?*
- *Has the culture of sharing been affected by hydroelectric development?*
- *What have you noticed about this area over time?*
- *Have any hardships occurred due to the industrialization of this land?*
- *What was this land like historically?*
- *What are some stories about the land, water and wildlife in this area?*
- *What do you think is important to preserve the health of the community?*
- *What do you think is important to preserve the health of the ecosystem?*
- *How would you like to be involved?*
- *What would you like to say to those involved in the hydroelectric development along the river?*
- *Why is this place significant?*
- *Does it have a particular name?*
- *How has this place been affected by hydroelectric development?*

## APPENDIX B

## CODED QUOTES

| **Most Diversified**<br><br>**(Lower Reservoir)**<br><br>Baan Don Sumran<br><br>Baan Kho Tai | **Least Diversified (Higher Res.)**<br><br>Baan Huay Mak Tai | **Moderate Diversified/Upstream (Lower Reservoir)**<br><br>Baan Wangsabang Tai | **Relocated**<br><br>Baan Hua Hew #4<br><br>Baan Hua Hew #11<br><br>Baan Na Choom Chon | **Sebok Tributary**<br><br>Baan Thalat<br><br>Baan Toom Yai |
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| "You do not study to come back and be a fisherman" - Wittaya Thongnoi (Baan Don Sumran)<br><br>**Edu:Mig** | "This area is very rocky, so only a few people have rice farms. Because it is also a national park area, officers can tell us when to stop fishing or growing. They have also passed a rule on not fishing during Buddhist holy days" - Mae Ora Boontun (Baan Huay Mak Tai)<br><br>**PA:RF:BHD:NP** | "I make brooms for a second source of money. We cannot fish so we started making brooms" – Pratim Kamparat (Baan Wangsabang Tai)<br><br>**BrMak** | "Some people still fish, but now we are very far from the river! Our livelihood is not the same. We live so far from the Mun there is no point in teaching our children to fish" – Por Jumrut Sanorwatee<br><br>**LFK:TravFL** | "We wanted a conservation area, so we asked the government. They stock the conservation area with fingerlings for the bigger fish" – Suphan Chan Sawang (Baan Thalat)<br><br>**PA:FStock** |
| "I did not teach my children to fish because they were not interested" Por Charlie Wae Wong (Baan | "At this moment I only fish near the Mekong. Although I do still travel to the Mun for worms (bait)" – Mae | "It is impossible to preserve the fishing traditions because the rapids were blasted. It is impossible to preserve fishing if | "There have been more adaptations. We can't rely on fish anymore. We have rice | "The King introduced them to the area and gave them to the people. It gives us extra food |

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| Don Sumran)<br><br>**LFK** | Tussanee Chiangam (Baan Huay Mak Tai)<br><br>**TravFL** | they don't have rapids" – Pratim Kamparat (Baan Wangsabang Tai)<br><br>**LKT** | fields, cassava and rubber plantations. Fish in the fishing season, rice in the rice season and construction in any other season" – Boonluan Mingboon (Baan Hua Hew #4)<br><br>**OF:RF:Lab** | and is good for eating. However, I prefer eating native Mun River specieas instead of Paa Nin" – Weera Surirach (Baan Doom Yai)<br><br>**FStock** |
| "We only grow rice once a year, so my fishpond gives me a side income as well as something to do" / "I eat from my rice fields and fish from my fish ponds" – Somchit Phathong (Baan Don Sumran)<br><br>**RF:FP** | "Our main source of income here comes from fishing and laboring" – Mae Tussanee Chiangam (Baan Huay Mak Tai)<br><br>**Lab** | "This villages makes a lot of brooms to sell as extra income" – Por Setun Kongkaew (Baan Wansabang Tai)<br><br>**BrMak** | Mae Charoen Gongsuk - "I said 'if you want us to speak up why are you trying to scare us?'" (Baan Hua Hew #11 – December 13th, 2016)<br><br>**Lob** | "Before the dam we used to eat raw fish, but now we cook them. We no longer make Goy Paa" / "The government warns us about liver disease from eating too many toxic fish. We have health promotion that informs the people about fish parasites" - Weera Surirach (Baan Doom Yai)<br><br>**LTC:LFK** |
| "Programs like the fibre glass fishing program are good because they allow people to learn | "I lost my family and our living condition, because we don't make enough. Money is an | "I have to adjust the nets that I buy from the market because they need to fit this environment – | "In the past even 6-year-old kids can fish. Young kids would go with nets and | "Some government officials say that we should use less fertilizer, |

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| to make boats and make a bit of money" – Por Paliwat Pinthong (Baan Don Sumran)<br><br>**Fibre:Gov** | important factor. We don't get enough money from fish catch and we don't even make the lowest estimated [household] income in Thailand (supposedly 100K Baht/year)." Mae Tussanee Chiangam (Baan Huay Mak Tai)<br><br>**Mig** | sometimes I need to add weight to weigh the nets down" – Por Setun Kongkaew (Baan Wansabang Tai)<br><br>**FGP:FGM** | fishing rods" Por Jumrut Sanorwatee from Baan Na Choom Chon (December 13th, 2016).<br><br>**FYA** | however the people know they will get more product if they use it. The government also warns about live diseases from eating too many toxins in the fish or getting too many toxins from the water. They have health promotions that inform the people about fish parasites." Weera Sururach Baan Doom Yai<br><br>**Chem** |
| "I started to deliver food to Don Sumran 5 or 6 years ago because there was a need for it. We bought a new motorbike cart to service this area" – Mae Sam Dii (Baan Don Sumran)<br><br>**MobM** | "when my Grandpa was fishing, he fished. He didn't have to sell the fish, he just traded and brought the rice home" (December 12th, 2016). Mae Tessanee Chiangam, Baan Huay Mak Tai<br><br>**TF** | "This community gets irrigation water from the Mun. Before we had to wait for rain" – Por Setun Kongkaew (Baan Wansabang Tai)<br><br>**Ir** | "The dam affects me a lot because I built it. I did not support the dam, but I needed the money so I had to just do it" (December 13th, 2016). Boonluan Mingboon – Baan Hua Hew #4<br><br>**Lab** | "In the future my grandchildren might not have fish" – Weera Suriach (Baan Toom Yai)<br><br>**LFK** |
| "I plant | "there are no | "People like to | "I am | "We used to |

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| Eucalyptus, Mango Trees, woods and rice. Now I have a tractor and don't have to do it by hand" – Por Saman Tong Noi (Baan Don Sumran)<br><br>**OF:MechFarm: RF** | 'rules' but we are considerate about where others fish. People already have nets set up and there is no room for us" - Mae Tussanee Chiangam (Baan Huay Mak Tai)<br><br>(December 12th, 2016).<br><br>**Loc:ShareL** | fish, but they also have other things to do. If the fish come from the Mekong they taste better. The flesh is softer because the river is flowing and the fish get more exercise and the taste is delicious. Fish in the Mun are bland because the water is stagnant. Most people in this village fish, raise crickets, make brooms, baskets and farm rice" Por Setun Kongkaew (Baan Wangsabang Tai)<br><br>**OF:RF:BrMak** | uneducated and don't know much about the system. I didn't get all my money and then it was gone" (December 13th, 2016). Boonluan Mingboon (Baan Hua Hew #4)<br><br>**Edu** | use cloth nets, but now we use 'Mong Eng' (Nylon) because the fish cannot see nylon". Suphan Chan Sawang (Baan Thalat)<br><br>**FGP** |
| "Education brings a lot of changes. Today, young people move to larger cities and older people look after the grandchildren. The kids send money back to their parents for their grandchildren" – Por Saman Tong Noi (Baan Don Sumran)<br><br>**Edu:Mig:Child:** | "Fishing equipment is very expensive and sometimes the equipment gets washed away and it is not worth it to fish" – Mae Tussanee Chiangam (Baan Huay Mak Tai)<br><br>**FGP** | "I would love it if my children were able to live in the village, but they don't have fish careers anymore. Traditional way of life doesn't offer careers anymore" – Pratim Kamparat (Baan Wangsabang Tai)<br><br>**Mig:LFK** | "People used to grow plants along the river that could make rope for fishing nets, people didn't have to buy fishing gear because they could make it out of Hemp or Thuringia" – Mae Charoen Gongsuk (Baan Hua Hew #11) ("Since the development, | "There is a fish conservation area near this town, it has been there for about 10 years" Suphan Chan Sawang (Baan Thalat)<br><br>**PA** |

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| **Cgrand** | | | people don't know about these two plants at all")<br><br>**RB:FGH** | |
| "Yes, I am worried about loss of culture because as a father, if I cannot catch that many fish, I don't feel confident to teach my children to fish. It cannot be their career. I feel bad that [fishing culture] is being lost. When my dad taught me there were lots of fish, now the wisdom is lost." – Por Tanom Tong Noi (Baan Don Sumran)<br><br>**LFK:FYA** | "I used to fish behind the dam on the Mekong side, but now it is not easy to get there. I would need to ask someone to put my boat in their car." – Mae Tussanee Chiangam (Baan Huay Mak Tai)<br><br>**TravFL** | "The rapids 'Hin Nak', 'Hin Soon' and Hin Len' were important rapids because we could go there and get our food immediately. It was quick and easy to get fish. Now the rapids are submerged. Today instead of the sounds of the rapids, we only hear the sound of the mobile market. My husband used to say 'cook the rice, boil the water and I'll be back in a few minutes with the fish'. It was that easy" – Pratim Kamparat (Baan Wangsabang Tai)<br><br>**MobM** | "The Mun River is the main source of fish for people, people here did not go to town. In the past people did not do a lot of rice farming. People here were not educated but they could live their lives because they had local wisdom" – Mae Charoen Gongsuk (Baan Hua Hew #11)<br><br>**TFK:RF** | "The government stocks the conservation area with fingerlings, so they can feed the bigger fish" Suphan Chan Sawang (Baan Thalat)<br><br>**FStock:Gov** |
| "We use fibregass for boats now. The Shorea trees are good trees but there aren't a lot left. People are starting to grow these trees again, but it takes many | "Before the dam we could go anywhere to fish, but now there are more people and less fish. When my grandpa was fishing, he fished. He didn't have to sell the | "We used to grow vegtables on the river bank. Corn, Pak Chi, Snake Beans and Cabbage. But the area is now flooded and covered in thorns and grass" – | "In the morning there is a mobile market and people buy eggs. Today people don't learn about the things that our grandparents | "The fish that are raised in the rice fields are raised with chemicals, fertilizers and pesticides" Weera Sururach (Baan Doom Yai) |

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| years for them to grow" – Por Tanom Tong Noi (Baan Don Sumran)<br><br>**FGM:Fibre:Gov** | fish, he just traded and brought the rice home" – Mae Tussanee Chiangam (Baan Huay Mak Tai)<br><br>**TF** | Pratim Kamparat (Baan Wangsabang Tai)<br><br>**RB** | taught us, there is no learning. I am worried about the future because they do not know any fundamental knowledge about learning" – Por Jumrut Sanorwatee (Na Choom Chon Village)<br><br>**MobM:LFK** | **Chem:RF:FRF** |
| "We no longer eat that much catfish. It is better to sell it. These days we buy fish from the market from aquaculture of captive breeding" – Mae Tim (Baan Kho Tai)<br><br>**Fi:SB:Aqua** | "We used to share fish. But now we don't share usually, we sell the fish because we need the income. Money is an important factor. We don't get enough from fish catch and it effects everything" – Mae Tussanee Chiangam (Baan Huay Mak Tai)<br><br>**SellF:LSF** | "The way people are fishing has changed. Now there is too much water to use the small nets. You can really only use the gill nets in flowing water or when the dam is open"<br><br>Pratim Kamparat (Baan Wangsabang Tai)<br><br>**Gear** | "If I don't have more children my knowledge might disappear. I knew my knowledge of fishing my entire life, I would be sad to lose it. But we have a different way of life now" Boonluan Mingboon (Baan Hua Hew #4)<br><br>**LFK** | "Some government officials say they should use less fertilizer, however the people know they will get more product if they use it. The government also warns about live diseases from eating too many toxins in the fish or getting too many toxins from the water. They have health proportions that inform the people about fish parasites" Weera Sururach (Baan Doom Yai) |

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| | | | | **Chem** |
| "I wanted to be a fisher because I saw it as part of the livelihood of Don Sumran" (December 3rd, 2016). Wittaya Thongnoi from Baan Don Sumran<br><br>**FYA** | "This area is very rocky, so only a few have rice farms" – Mae Ora Boontun (Baan Huay Mak Tai)<br><br>**RF** | "We used to grow vegetables on the riverbank, Corn, Pak Chi, Snake Beans and Cabbage. But now the area is flooded and covered in thorns and grass"<br><br>Pratim Kamparat (Baan Wangsabang Tai)<br><br>**RB** | "Some people still fish, but now they are very far from the river"<br><br>Por Jumrut Sanorwatee (Baan Na Choom Chon)<br><br>**TravFL** | "We share boats, but not nets because nets are delicate. If you are careful with your net it can last up to 3 years" Weera Sururach (Baan Doom Yai)<br><br>**SG2** |
| "I used traditional farming in the past. Now I have a tractor and don't have to do it by hand. My wife and eldest son help me. The old technique involved my wife gathering and sowing seeds." Por Saman Tong Noi (Baan Don Sumran – December 3rd, 2016)<br><br>**MechFarm:RF** | "I have been fishing all my life" Mae Ora Boontun (Baan Huay Mak Tai)<br><br>**FYA** | "My children don't know how to fish, they only study"<br><br>Pratim Kamparat (Baan Wangsabang Tai)<br><br>**Edu:LFK** | "The riverbank is not the same, there are so many thorny plants and we cannot fish"<br><br>Por Jumrut Sanorwatee (Baan Na Choom Chon)<br><br>**RB** | "I sell more fish than I cook"<br><br>Suphan Chan Sawang Baan Thalat<br><br>SellF:LTC |
| "We used to be able to find food in the river and forests, now we just buy it at the | "They have also passed a rule on not fishing during Buddhist holy days" Mae | "I would love if my children were able to live in the village, but they don't have fish | "We don't teach the kids because we don't want them to get too | "People don't usually share nets anymore, but they do share places to |

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| market" – Mae Lamtian Pinthong (Baan Don Sumran)<br><br>**SB** | Ora Boontun (Baan Huay Mak Tai)<br><br>**BHD** | careers anymore. Traditional way of life doesn't offer careers anymore"<br><br>Pratim Kamparat (Baan Wangsabang Tai)<br><br>**Mig:LFK** | close to the water, it can be dangerous"<br><br>Por Jumrut Sanorwatee (Baan Na Choom Chon)<br><br>**LFK** | fish with each other"<br><br>Suphan Chan Sawang Baan Thalat<br><br>**Loc:LSG:ShareL** |
| "We used to share food and fish before, but now people just keep their fish for themselves" – Mae Lamtian Pinthong (Baan Don Sumran)<br><br>**LSF** | "Our main source of income comes from fish and laboring" Mae Tussanee Chiangam (Baan Huay Mak Tai)<br><br>**Lab** | "I started fishing when I was about 7 or 8"<br><br>Por Seetun Kongkaew (Baan Wangsabang Tai)<br><br>**FYA** | "Last year I only made one net"<br><br>Por Jumrut Sanorwatee (Baan Na Choom Chon)<br><br>FGH | "We have rules about fishing from the government"<br><br>Suphan Chan Sawang Baan Thalat<br><br>**DoF** |
| "I rarely use my fishing gear or my boat. It's covered in dust. There is also an old cage that I no longer use" – Mae Tim (Baan Kho Tai)<br><br>**LFK** | "In the past, no one needed to leave the village, but now they have to because they have no money" (Mae Tussanee Chiangam (Baan Huay Mak Tai)<br><br>**Mig** | "Me and my son are working on a construction project right now"<br><br>Por Seetun Kongkaew (Baan Wangsabang Tai)<br>**Lab** | "People today just go to Bangkok or Chon Buri to work in Factories"<br><br>Por Jumrut Sanorwatee (Baan Na Choom Chon)<br><br>**Mig** | "Rainy season is better for catching fish than the dry season because less people are fishng in the rainy season"<br><br>Suphan Chan Sawang Baan Thalat<br><br>**Seas** |
| "People today buy ready made fish from the market. The days of fish cooking are done" – Pim Davong (Baan Kho Tai) | "We share the areas, but we don't fish. We don't share, only sell" Mae Tussanee Chiangam (Baan Huay Mak Tai) | "This village makes a lot of brooms to sell as extra income"<br><br>Por Seetun Kongkaew (Baan | "Now the older people look after the children, but they are old. The knowledge skips a generations" | |

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| **SB:LTC** | **SellF:LSF:ShareL** | Wangsabang Tai)<br><br>**BrMak** | Por Jumrut Sanorwatee (Baan Na Choom Chon)<br><br>**Cgrand:LFK** | |
| "Now very few people get together and share fish. Probably because less people are fishing at all" – Wittaya Thongnoi (Baan Don Sumran)<br><br>**LSF** | **"**Everyone feels considerate so they don't really want to borrow gear from each other, like gill nets. People might borrow cast nets though because they are more durable." Mae Tussanee Chiangam (Baan Huay Mak Tai)<br><br>**LSG** | **"**Before the gear was not as advanced as today. The "gill" nets are not the same, they were made out of rope and they weaved them themselves. Now they just buy them.<br><br>Por Seetun Kongkaew (Baan Wangsabang Tai)<br><br>**FGP:FGH** | "Yes I am a fisherman. I also do farming, and labour and construction"<br><br>Boonluan Mingboon (Baan Hua Hew #4)<br><br>**RF:Lab** | |
| "I breed Climbing Perch in my fish pond. Most people breed Tilapia but I think this type is more delicious" – Somchit Phathong (Baan Don Sumran)<br><br>**FP** | "I have 7 children. 3 live in the village and fish for me"- Mae Ora Boontun (Baan Huay Mak Tai)<br><br>**Mig** | **"**I have to adjust nets from the market because they need to fit this environment – sometimes they need to add weight to weigh the nets down. I makes my own nets." - Por Seetun Kongkaew (Baan Wangsabang Tai)<br><br>**FGH:FGP:FGM** | "There are rules by the fisheries department. People cannot use big fishing gear that is too big and no electric fishing, no poison and no explosions" - Boonluan Mingboon (Baan Hua Hew #4)<br><br>**DoF** | |

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| "Almost all the fish I sell is aquaculture fish. I come to the villages everyday and people buy meat and vegetables" – Mae Sam Dii (Baan Don Sumran)<br><br>**SellF:Aqua:Sell Food** | "This area is very rocky, so only a few people have rice farms"- Mae Ora Boontun (Baan Huay Mak Tai)<br><br>**RF** | "I taught my son how to fish, make nets and use a boat" - Por Seetun Kongkaew (Baan Wangsabang Tai)<br><br>**TFK:FGH** | "I fish both in front and behind the dam" - Boonluan Mingboon (Baan Hua Hew #4)<br><br>**Camp** | |
| "We used to share food and fish before, but now people just keep their fish for themselves" – Mae Lamtian Pinthong (Baan Don Sumran)<br><br>**ShareF:LSF** | "I have 5 children, 2 still in the village, the rest live in other provinces" - Mae Tussanee Chiangam (Baan Huay Mak Tai)<br><br>**Mig** | "The price of fish is higher so I fish more for fish and prawns" - Por Seetun Kongkaew (Baan Wangsabang Tai)<br><br>**SellF** | "I wish I could send my children to higher education, but I don't have the money" - Boonluan Mingboon (Baan Hua Hew #4)<br><br>**Edu** | |
| "The 'Bugban' Fish with white scales is gone completely. Plaa Soi, Hua Kiaew, and the Greenhead Soi fish are gone. In the past there were lots of fish and a big catch. Our Relatives would ask for fish and we would give to them for free. Now people don't ask for fish because people | "The best time to catch fish is from April to August, the rain stimulates the fish for migrating and breeding" - Mae Tussanee Chiangam (Baan Huay Mak Tai)<br><br>**Seas** | "In recent times (about 2 – 3 years ago), people have decided not to fish on holy days or during Buddhist lent. This is to let the fish migrate to their habitat and spawn." - Por Seetun Kongkaew (Baan Wangsabang Tai)<br><br>**BHD** | "I taught my daughter to fish, but I would rather her leave and have a better life" - Boonluan Mingboon (Baan Hua Hew #4)<br><br>**TFK:Mig** | |

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| don't catch that many fish" – Mae Mii Santaweesoong (Baan Don Sumran)<br><br>**ShareF:LSF** | | | | |
| "My father taught me how to fish. Before you learn to fish however, you must learn to row the boat. The next step is to use the nets. You learn how to expand the net properly and cast it into the river. After you learn which seasons require certain types of fishing gear, and when you will get the most fish." (Wittaya Thongnoi – Baan Don Sumran)<br><br>**FYA:TFK:LFP :Seas:Gear** | "When my grandpa was fishing, he fished. He didn't have to sell the fish, he just traded and brought the rice home". - Mae Tussanee Chiangam (Baan Huay Mak Tai)<br><br>**TF** | "We share good fishing spots and people take turns catching fish" - Por Seetun Kongkaew (Baan Wangsabang Tai)<br><br>**Loc** | "This knowledge depends on fish resources. Maybe if I had more fish I could preserve this knowledge" - Boonluan Mingboon (Baan Hua Hew #4)<br><br>**LFK** | |
| "They need more information to educate young people on fishing – sharing more info. However it has become harder with technology because people are finding more interesting things | "Children need to go to school. It is free, but they still need to pay for supplies and things" - Mae Tussanee Chiangam (Baan Huay Mak Tai)<br><br>**Edu** | "People borrow the fishing gear but others don't really like lending out their fishing gear because it can get broken easily" - Por Seetun Kongkaew (Baan Wangsabang Tai) | "I want the government to release more fish and prawns" - Boonluan Mingboon (Baan Hua Hew #4)<br><br>**FStock** | |

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| to do rather than fish. There are more options for people." Wittaya Thongnoi – Baan Don Sumran<br><br>**TFK** | | **LSG** | | |
| "Once child is in the village, the other two are in Bangkok" – Por Charlie Wae Wong (Baan Don Sumran)<br><br>**Mig** | "Older people usually stay in the village with their grandchildren" – Mae Tussanee Chiangam (Baan Huay Mak Tai)<br><br>**Cgrand** | "We catch fish, sell fish and make money, especially from tiger fish" - Por Seetun Kongkaew (Baan Wangsabang Tai)<br><br>**SellF** | "I am a local teacher. If you know something you should spread knowledge to others" - Mae Charoen Gongsuk (Baan Hua Hew #11)<br><br>**TFK** | |
| "I "invented" the 'baht' fishing method – using the net for fishing in the twigs. You don't have to use bait because tiger fish like to be in dark places with lots of plants" – Por Charlie Wae Wong (Baan Don Sumran)<br><br>**FGM** | "Buddhist lent is also breeding season so we can't fish at all" - Mae Tussanee Chiangam (Baan Huay Mak Tai)<br><br>**BHD** | "Both EGAT and Royal Irrigation Dpt release fish into the water" - Por Seetun Kongkaew (Baan Wangsabang Tai)<br><br>**FStock** | "My rice farm was close to the river and it would be flooded and affect all living things on the riverbank" - Mae Charoen Gongsuk (Baan Hua Hew #11)<br><br>**RB** | |
| "I sometimes teach young people in the village about fishing. Young people think they will | "They passed a rule on not fishing during Buddhist Holy Days. If you don't fish then they can migrate | "If the fish come from the Mekong they taste better. The flesh is softer because the river is flowing and the fish get more | "We weaved baskets to put fish in" - Mae Charoen Gongsuk (Baan Hua Hew #11) | |

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| have a better life if they go to BKK, they are not interested in fishing either." – Por Charlie Wae Wong (Baan Don Sumran)<br><br>**TFK:Mig** | and breed. But its not so good because they can't make income. For 8 days they get 0 Baht instead of 200-300 Baht" - Mae Ora Boontun (Baan Huay Mak Tai)<br><br>**BHD** | exercise and the taste is delicious. Fish in the Mun are bland because the water is stagnant. Most people in this village fish, raise crickets, make brooms, baskets and farm rice" - Por Petch Najaan (Baan Wangsabang Tai)<br><br>**RF:BrMak:OF** | **FGH** | |
| "I have three children, only one daughter still lives with me in the village" Por Saman Thongnoi (Baan Don Sumran)<br><br>**Mig** | "There are no rules but we are considerate about where others fish" - Mae Tussanee Chiangam (Baan Huay Mak Tai)<br><br>**Loc** | | "Yes I am worried about that the younger generation won't know" - Mae Charoen Gongsuk (Baan Hua Hew #11)<br><br>**LFK** | |
| "We have a nephew that was sent back to live with us at six months" - Por Saman Thongnoi (Baan Don Sumran)<br><br>**Cgrand** | "September to October is the beginning of a season with less fish, so we migrate to Huay Mak Lake to fish instead" - Mae Tussanee Chiangam (Baan Huay Mak Tai)<br><br>**Seas** | | "I want the next generation to learn from and keep the wisdom with them"<br><br>"If you have good wisdom you will have a good life" - Mae Charoen Gongsuk (Baan Hua Hew #11)<br><br>**TFK** | |

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| "In 1992 the dam was constructed, but not finished. There was still a lot of fish in the river, and there were lots of children learning to fish." - Wittaya Thongnoi (Baan Don Sumran)<br><br>**FYA** | "I have been fishing all my life" - Mae Tussanee Chiangam (Baan Huay Mak Tai)<br><br>**FYA** | | | |
| "at the time, different families would share boats. 3 or 4 different families would all go out on one boat to fish together" - Wittaya Thongnoi (Baan Don Sumran)<br><br>**SG** | | | | |
| "In the wet season, I will wake up at 5:00AM and fish until 7:30AM then fish again from 4.30PM to 7.30PM. Dry season from January until May, the water level is lower – I will fish from 3:30AM until 8:30AM. During this time the fish migrate and lay eggs, | | | | |

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| you will catch more fish in the dry season when the fish are migrating" - Wittaya Thongnoi (Baan Don Sumran)<br><br>**Seas** | | | | |
| "What gear you use depends on the season. Sometimes the river changes and you need to adapt your net. "Nam Tao" – fishing gear, you can use it from May – August. However, I am the only one in the town who uses it. "Can (Jan)" – fishing gear to use near the riverbank during May – July." - Wittaya Thongnoi (Baan Don Sumran)<br><br>**Gear:Seas** | | | | |
| "If the fish is a good size I will sell it, if it is small I will keep it" - Wittaya Thongnoi (Baan Don Sumran)<br><br>**SellF** | | | | |
| "went to Bangkok but | | | | |

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| came back after an accident" - Wittaya Thongnoi (Baan Don Sumran)<br><br>**Mig** | | | | |
| "Now very few people get together and share fish – probably because less people are fishing at all." - Wittaya Thongnoi (Baan Don Sumran)<br><br>**ShareF** | | | | |
| "The dam blocks the migration, and some people will wait outside the dam to catch fish, or fish near the dam. A good place to fish is in front of the dam because the fish don't know where else to go so they just stay there." - Wittaya Thongnoi (Baan Don Sumran)<br><br>**Camp** | | | | |
| "Lob is used in the wet season mostly" - Wittaya Thongnoi (Baan Don Sumran)<br><br>**Seas:Gear** | | | | |

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| "Today I fish with my father, but we separate the fist" - Wittaya Thongnoi (Baan Don Sumran)<br><br>**LSF** | | | | |
| "There should be more programs for fishermen" - Wittaya Thongnoi (Baan Don Sumran)<br><br>**Gov** | | | | |
| "There are many fishing gears in the past – net, toom, rods, hooks and casting nets" - Por Charlie Wae Wong<br>Baan Don Sumran<br><br>**FGH** | | | | |
| "Before the dam, I mostly sold my fish and did not really eat them because I has no land. I would trade fish for rice with people who did not fish" - Por Charlie Wae Wong<br>Baan Don Sumran<br><br>**TF** | | | | |
| "In the rainy season it is | | | | |

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| harder to catch fish"<br>Por Charlie Wae Wong<br>Baan Don Sumran<br><br>**Seas** | | | | |
| "I did not teach his own children to fish because they are not interested in fishing" - Por Charlie Wae Wong<br>Baan Don Sumran<br><br>**LFK** | | | | |
| "My parents and grandparents taught me how to fish, I learned by watching and following them to the river" - Por Charlie Wae Wong<br>Baan Don Sumran<br><br>**FYA** | | | | |
| "If the dam was not constructed people would stay and learn to fish, his children wouldn't leave, but they leave because they don't know what else to do or how to make use of the river without the fish." - Por | | | | |

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| Charlie Wae Wong<br>Baan Don Sumran<br><br>**Mig:TFK** | | | | |
| "Before the dam, more women were fishing, now they go to Bangkok and work in factories." - Por Charlie Wae Wong<br>Baan Don Sumran<br><br>**Mig** | | | | |
| "Mae Mi is exceptional with her shrimp trap." - Por Charlie Wae Wong<br>Baan Don Sumran<br><br>**FGM** | | | | |
| "I was a member of the AOP – no position, just an activist" - Por Charlie Wae Wong<br>Baan Don Sumran<br><br>**Lob** | | | | |
| "I still catch fish every day, but I have been a tiger trader for the past 8 years" - Por Charlie Wae Wong<br>Baan Don | | | | |

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| Sumran<br><br>**TF** | | | | |
| "I hope my children will come back to Dom Sumran, but I know they have no choice but to move – maybe if they opened the dam the children would come back." - Por Charlie Wae Wong<br>Baan Don Sumran<br><br>**Mig** | | | | |
| "Fishermen rely on their families for support when not fishing<br>Today, 30% of families in this village earn a living through fishing. Around 80% of families do some fishing as hobby, recreation or occasionally" - Por Charlie Wae Wong<br>Baan Don Sumran<br><br>**Child** | | | | |
| "this pond is not a common thing in the village, especially because I raise | | | | |

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| “Climbing Perch” fish instead of Tilapia” - Somchit Phathong (Baan Don Sumran)<br><br>**FP** | | | | |
| “I got the fish from the department of fisheries” - Somchit Phathong (Baan Don Sumran)<br><br>**Fstock:Gov** | | | | |
| “The Tessaban does have a program for raising Tilapia” - Somchit Phathong (Baan Don Sumran)<br><br>**FRC:Gov** | | | | |
| “I taught her son to farm rice, but not to fish.” - Somchit Phathong (Baan Don Sumran)<br><br>**RF:LFK** | | | | |
| “The fishpond is a family activity, and they help me with it. My son used the tractor to make the pond, and my daughters help | | | | |

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| sell the fish" - Somchit Phathong (Baan Don Sumran)<br><br>**Mech:FP:SellF** | | | | |
| "There is a 100% loss of local knowledge. People lose it because they don't use it" - Por Paliwat Pinthong Baan Don Sumran<br><br>**LFK** | | | | |
| "The policy of the Tessaban is to survive the fishermen. Programs like the fibre glass fishing program are good because they allow people to learn to make boats and make a bit of money" - Por Paliwat Pinthong Baan Don Sumran<br><br>**Fibre:Gov** | | | | |
| "Almost all fish is aquaculture fish" (talking about the fish she sells) - Mae Sam Dii (Ban Don Sumran) | | | | |

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| **Aqua** | | | | |
| "I have 2 children that live in Chon Buri" - Mae Lamtian Pinthong (Baan Don Sumran)<br><br>**Mig** | | | | |
| "I learned how to fish and everything from my parents" - Mae Lamtian Pinthong (Baan Don Sumran)<br><br>**FYA** | | | | |
| "I wish there were more opportunities for people to stay in the village, but most people leave for work and come back" - Mae Lamtian Pinthong (Baan Don Sumran)<br><br>**Mig** | | | | |
| "During this time, some people were compensated differently which created some conflicts in the village. They asked the headman to make a survey about who has | | | | |

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| what fishing equipment, but it wasn't correct because everyone fished, so it should have been equal compensation." - Mae Lamtian Pinthong (Baan Don Sumran)<br><br>**Head** | | | | |
| "I farm during the rice season"<br><br>"I plant Eucalyptus, mango trees, wood and rice" - Por Saman Thongnoi (Baan Don Sumran)<br><br>**RF:OF** | | | | |
| "Education brings a lot of changes. Now we send our kids to child care centre so they can learn how to count basic numbers before primary school." **-** Por Saman Thongnoi (Baan Don Sumran)<br><br>**Edu** | | | | |
| "We don't see the teenagers because they | | | | |

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| study in different cities and they work in different cities, once you are done school you can work in the factory" - Por Saman Thongnoi (Baan Don Sumran)<br><br>**Mig:Edu** | | | | |
| "During the wet season people use nets against the water ways and you can catch some fish in the rough flow. In October you get the best fish because they just go with the flow." - Por Saman Thongnoi (Baan Don Sumran)<br><br>**Gear:Seas** | | | | |
| "I started fishing with my dad when I was young" - Por Tanom Tongnoi (Baan Don Sumran)<br><br>**FYA** | | | | |
| "People grow rice and are more focused on their other jobs than fishing" - Por Tanom Tongnoi | | | | |

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| (Baan Don Sumran)<br><br>**RF** | | | | |
| "Maybe these people didn't start learning early enough or their parents did not provide them knowledge on fishing" - Por Tanom Tongnoi (Baan Don Sumran)<br><br>**LFK** | | | | |
| "Fishing gives only a bit of money, the income is too small; study hard, fishing is not worth the time or money." - Por Tanom Tongnoi (Baan Don Sumran)<br><br>**Edu** | | | | |
| "First we tell our children good locations for good rapids. Teach them fishing methods and location of the fish and where the fish are. Also ideas about when the fish migrate upstream for breeding and choose which | | | | |

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| equipment to use.”<br>Por Tanom Tongnoi (Baan Don Sumran)<br><br>**TFK:Loc:Gear** | | | | |
| “The younger generation, like my children and grandchildren, should try and remember the fishing of the area, where big fish and smaller fish are. They should say ‘look this is where my grandfather fished’. You must first follow, learn, and then pass on.”<br>Por Tanom Tongnoi (Baan Don Sumran)<br><br>**TFK** | | | | |
| “People hire me to cut cassava”<br>Mae Mii Santaweesoong (Baan Don Sumran)<br><br>**Lab** | | | | |
| “I know how to make fermented fish, I leared from my grandparents”<br><br>“I taught my | | | | |

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| children how to make fermented fish, but not to fish themselves" Mae Mii Santaweesoong (Baan Don Sumran)<br><br>**TFK:LFK** | | | | |
| "Children can learn to fish in their free time but studying is more important" - Mae Mii Santaweesoong (Baan Don Sumran)<br><br>**Edu** | | | | |
| "You could ask each other for fish. It's not like that anymore, people no longer really talk to each other because they don't fish together and their boats are farther away from each other" **-** Mae Mii Santaweesoong (Baan Don Sumran)<br><br>**LSF** | | | | |
| "I invented fishing equipment" - Mae Mii Santaweesoong (Baan Don | | | | |

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| Sumran)<br><br>**FGM** | | | | |
| "Children support their parents financially now. My husband and I are old, but we cannot stop fishing because we have to. We have a lot of jobs" - Mae Mii Santaweesoong (Baan Don Sumran)<br><br>**Lab:Child** | | | | |
| "Now many people have diabetes from too much sugar" - Mae Mii Santaweesoong (Baan Don Sumran)<br><br>**SB** | | | | |
| "If my grandson is older, I would take him out to check out the nets or drop the fishing rods. So when I die he can feed his family" - Mae Mii Santaweesoong (Baan Don Sumran)<br><br>**TFK2** | | | | |
| "These days I need to buy fish | | | | |

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| from the market. Those fish come from Aquaculture or captive Breeding" – Mae Tim (Baan Kho Tai)<br><br>**Aqua:SB** | | | | |
| "We never eat a giant catfish, only sell it" - Mae Tim (Baan Kho TaI)<br><br>**SellF** | | | | |
| "People share their fishing gear" - Mae Tim (Baan Kho TaI)<br><br>**SG** | | | | |
| "I have not fished in a long time. People today buy ready-made fish from the market. The days of fish cooking are done" - Pim Davong (Baan Kho Tai)<br><br>**LTC:SB** | | | | |
| "I provide fish quality data to NGOs but the government doesn't seem to care" - Amporn Chai Tadum (Baan Kho Tai)<br><br>**Lob** | | | | |

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| "Before the Dam there were lots of fish. November used to be a good time for fishing" - Amporn Chai Tadum (Baan Kho Tai)<br><br>**Seas** | | | | |

## APPENDIX C

## TABLE OF CODES AND DATA

| Diversifications to Fishing Practices | | Fishing | | | |
|---|---|---|---|---|---|
| | | | # of Interviewees | # of Quotes about Theme | # of people interviewed in each community |
| | Historic | Fishing Gear - Homemade (FGH) | 4 | 7 | Baan Wangsabang Tai (1) Baan Hua Hew #11 (1) Baan Na Choom Chon (1) Baan Don Sumran (1) |
| | | Fishing from a young age (FYA) | 8 | 11 | Baan Don Sumran (4) Baan Wangsabang Tai (1) Baan Huay Mak Tai (2) Baan Na Choom Chon (1) |
| | | Sharing Fish (ShareF) | 3 | 3 | Baan Don Sumran (3) |
| | | Sharing of fishing gear (SG) | 2 | 2 | Baan Don Sumran (1) Baan Kho Tai (1) |
| | | Utilizing Riverbank to grow materials for gear (RB) | 3 | 5 | Baan Wangsabang Tai (1) Baan Na Choom Chon (1) Baan Hua Hew #11 |
| | | Trading Fish (TF) | 2 | 4 | Baan Don Sumran (1) Baan Huay Mak Tai (1) |
| | | Transmission of Fishers' Knowledge (TFK) | 7 | 13 | Baan Don Sumran (4) Baan Wangsabang Tai (1) Baan Hua Hew #11 (1) Baan Hua Hew #4 (1) |
| | | | | | |
| | Contemporary | Fishing gear - purchased (FGP) | 3 | 5 | Baan Wangsabang Tai (1) Baan Huay Mak Tai (1) Baan Thalat (1) |
| | | Fishing gear - modifications (FGM) | 4 | 6 | Baan Don Sumran (3) Baan Wangsabang Tai (1) |
| | | Fishing gear - homemade (FGH) | 4 | 7 | Baan Wangsabang Tai (1) Baan Hua Hew #11 (1) Baan Na Choom Chon (1) Baan Don Sumran (1) |
| | | Storebought Fish (SB) | 2 | 6 | Baan Don Sumran (2) Baan Kho Tai (2) |
| | | Less sharing of fish (LSF) | 5 | 8 | Baan Don Sumran (3) Baan Huay Mak Tai (1) |

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| Less sharing of fishers' knowledge (LFK) | 12 | 20 | Baan Don Sumran (5) Baan Wangsabang Tai (1) Baan Na Choom Chon (1) Baan Thalat (1) Baan Doom Yai (1) Baan Hua Hew #4 (1) Baan Kho Tai (1) Baan Hua Hew #11 (1) |
| Transmission of Fishers' Knowledge (TFK2) | 1 | 1 | Baan Don Sumran (1) |
| Irrigation to fish ponds (Ir) | 1 | 1 | Baan Wangsabang Tai (1) |
| Fish Ponds to Raise Fish (FP) | 1 | 4 | Baan Don Sumran (1) |
| Fish Raising Course from Tessaban (FRC) | 1 | 1 | Baan Don Sumran (1) |
| Less traditional cooking (LTC) | 3 | 4 | Baan Kho Tai (1) Baan Doom Yai (1) Baan Thalat (1) |
| Aquaculture (Aqua) | 2 | 4 | Baan Don Sumran (1) Baan Kho Tai (1) |
| Fish stocking (Fstock) | 5 | 6 | Baan Thalat (1) Baan Hua Hew #4 (1) Baan Doom Yai (1) Baan Wangsabang Tai (1) Baan Don Sumran (1) |
| Prefer to sell fish instead of eat (SellF) | 8 | 9 | Baan Don Sumran (3) Baan Wangsabang Tai (1) Baan Thalat (1) Baan Huay Mak Tai (1) Baan Don Sumran (1) Baan Kho Tai (1) |
| Travelling to fishing locations (TravFL) | 2 | 4 | Baan Na Choom Chon (1) Baan Huay Mak Tai (1) |
| Mechanization to create fish pond (Mech) | 1 | 1 | Baan Don Sumran (1) |
| Protected Areas (PA) | 2 | 3 | Baan Huay Mak Tai (1) Baan Thalat (1) |
| No Fishing on buddhist holy days (BHD) | 3 | 5 | Baan Huay Mak Tai (2) Baan Wangsabang Tai (1) |
| Less Sharing of Gear (LSG) | 3 | 4 | Baan Wangsabang Tai (1) Baan Thalat (1) Baan Huay Mak Tai (1) |
| Fibreglass Boat Course from Tessaban (Fibre) | 2 | 3 | Baan Don Sumran (2) |
| "Camping" in front or behind dam (Camp) | 2 | 2 | Baan Hua Hew #4 (1) Baan Don Sumran (1) |

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| Other livelihood diversifications | | Irrigation to fish ponds (Ir) | 1 | 1 | Baan Wangsabang Tai (1) |
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| | | Rural-Urban Migration (Mig) | 9 | 20 | Baan Don Sumran (4) Baan Wangsabang Tai (1) Baan Huay Mak Tai (2) Baan Na Choom Chon (1) Baan Hua Hew #4 (1) |
| | | Education (Edu) | 7 | 10 | Baan Don Sumran (4) Baan Huay Mak Tai (1) Baan Hua Hew #4 (1) Baan Wangsabang Tai (1) |
| | | Mechanization for farming (MechFarm) | 2 | 2 | Baan Don Sumran (2) |
| | | Rice Farming (RF) | 8 | 15 | Baan Don Sumran (2) Baan Wangsabang Tai (2) Baan Hua Hew #4 (1) Baan Hua Hew #11 (1) Baan Huay Mak Tai (1) Baan Doom Yai (1) |
| | | Other Farming (OF) | 3 | 4 | Baan Don Sumran (1) Baan Hua Hew #4 (1) Baan Wangsabang Tai (1) |
| | | Labouring (Lab) | 4 | 8 | Baan Don Sumran (1) Baan Wangsabang Tai (1) Baan Huay Mak Tai (1) Baan Hua Hew #4 (1) |
| | | Selling Food (SellFood) | 1 | 1 | Baan Don Sumran (1) |
| | | Children sending money to parents (Child) | 3 | 3 | Baan Don Sumran (3) |
| | | Broom-making (BrMak) | 3 | 5 | Baan Wangsabang Tai (3) |
| | | Children raised by grandparents (Cgrand) | 3 | 4 | Baan Huay Mak Tai (1) Baan Na Choom Chon (1) Baan Don Sumran (1) |
| | | Use of herbicides/pesticides/fertilizer (Chem) | 1 | 3 | Baan Doom Yai (1) |
| | | Mobile Markets (MobM) | 3 | 3 | Baan Don Sumran (1) Baan Wangsabang Tai (1) Baan Na Choom Chon (1) |
| | | | | | |
| | | Using appropriate gear for the season (Gear) | 4 | 6 | Baan Don Sumran (3) Baan Wangsabang Tai (1) |

| | | | | | |
|---|---|---|---|---|---|
| | | Learning about locations to fish (Loc) | 4 | 5 | Baan Don Sumran (1) Baan Huay Mak Tai (1) Baan Wangsabang Tai (1) Baan Thalat (1) |
| | | Fishing in Rice Farms, Wetlands, Fish Ponds and Tributaries (FRF) | 1 | 1 | Baan Doom Yai |
| | | Transmission of Fishers' Knowledge (TFK) | 7 | 13 | Baan Don Sumran (4) Baan Wangsabang Tai (1) Baan Hua Hew #11 (1) Baan Hua Hew #4 (1) |
| | | Continuous Observation of dynamics of the year (Seas) | 6 | 10 | Baan Don Sumran (3) Baan Huay Mak Tai (1) Baan Kho Tai (1) Baan Thalat (1) |
| | Community | Headman (Head) | 1 | 1 | Baan Don Sumran (1) |
| | | Sharing Fishing Areas but not Fish (ShareL) | 2 | 3 | Baan Huay Mak Tai (1) Baan Thalat (1) |
| | | Trading Fish (TF) | 2 | 4 | Baan Don Sumran (1) Baan Huay Mak Tai (1) |
| | | | | | |
| | State | Respect of the Boundaries of the National Park (NP) | 1 | 1 | Baan Huay Mak Tai (1) |
| | | No Fishing on Buddhist Holy Days (BHD) | 3 | 5 | Baan Huay Mak Tai (2) Baan Wangsabang Tai (1) |
| | | Working with the Government - Tessabaan (Gov) | 5 | 7 | Baan Don Sumran (4) Baan Thalat (1) |
| | | Lobbying the Government through Community Networks Ex: AoP (Lob) | 3 | 3 | Baan Don Sumran (1) Baan Kho Tai (1) Baan Hua Hew #11 |
| | | Fisheries Department Rules about Fishing (DoF) | 2 | 2 | Baan Hua Hew #4 (1) Baan Thalat (1) |

# Appendix D

# MEKONG ETHICS APPROVAL

## Notification of Approval

| | |
|---|---|
| Date: | September 7, 2016 |
| Study ID: | Pro00066279 |
| Principal Investigator: | Brenda Parlee |
| Study Title: | Tracking Change in the Lower Mekong River Basin |
| Approval Expiry Date: | Wednesday, September 6, 2017 |

| Approved Consent Form: | Approval Date | Approved Document |
|---|---|---|
| | 9/7/2016 | Information Sheet |
| | 9/7/2016 | Consent Form |

Sponsor/Funding Agency: SSHRC - Social Sciences and Humanities Research Council SSHRC

RSO-Managed Funding:

| Project ID | Project Title | Speed Code | Other Information |
|---|---|---|---|
| RES0028492 | UAlberta VPR Support | ZE236 | |
| RES0027949 | SSHRC PG Tracking Change | ZE420 | |
| RES0028089 | UAlberta Faculty Support | ZE235 | |

Thank you for submitting the above study to the Research Ethics Board 1. Your application has been reviewed and approved on behalf of the committee.

A renewal report must be submitted next year prior to the expiry of this approval if your study still requires ethics approval. If you do not renew on or before the renewal expiry date, you will have to re-submit an ethics application.

Approval by the Research Ethics Board does not encompass authorization to access the staff, students, facilities or resources of local institutions for the purposes of the research.

Sincerely,

Anne Malena, PhD
Chair, Research Ethics Board 1

*Note: This correspondence includes an electronic signature (validation and approval via an online system).*