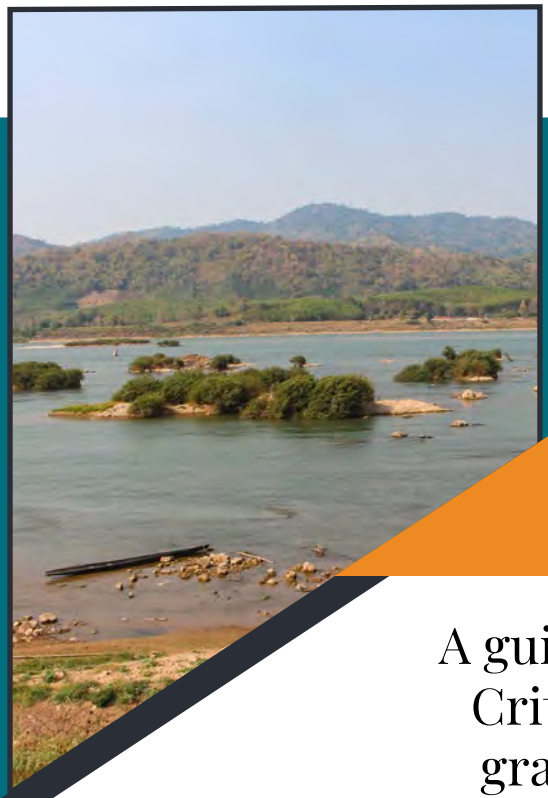
Establishing and Managing Freshwater Fish Conservation Zones with Communities



A guide based on lessons learned from Critical Ecosystem Partnership Fund grantees in the Indo-Burma Hotspot

FISHBIO
CRITICAL ECOSYSTEM PARTNERSHIP FUND

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Table of Contents

Supplemental Materials

Table of Contents Cont.

Introduction

Freshwater environments provide valuable benefits to communities around the world in the form of food, water, livelihoods, and natural materials. In particular, freshwater fisheries play a critical role as a source of protein, micronutrients, and income, especially for rural or impoverished people, as they are often more readily accessible than marine fisheries. However, both freshwater ecosystems and the fish species that inhabit them are among the most imperiled in the world, and face a host of threats ranging from degradation and fragmentation to overharvesting, pollution, and climate change. Interventions are urgently needed to help conserve freshwater fishes and their important habitats.

Mekong landscape, Lao PDR

Fish in FCZ, Thailand

© Aaron Koning

In the last few decades, many countries have decentralized natural resources management, which in some cases has created opportunities for communities to participate in the resource management process, such as through community forests or community fisheries. This approach empowers communities to take responsibility for sustainably managing the resources they depend on, and allows them to respond to threats at a local level in a timely way.

One strategy for conserving freshwater fish populations is the establishment of a type of freshwater protected area, commonly referred to as a **Fish Conservation Zone** (FCZ).* Some of the first formally recognized FCZs in Southeast Asia were established in Lao People's Democratic Republic (Lao PDR) in the 1990s (Baird 2006), and now more than 1,300 FCZs exist in Lao PDR alone (Ounboundisane et al. 2019). Since 2008, the Critical Ecosystem Partnership Fund (CEPF) has supported 13 grantees to establish and manage FCZs in the Indo-Burma Hotspot in the countries of Cambodia, Lao PDR, Myanmar, Thailand, and Vietnam. This guide provides a tool for replicating the FCZ approach using best practices. It also synthesizes some of the key successes, challenges, and lessons learned by CEPF grantees and other conservation practitioners in order to transfer knowledge from the Indo-Burma Hotspot to a global audience. Case studies of FCZ experiences are referred to by number throughout the guide, and can be found in their entirety at the end.

* This model may go by different names, including Fish Conservation Area (used in Cambodia), fish reserve, fish refuge, or fish sanctuary.

What are Fish Conservation Zones?

Fish Conservation Zones are a type of **freshwater protected area.** As a form of spatial management, they restrict or limit fishing and other human activities in a particular location with the objective of protecting fish or other freshwater life. Just like terrestrial or marine protected areas, freshwater protected areas can be implemented at a range of management levels, from top-down, government-led initiatives to bottom-up community-led initiatives. In this guide, FCZs refer to a type of freshwater protected area in which communities play a significant role in their establishment and management. Most of the examples in this guide illustrate a co-management model, in which responsibilities are shared between communities and the government.

FCZs can be used to prohibit or regulate human activities in discrete areas in order to protect important habitats. Regulations that can be incorporated into an FCZ include:

1. **When** fishing is allowed (e.g., never, only during particular seasons, only for special occasions, etc.)
2. What types of **fishing gear** are allowed (e.g., none, only traditional nets and traps, only fishing from the shore with hook and line, etc.)
3. Which fish (or other aquatic animal) **species** or **sizes** may be harvested (e.g., none, only fast-growing species, only adult fish that are not in spawning condition, etc.)

In practice, the most common type of FCZ established in the Indo-Burma Hotspot tends to be a **"no-take" zone**, where fishing with any type of gear for any species is prohibited all year. This is often because enforcing and communicating the principle of a no-take zone is relatively straightforward in theory: no one should be fishing in the protected area in any way at any time. However, the regulations of an FCZ should be tailored to meet a community's needs.

It is important to note that FCZs are just one strategy for managing fish populations. If a community does not wish to restrict fishing in a particular area, the other types of regulations listed above (i.e., regulating fishing times, gears, and species), could be used to manage fisheries without implementing an FCZ.

FCZ boundary sign, Lao PDR

How do Fish Conservation Zones work?

Benefits to Fish Populations: FCZs help address the threat of overharvest by removing fishing pressure on fish populations within their borders. This can allow fish species to reproduce (spawn) and increase in size and abundance. Spawning is essential for the sustainability of a fish population to ensure the continuity of future generations; therefore, FCZs are often most effective when established in key fish habitats such as **spawning grounds** or **refuge areas**. FCZs can also provide a refuge for large-bodied fish that are often targeted by fishing, and that often produce the most offspring.

FCZs do not benefit all fish species equally, and those that are likely to demonstrate benefits most

quickly are those that reproduce rapidly and that stay in the vicinity of the FCZ. It is harder to protect highly migratory species with FCZs; however, these fishes may still derive benefits if FCZs protect habitats important to key stages of their life cycles (e.g., spawning areas), or if a network of FCZs provides a series of refuges along their migration routes.

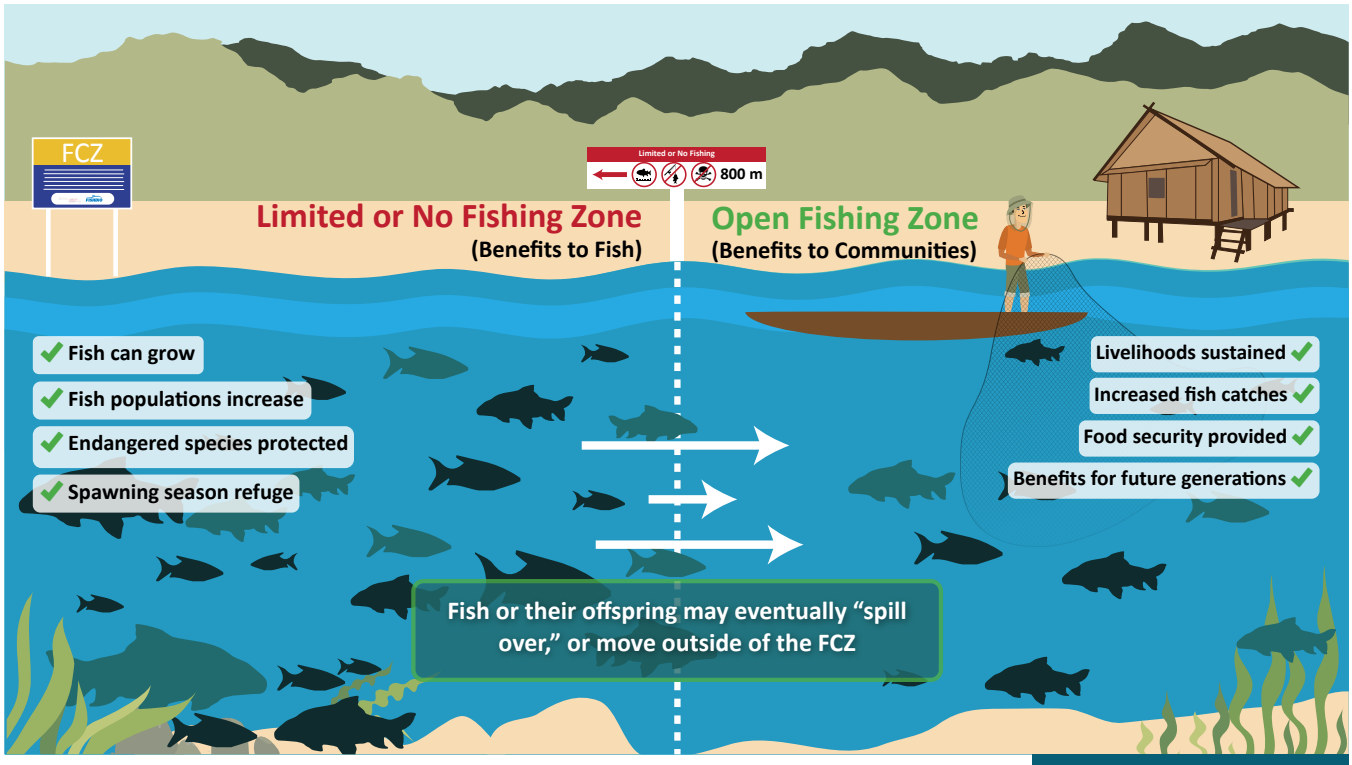
Benefits to Aquatic Ecosystems: In addition to fishing, FCZs may regulate other human activities, such as harvesting plants, mining gold, or dredging sand. Protecting aquatic habitat from human disturbance may benefit the entire ecosystem, and FCZs may therefore help increase biodiversity and improve natural processes within their borders.

Benefits to Local Communities: There are two main ways that FCZs can theoretically support local fisheries directly and help bolster food security and income through a process called **spillover**:

1. If fish populations increase in abundance inside an FCZ, some individuals may eventually "spill over," or leave the FCZ boundaries in search of additional food or habitat, and may be caught by fishers.

2. If fishes are allowed to reach reproductive age or spawn inside an FCZ, their offspring may "spill over" to unprotected areas where they can be caught by fishers.

It should be noted that FCZs are primarily a solution in response to overfishing, and that other interventions will be needed to address additional threats to fishes and freshwater habitats. FCZs alone cannot address large-scale threats such as hydropower development, habitat degradation, or climate change; however, they may be able to provide some resilience to fish populations and local communities to cope with these larger threats.



FCZ spillover concept

What is the purpose of this guide?

This guide provides a **step-by-step overview** of the best practices for **creating, managing, and monitoring community-based FCZs.** It is a tool intended to empower staff at civil society organizations who wish to help communities establish FCZs to manage fisheries resources. This guide also **synthesizes key lessons** that CEPF grantees and other conservation practitioners have learned in the Indo-Burma Hotspot about this process in order to inform others interested in replicating the FCZ model. These lessons are presented as numbered case study examples throughout the guide. With this approach, the guide is intended to facilitate the replication of community-based FCZs as a successful fisheries management strategy.

Who is this guide for?

This guide is primarily designed for staff of **civil society organizations** and **government agencies** working in the fields of biodiversity conservation, rural development, agriculture, or natural resource management who wish to facilitate the process of fisheries management and conservation with interested local communities. It may be valuable to other stakeholders as well, provided that they have a basic level of knowledge about natural resource management techniques, community engagement, and scientific methods.

Fauna & Flora International staff checking a fish trap on Indawgyi Lake, Myanmar

WARECOD staff greeting a community member at Na Hang Reservoir, Vietnam

FCZ Implementation Checklist

The following checklist is a summary of the key management steps that can be used to guide the establishment and management of an FCZ.

Understanding Context

Identify legal framework and requirements

- ☑ Is there a **legal basis** for community involvement in FCZ management?
- ☑ Will this FCZ seek **government approval**?
- ☑ Which **government departments** should be involved at which steps?
- ☑ Which **documents** are legally required and what they should contain?
- ☑ What is the **approval timeline**?

Observing Social Safeguards

- ☑ Identify **vulnerable individuals** in the community who could be impacted by FCZ regulations and how
- ☑ Conduct interviews or surveys to document **potential impacts** and **community concerns**
- ☑ Engage **marginalized groups** like women or youth
- ☑ Plan to **regularly revisit issues** throughout the fisheries management cycle
- ☑ Establish a **grievance mechanism**

Fisheries Management Cycle

Phase 1: Evaluate Fisheries Situation (Problems and Solutions)

- ☑ Hold community discussions about:
  - ☑ **Trends in catches** or observations of fish populations and other aquatic resources compared to prior years or generations
  - ☑ Ideas of why the fishery has changed and **potential threats**
  - ☑ Any **target species** of conservation concern
  - ☑ Potential **management strategies to address threats**, such as FCZs
- ☑ Have the community **decide which management strategy(s)** to pursue

Phase 2: Develop Fisheries Regulations and Write Management Plan

- ☑ **Identify goals and objectives** of the management plan
- ☑ Describe the **management strategies** that will be employed
- ☑ **Select and map a site** for the FCZ based on relevant criteria
- ☑ Decide on **regulations and penalties** for the FCZ (and other management strategies)
- ☑ Identify and assign **roles and responsibilities** for FCZ management
- ☑ Develop **patrolling and enforcement** protocols

- ☑ Develop a **budget and financing** mechanism for the FCZ
- ☑ Develop a **monitoring plan** for the FCZ
- ☑ Develop a community **outreach and engagement plan** for the FCZ
- ☑ Determine the process for **changing FCZ regulations**
- ☑ Obtain **community approval** of FCZ regulations and management plan
- ☑ Obtain relevant **government approval** of FCZ regulations and management plan

Phase 3: Implement FCZ Management Strategies

- ☑ Demarcate **FCZ boundaries**
- ☑ **Disseminate regulations** widely
- ☑ Implement community **outreach and awareness** raising
- ☑ Integrate **cultural beliefs** with management
- ☑ Provide **capacity building** and training
- ☑ Implement **patrolling and enforcement**
- ☑ Implement a strategy for **addressing conflict** as it arises
- ☑ Perform **habitat restoration** or improvement
- ☑ Integrate management with **tourism** or other **alternative livelihoods**
- ☑ Seek **networking** opportunities

Phase 4: Monitoring

- ☑ Identify appropriate **indicators** of FCZ effectiveness
- ☑ Develop an **assessment plan** and **select methods** to measure indicators
- ☑ Implement sampling methods to **collect data**

Phase 5: Evaluation

- ☑ Perform **quality control** of data
- ☑ Perform **analysis** of the data at regular intervals (e.g., seasonally, annually)
- ☑ **Evaluate** the strengths and weaknesses of the FCZ based on assessment results

Phase 6: Communication and Dissemination

- ☑ **Identify stakeholder groups** to communicate results to
- ☑ **Summarize results** in formats appropriate for each stakeholder group
- ☑ Present any **recommendations for management** based on assessment results

Phase 7: Adjust Management Strategies

- ☑ Discuss with the management committee whether and how to **adjust FCZ regulations** or management protocols.
- ☑ **Implement** any agreed-to changes (repeat Phase 3)

Repeat

- ☑ Plan for the **next FCZ assessment** and repeat Phases 4-7

Identify the Legal Framework and Requirements for Fish Conservation Zones

☑ Is there a legal basis for community involvement in FCZ management?

Before proceeding with the FCZ establishment process, it is important to determine whether a legal framework exists in your country for community participation in freshwater fisheries management, particularly with regards to setting and enforcing regulations. This is especially important when establishing a co-management model where responsibility is shared between the government and communities. There may be a specific government process to follow in order to formally approve and recognize a co-managed FCZ, and it will be important to coordinate with the relevant government officials at each step.

If a legal framework for co-management does not exist, there may still be formal rules for stakeholder groups such as communities to provide input in the regulation-setting process of freshwater protected areas. It may also be possible for communities to independently establish FCZs in waters they have jurisdiction over, and to agree to internally regulate fishing activities within the community. However, it may be challenging to enforce such regulations that do not have government backing if people from outside the community come to fish in the FCZ and do not respect the community's authority.

☑ Will this FCZ seek government approval?

One of the benefits of receiving government approval under a formalized co-management process is that government recognition can give communities the ability to enforce FCZ regulations against outsiders. The government may also support the community's efforts by assisting with patrolling or by providing financial resources, and can help settle disputes or prosecute violations of the FCZ regulations that communities may not be able to do on their own. This form of management requires a good deal of trust and communication between communities and the local government, and building these relationships is an integral part of co-management projects.

> "We have to keep in touch with the communities; that is very important. Formerly, the relationships between the communities and government departments were very weak in our country. There was a big gap in communication. Communication is very important for trust building. So we try to bring together communities and government staff in every meeting, to work together very closely. Communication between government staff and the community is very important to achieve the goal of the FCZ approach."
>
> ***— Zau Lunn, Fauna & Flora International, Myanmar (Case Study 8)***

☑ Determine which government departments should be involved at which steps

Even if communities have the legal ability to establish an FCZ, they may lack the resources or familiarity with the legal steps and required documentation to complete the process on their own. Therefore, civil society organizations often play a facilitating role in connecting communities with government, overseeing the FCZ establishment process, and providing relevant training and capacity building to support effective community fisheries management. This includes building relationships with the relevant authorities from the beginning of a project, who might include people in administrative positions (such as heads, councilors, or governors) or government staff from fisheries or environmental departments. In best-case scenarios, government officials and local authorities are responsive to community needs, and can even become advocates for their issues.

Zau Lunn from FFI working with a village head to approve FCZ regulations in Indawgyi Lake, Myanmar

☑ Determine which documents are legally required and what they should contain

The government may require communities to submit formal documents to recognize an FCZ, which may include **FCZ regulations**, **a management plan**, and **a map**. It is important to determine which documents you will need to help the communities prepare, and identify who may need to approve them within the community, as well as which government departments they should be submitted to for review and approval.

Case Studies 1-5: Cambodia

Under the Cambodian fisheries law, each community fisheries group must complete three types of legal documents based on templates provided by the government. These documents cover the establishment and management of a community fishing area (a managed fishing area where the gear types used by the community are regulated), and a community fish conservation area (i.e., a no-take FCZ). The documents include:

1. **By-Laws:** These are mostly stipulated by the government and include guidelines for:

- Conditions for becoming a member in a community fishery
- Rights of members
- Financial management and bookkeeping
- Roles and responsibilities of the community fisheries committee
- Function of the community fisheries congress (the highest-level meeting of the community fisheries group for decision making)
- Elections
- Dissolution or dispute resolution
- Amending by-laws and internal rules

2. **Internal Rules:** These are mostly stipulated by the government, although the community can decide which types of fishing gears may be used in the community fishing area. Contents include:

- Rules and conditions for community fisheries membership
- Punishment procedures for breaking the rules
- Permitted types and numbers of fishing gear
- Rules regarding fishers who are not members of the community fishery

3. **Management Plan:** The details of this template are filled in by the community. Contents include:

- A description of the community, its demographics, and livelihoods
- Location and description of community fishing grounds
- Location and description of community fish conservation areas (FCZs)
- List of key fisheries species and habitats
- List of fishing gears and boats in the community
- Estimated yearly fish catch
- Vision and objectives of the community fishery
- Plans for use of fishing gears, improving fishing grounds, establishing FCZs, managing flooded forest, developing aquaculture, and securing financial support

FCZ management revision meeting with community and local authorities, Cambodia

Case Study 6: FISHBIO, Lao PDR

In Lao PDR, the government template for FCZ regulations includes the following information:

- Objective, location, and size of the FCZ
- The regulations of the FCZ (which fishing gears are prohibited)
- Penalties for violators, including the amount to be fined for each offence using a particular gear
- How collected fines will be distributed among the village fund, enforcement team, management committee, and any individuals who report violators (percentage to be distributed to each)
- Names of management committee members, and the rights and responsibilities of each role

☑ Understand the approval timeline

The timeline for receiving government approval of FCZs can vary widely depending on the responsiveness of the relevant government officials, and whether there is an established legal pathway for FCZ approval, or whether one must be created. Establishing FCZs can be a learning experience for all involved, especially the first time going through the entire process. It is therefore important for a project to have realistic expectations and flexibility around timelines and to be prepared for delays.

> “Normally it takes about six months for the process of consultation in the village and document support, and the process at the district level will take about three months up to five months, so for the project cycle to complete all FCZ requirements until dissemination is about one year.”
>
> *— Sinsamout Ounboundisane, FISHBIO, Lao PDR (Case Study 6)*

Examples from the Indo-Burma Hotspot

The legal framework for FCZs in the Indo-Burma Hotspot varies by country, offering examples from across the spectrum. The respective fisheries laws in **Cambodia** and **Lao PDR** have specific articles that allow community fishery co-management activities, such as the creation of FCZs. In both countries (Case Studies 1–7), CEPF grantees followed a widely recognized government process to seek approval of FCZ regulations, often from the most local government department responsible for fisheries or administration.

In **Thailand**, communities are able to establish and enforce FCZs without government approval (Case Studies 10 and 11). These cases are more likely to succeed if the community has a high level of management capacity and resources for management, and if neighboring communities recognize and respect their authority.

In **Myanmar**, freshwater fisheries are managed at the state or regional level. Fauna & Flora International (FFI) recognized that

while the government had previously set up top-down freshwater protected areas in places such as Indawgyi Lake in Kachin State, the state had no legal framework for community involvement in establishing FCZs (Case Study 8). FFI has convened multiple meetings with state and national officials to draft legislation for co-management of FCZs that will hopefully be included in the next revision of the state fisheries law. In the meantime, they have worked with the Department of Fisheries to obtain government approval and recognition of individual community FCZs in their projects on a case-by-case basis.

In contrast, in the Sagaing Region of Myanmar where the Turtle Survival Alliance and Wildlife Conservation Society are working on the Chindwin River, the river is divided into fishing concessions that must be purchased from the government every year in order to regulate fishing or establish FCZs (Case Study 9). Renewing a fishing concession annually is cost prohibitive for most communities, and is one of the challenges that has prevented the adoption of FCZs on the Chindwin River, except in one village where TSA and WCS have annually purchased the concession.

In **Vietnam**, a legal framework for community co-management did not exist when the Center for Water Resources Conservation and Development (WARECOD) began working in Tuyen Quang Province in 2009 (Case Study 12). WARECOD held repeated discussions to introduce the concept of co-management to government authorities, which some did not initially support because they believed that communities did not have the capacity to be involved in management. WARECOD worked to convince government officials to shift their perspective by being conscious about their choice of language.

> “Some governments do not think that people can play the role of management. They think management is a very big role. But indeed, it can be a very simple thing, being involved in sustainable use. We can talk about the role of community people in decision making as co-management.”
>
> ***— Nguyen Thi Ngoc Lan, WARECOD (Case Study 12)***

By 2013, Tuyen Quang Province issued a decree to implement aquatic co-management as a result of WARECOD’s work. In 2017, Vietnam included co-management in the revision of the fishery law for the entire country. Discussions with ministry-level officials about WARECOD’s activities during the law revision may have contributed to this inclusion. While no-fishing areas (FCZs) are dictated by the government, communities can play an active role in enforcing who is allowed to fish where and educating each other about not using destructive fishing tools or polluting the aquatic environment.

WARECOD co-management sign at Na Hang Reservoir, Vietnam

Implementing Social Safeguards when Establishing FCZs

☑ Identify vulnerable individuals in the community who could be impacted by FCZ regulations and how

Before pursuing an FCZ, it is important to identify who in the community could be impacted by the regulations and how. FCZs typically limit fishing activities within their boundaries, and therefore may restrict community access to natural resources such as fish or other aquatic animals. This may particularly impact community members who solely depend on fisheries for their food or income, or those without boats who cannot easily access other fishing areas. Considerations should be made when designing the FCZ to **minimize adverse effects** on the community. For example, the most productive fishing ground may not be an ideal location for establishing an FCZ if the negative impacts on community access outweigh the benefits of conservation.

☑ Conduct interviews or surveys to document potential impacts and community concerns

It is important to consider whether the people making decisions about an FCZ are representative of the diverse views within the community. The whole community may not be able to attend meetings where decisions are made regarding an FCZ because of their livelihood responsibilities or other factors. Community members may also not feel comfortable voicing their opposition or concerns about an FCZ in a public meeting. Therefore, individual interviews should also be conducted in addition to group discussions to try to capture as many **representative viewpoints and concerns** as possible, especially from community members most dependent on fisheries and aquatic resources. After an FCZ is established, interviews can be used to gauge community satisfaction or dissatisfaction with the FCZ regulations and management, and assess whether any changes should be made, or whether more outreach and awareness raising is needed to build support.

☑ Engage marginalized groups like women or youth

Disadvantaged groups like **poor households**, **women**, or **youth** can be encouraged and supported to participate in the process of natural resource management, which can lead to increased equity in rural communities. This includes encouraging their participation and seeking their opinions about FCZs, which may need to happen outside formal project meetings related to FCZ establishment.

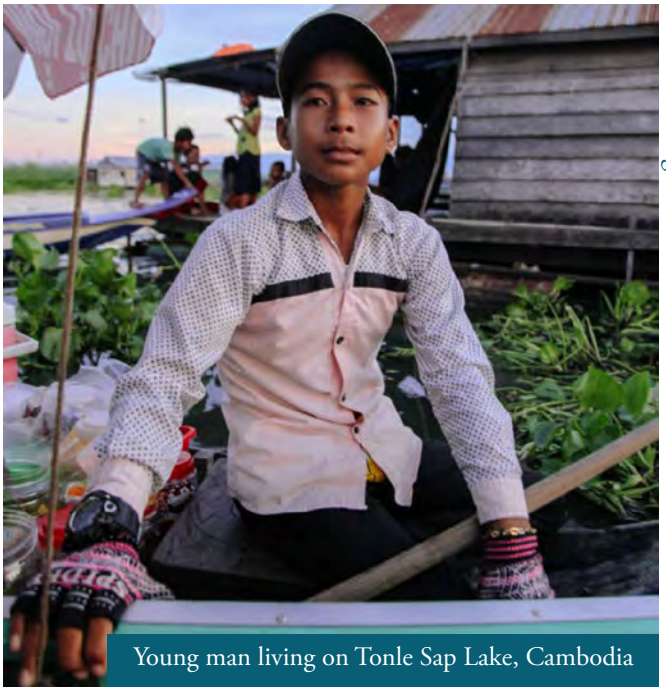
FISHBIO staff interviewing a woman at her home, Lao PDR

It can often be challenging for women to take an active role in FCZ management, especially if there is no local precedent for women holding leadership roles, if the FCZ is located in an area where women do not traditionally fish (such as in large rivers), and if patrolling may require traveling far from the village or at night. However, women can be active in monitoring the FCZ if it is located near the village as they go about their daily tasks, and can help inform and educate community members about FCZ regulations. Their support can also be very important because some women have to take on additional work to allow their family members to participate in FCZ patrolling or management, and it is important to acknowledge this increased labor burden. It may also be possible to engage women in managing the types of fisheries and harvest of other aquatic animals that they participate in.

Implementing livelihood improvement activities that empower women and give them more financial resources (such as through savings groups, see Case Study 1) allows them to make financial contributions to community fisheries activities and can shift the balance of power, giving women a voice in fisheries management decisions.

Youth are another key group to engage in the FCZ establishment and management process to help develop the community's next generation of fish conservation leaders.

> "We try to build up youth because they are very important for the next generation. Without giving capacity to them, they don't know what happens in their village. We try to involve them in discussions to analyze their community, to understand 'What happens in my village? What happens in the next 10 years if we don't have resources, if we don't have people to run this organization?'"
>
> ***— Srey Marona, The Learning Institute (Case Study 3)***

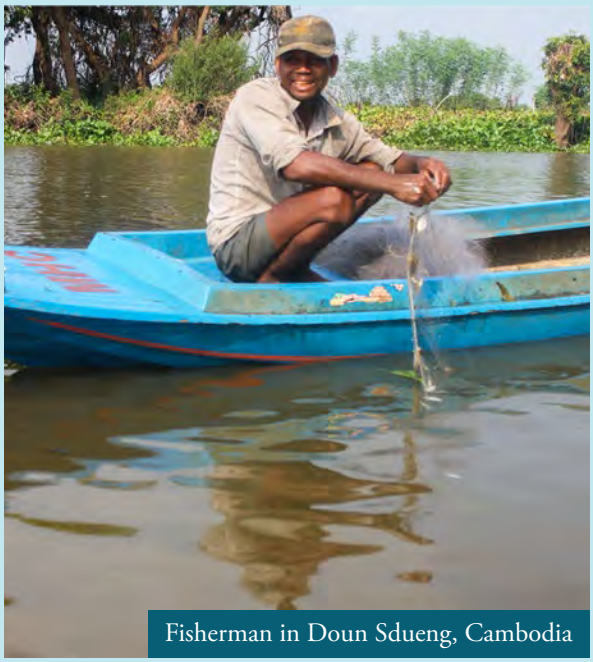


Young man living on Tonle Sap Lake, Cambodia

☑ Plan to regularly revisit issues throughout the FCZ management process

Community concerns should be taken into consideration both during the design and implementation of an FCZ, and revisited regularly throughout the FCZ management process. It is important for staff from facilitating organizations to recognize how biases may shape their perceptions of resource use and understanding of FCZ impacts. For example, those with expertise in fisheries may not be aware of other uses of the waterbody, such as recreational or spiritual uses. Regularly interviewing or talking with a diversity of community members can help identify whether the FCZ is adversely affecting individual access to food or income, or impacting traditional or cultural uses of the aquatic environment. Such interviews can also be used to assess the level of community satisfaction with the FCZ.

Case Study 3: The Learning Institute, Cambodia



© The Learning Institute

Fisherman in Doun Sdueng, Cambodia

A few families who normally fished in the proposed FCZ area on Tonle Sap Lake objected to new FCZs being established. The Learning Institute encouraged the community fisheries committees to take the lead in meeting with fisher families and have face-to-face discussions to hear their concerns.

In these discussions, committee members explained why the new FCZ area was important to conserve, how the whole community had agreed to conserve that area, and that the families could fish in other areas, including near the FCZ. They also explained the concept that once the fish population started to increase, fish would move out of the FCZ and the families would be able to catch more. Eventually, these community members came to agree with the idea.

☑ Establish a grievance mechanism

Projects should identify clear communication channels that community members can use to express concerns about the project, whether by contacting project staff, funders, partners, or authorities. Communities should also be made aware of the legal process they can follow to change or remove FCZ regulations, should they become dissatisfied with the function of the FCZ. For example, in Cambodia, community fisheries management plans can be revised every three years. Like all protected areas, FCZs may be successful at conserving aquatic resources, but can still fail at providing a sustainable solution for the community if social safeguards are not followed.

Kengmeaw community members holding CEPF grievance information with FISHBIO staff, Lao PDR

Case Study 5: WorldFish, Cambodia

Once FCZs were established in the Stung Treng Ramsar Site and their impacts became clear, WorldFish helped facilitate discussions with communities so that exemptions could be provided for the poorest and most vulnerable households.

These were identified as those without alternative livelihoods other than fisheries, widow-headed households, those with many dependents, and those who could not access other fishing areas. Local authorities (commune chiefs) played a lead role in convening community meetings to renegotiate the rules of the FCZs, and both people who opposed and supported the FCZs could raise their points.

> "In two instances where some community members reported adverse impacts on their access to fishing, consultation was made with the commune chiefs leading the effort. One of the cases was solved by readjustment to the boundary restriction while the other was confirmed by the community members as not being an impact on small-scale fishers, but rather on large-scale commercial fishers whose gears were illegal and thus should not be allowed in any fishing grounds in the first place."
>
> *— Mam Kosal, WorldFish*

A broad group of community members were engaged to arrive at a solution that most people could accept, such as making exceptions for vulnerable households to fish in specific locations inside the FCZ with gear restrictions. This conflict management strategy worked well because the communities felt they were bound by their commitment to implement the FCZ, which the whole community had agreed to.

Case Study 6: FISHBIO, Lao PDR

Kengmai Rapids FCZ, Lao PDR

During a project to strengthen the management of an FCZ at Kengmai Rapids in Lao PDR, the village committee of one project village wished to add a buffer zone to the FCZ to prevent fishers from setting nets just outside the FCZ boundary that could drift into the protected area. However, FISHBIO staff later learned that fishers in the same village opposed this idea because they felt the 5-km-long FCZ was sufficiently large. Without enough stakeholder support, FISHBIO decided not to pursue the buffer zone.

Overview of the Fisheries Management Cycle

Fisheries management can be viewed as a repeating cycle with seven key phases (Figure 1). FCZs are one possible tool in the fisheries management toolbox for managing access to specific areas, and they can be used in combination with other tools, such as restrictions on fishing times, gear use, and sizes or species of fish that can be harvested. In a community fisheries model, community members should actively participate in all phases of the cycle. Depending on the community's capacity, a facilitating civil society organization may be involved in all phases of the cycle as well. Advice from outside experts may need to be consulted for more technical phases, such as for FCZ assessments (Phases 4–6).

- **Phase 1** is to **evaluate** the fisheries issues in a location and come up with ideas for management tools to address problems and make improvements.
- **Phase 2** is to **develop** a management plan to address the problems, which should include clear goals, desired outcomes, management strategies (tools), and specific indicators of management effectiveness.
- **Phase 3** is to **implement** the strategies in the management plan, which could include establishing and enforcing an FCZ.
- **Phases 4–6** are to **evaluate** the effectiveness of the management strategies. They include collecting data for an effectiveness assessment, evaluating the assessment results, and presenting the assessment findings to key stakeholders.
- **Phase 7** is to use the information from the evaluation to **adjust** fisheries management strategies and activities, if needed. This important step makes the process a management "cycle" that can repeat.

Additional resources describe the process of FCZ establishment (Phases 1–3; DLF and WWF 2009) and evaluation (Phases 4–6; Loury et al. 2019) in greater detail.

While this guide presents the steps of the management cycle as they relate to FCZs, this cyclical approach can be used with any management strategy, such as gear or species restrictions. The cycle can be completed annually or at regular intervals, such as three or five years. The timeframe selected will depend on the resources available to the management organization and the desire for rapid results. A one-year management cycle requires more resources, but also provides more rapid feedback that can improve outcomes more quickly. On the other hand, a longer management cycle allows more time for impacts to emerge and regulations to take effect.

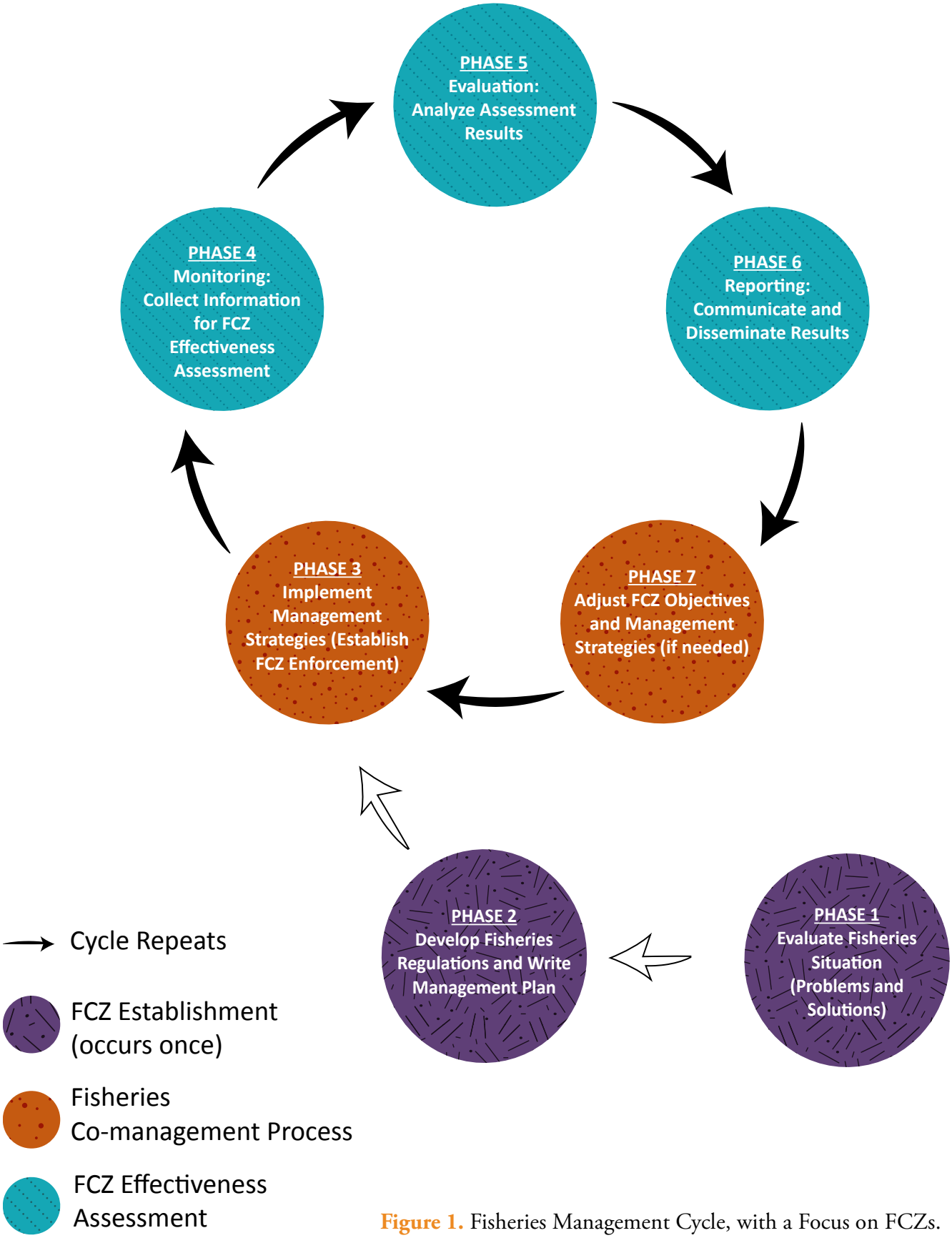


Figure 1. Fisheries Management Cycle, with a Focus on FCZs.

Phase 1: Evaluate Fisheries Situation (Problems and Solutions)

The process of implementing any form of community fisheries management begins with a discussion with the community about the current state of the fishery, perceived threats to fish populations that are both internal and external, and potential solutions to address those threats. The goal here is to determine whether the community recognizes a need for aquatic resource management. If not, they are unlikely to support a management intervention such as establishing an FCZ. It should also be determined explicitly whether the community is interested in working with a facilitating organization or government department to develop fisheries management strategies.

Community discussion, Lao PDR

It is important to ensure that a diverse group of community members is engaged in this activity, not just fishers. Tools that can help facilitate this process include focus group discussions, brainstorming lists or rankings, "Strengths, Weaknesses, Opportunities, and Threats (SWOT)" analysis, or creating a matrix of resources and associated risks or threats. For additional details on this process, please refer to *Guidelines for Fisheries Co-Management* (DLF and WWF 2009).

☑ Discuss trends in fish catches or observations of fish populations and other aquatic resources compared to prior years or generations

Community members can answer these questions in large or small groups through brainstorming or facilitated discussion:

1. What is the current state of the fishery and how does it compare to prior years or generations?

> "The initial conversation needs to be a problem assessment. Firstly, "Do you think fisheries are in decline?" People aren't going to do anything if they don't think there's a problem. You have to figure out what the problem is in their view. Then you have to consider what is possible to address the problem, what are the tradeoffs, and then you work with what's feasible."
>
> ***— Ian Baird, University of Wisconsin-Madison***

2. How have fishing catches changed in the last year, five years, 10 years, etc.? (have they increased or decreased?)
3. How have the sizes of fish caught changed in the last year, five years, 10 years, etc.? (have they increased or decreased?)
4. What species are currently caught in the area? What species have become rare or are no longer caught?

> “In the very first meetings with communities, we told them about the fish we found in our surveys. We asked them, ‘How were those fish in former times?’ They said those were big fish species, now they are small and rare. In the meetings they said that all are very rare compared to former times, so they notice that. They know it is important to conserve these areas for the future.”
>
> *— Zau Lunn, Fauna & Flora International, Myanmar (Case Study 8)*

☑ Discuss ideas of why the fishery has changed and potential threats

Facilitators can then ask community members for their ideas about why the fishery may have changed. This discussion can point out the difference between **internal threats** (those related to within the community), and **external threats** (those outside of community control). If there are numerous external threats, such as a hydropower dam that will change the structure of the river or a factory that pollutes the lake or river, then fisheries management solutions alone may not be sufficient to address the problems.

🔍 Case Study 12: WARECOD, Vietnam

In order to evaluate the fisheries situation and threats in Na Hang Reservoir, Vietnam, WARECOD engaged communities in **Thai Baan research**, or research that is conducted by villagers. Acting as facilitators, WARECOD staff advised the communities to investigate the past and present conditions of aquatic resources, and to see if they could identify any major turning point. Community members were organized into research teams and recorded the history of aquatic resource use before and after the construction of Tuyen Quang Dam, as well local knowledge of aquatic species and fishing gears.

As a result of conducting research and presenting their findings, community members more fully realized the benefits they derived from natural resources, and also

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Community members in a research implementation workshop during Thai Baan research, Vietnam

what they had lost – for example, fish populations had declined, and some fish species had disappeared following dam construction. This motivated the communities to protect what they had left and raise local awareness about environmental conservation.

Organizing villagers into research teams to conduct Thai Baan research gave them experience working together and improved their organizational and management skills, which helped lay the groundwork for working together as a co-management group. Government officials who attended presentations of the Thai Baan research results were able to see how community capacity had improved, which helped convince them that community members could be responsible for co-management activities.

> “Through doing research, they deeply understand the situation.”
>
> *— Nguyen Thi Ngoc Lan, WARECOD*

Fisherman at Na Hang Reservoir, Vietnam

Probarbus jullieni at a market, Lao PDR

Statues of Giant mekong catfish next to FCZ in Ang Gnay, Lao PDR

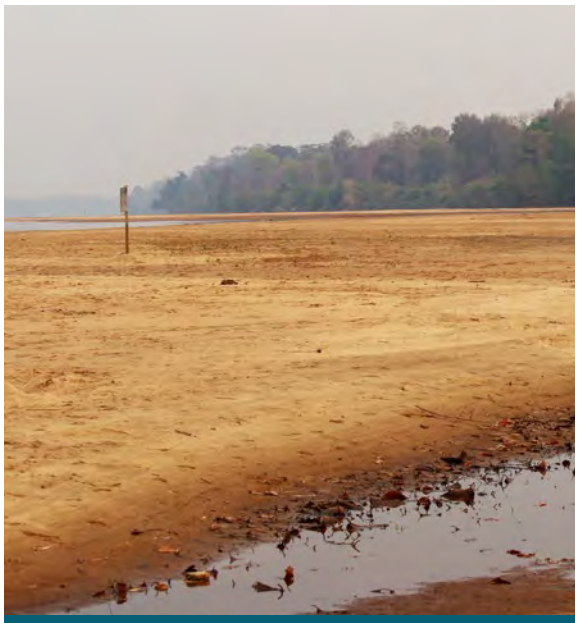
☑ Identify any Target Species of Conservation Concern

While communities are typically interested in managing aquatic resources generally to support human consumption, there may be a particular species of conservation interest to the community or the facilitating organization. It is important to identify such **target species** so that management strategies can be targeted to address the threats relevant to that species. FCZs are often established to generally protect all fish or other aquatic wildlife from overfishing, but they can also be established for certain key species. Since target species may have particular habitat requirements, this will likely influence the selection of the FCZ site location.

For example, FISHBIO worked with communities in northern Lao PDR to create FCZs at locations thought to be important spawning or refuge habitats for endangered *Probarbus* fishes (Case

Study 6). The village of Ang Gnay in Lao PDR has created an FCZ intended to protect Mekong giant catfish (*Pangasianodon gigas*) on the Mekong River. FCZs can also be established to protect species other than fish, especially if the species are vulnerable to being entangled in fishing gear, or if the FCZ encompasses important breeding sites for that species.

FCZs for the Irrawaddy dolphin (*Orcaella brevirostris*) have been established on the Mekong River in Lao PDR and Cambodia, the Royal University of Phnom Penh worked with communities in Cambodia to establish FCZs around sandbar habitats important for water birds and softshell turtles (Case Study 4) and in Myanmar the Turtle Survival Alliance and Wildlife Conservation Society sought to establish FCZs on the Chindwin River to protect the Burmese roofed turtle (*Batagur trivittata*; Case Study 9).



© RUPP

Protected sandbar habitat for water birds and softshell turtles, Cambodia

☑ Discuss management strategies to address threats, such as FCZs

Once the community has adequately identified the fisheries problems and threats, then ideas for solutions can be solicited. FCZs should be presented as one of multiple potential options. Other fisheries management strategies may include restricting the number or types of fishing gear, number of fishers, fishing seasons, or species retrained. Some of these strategies could be used in combination with an FCZ. The benefits and drawbacks of each strategy should be addressed.

The concept of an FCZ can be explained as a safe place for fish that can help the population recover from overfishing. The key is to allow fish to reproduce (spawn) so their offspring can help the population grow. If fish populations increase their abundance inside an FCZ, some individuals may eventually "**spill over**," or move outside the FCZ boundaries in search of additional food or habitat. This process largely applies to fish that are more sedentary, and these types of species may experience more benefits from FCZs compared to highly migratory species. Alternatively, if fish species are allowed to reproduce inside an FCZ, their offspring may "spill over" to unprotected areas where they can be caught by fishers. These are two ways that FCZs can theoretically benefit local fisheries and help bolster food security and income.

One analogy for an FCZ could be that of a **savings account**. The fish that are protected inside the FCZ are like the principal deposited in an account, and their offspring are like the interest. Project staff should provide realistic expectations about the benefits an FCZ can provide. While some fish populations can respond to protection quite rapidly, others can take many years to recover, while others might be so migratory that they do not receive any noticeable benefits from the FCZ. The amount of enforcement can also influence the effectiveness of the FCZ.

Case Study 8: Fauna & Flora International, Myanmar

In places where community managed FCZs are a relatively new concept, sharing examples about how community-based activities have been implemented elsewhere can help address community members' initial skepticism about how this process could work. When introducing the concept of FCZs in Myanmar, FFI drew on their experience of establishing Locally Managed Marine Areas (LMMAs) with coastal communities elsewhere in the country, and also partnered with FISHBIO to share experiences of FCZ establishment in Lao PDR.

FISHBIO staff sharing FCZ experiences

> "Examples are very important for them. If they don't know these [community-based conservation approaches] are being used in other areas in the same country, sometimes they do not believe it is possible. So we explained very clearly with examples to the community."
>
> *— Zau Lunn, Fauna & Flora International, Myanmar*

☑ Decide which Management Strategy(s) to Pursue

At this stage, the community should decide which fisheries management strategies (tools) they wish to implement, including whether or not to establish an FCZ. These strategies should then be listed out to prepare for writing the management plan. Management strategies can be diverse and complementary. For example, the community could decide to implement a no-take FCZ in one area, and to limit the types of gear allowed in the community fishing areas.

For FCZs to succeed, it is imperative that the decision to move forward be made by the community members themselves. The FCZ will only be sustained in the long term without external support if communities feel full ownership and responsibility for the FCZ. It is important to get broad community support and approval for the concept of an FCZ at this stage before moving on, and all community concerns should be documented.

Community FCZ meeting, Lao PDR

It may take time for community members to consider the pros and cons of an FCZ, and they may not be ready to reach a decision during one meeting. Additional meetings and discussions may be required to achieve community agreement. Communities with previous experience working with NGOs around topics of conservation and natural resources management are often more receptive to the idea of FCZs (see Case Studies 4 and 7). Therefore, it may first be necessary to lay a strong foundation about the benefits of natural resource conservation in the community before they are willing to take on the responsibility of managing an FCZ. If the community opposes the idea of an FCZ, they may be open to other fisheries management strategies such as regulating fishing times or types of fishing gear.

Case Study 9: Turtle Survival Alliance & Wildlife Conservation Society, Myanmar

FCZ projects cannot move forward without community support, which was a challenge faced by TSA and WCS on a project in the Chindwin River in Myanmar, where both organizations have a long history of conserving turtles. At the encouragement of CEPF, the groups investigated the potential of setting up FCZs in 15 communities, since entanglements in fishing gear are one of the major threats to river turtles.

Community discussion about FCZ on the Chindwin River, Myanmar

As TSA and WCS did not have freshwater fisheries staff and were unfamiliar with the FCZ process, they partnered with FISHBIO to learn about FCZ establishment in Lao PDR. FISHBIO staff provided training and visited seven communities in the Chindwin River basin, where they presented about the benefits of FCZs and shared experiences from Lao PDR. However, once the project tried to move beyond consultation into the development of community-based management plans, local communities did not support the idea of giving up access to fishing resources, despite recognizing long-term declines in fish populations.

This was in part due to a lack of trust between neighboring communities, and between communities and the fisheries

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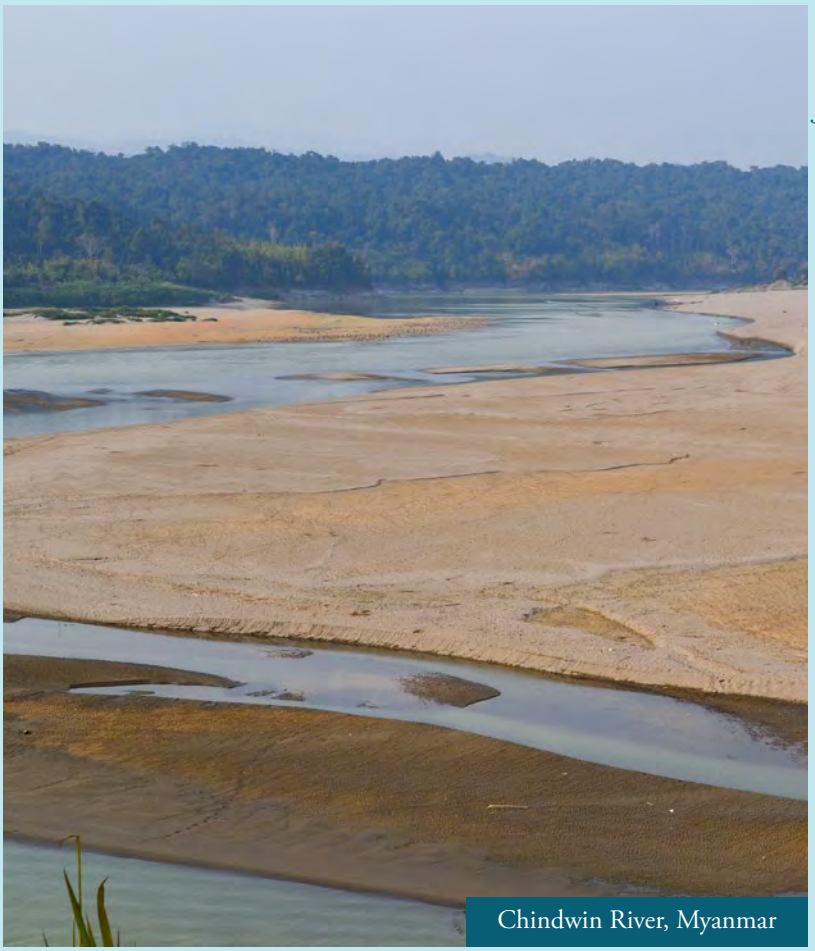
Pagoda Island on the Chindwin River, Myanmar

administration. Communities were concerned that others would still continue to benefit from the fisheries resource if they restricted their own use (i.e., "Tragedy of the Commons"). Another challenge was that establishing an FCZ in the Chindwin River would require purchasing a fishing concession at a cost of about 150 USD per mile and renewing it ever year, which was cost prohibitive for the communities.



Chindwin River, Myanmar

Trying to establish FCZs can be a challenge for an organization without fisheries expertise or a dedicated fisheries team. Dedicated staff are required to build relationships with communities and take the time to get to know their fishing networks and local issues, as well as introduce the idea of local resource management. Moving forward, TSA and WCS recognize that it may be easier to start in a village that already has some experience with community-based resource management, such as managing a community forest. Focusing on one or two villages as a pilot project may prove an effective way to produce results that does not spread an organization's resources too thin. If fish conservation efforts are successful in these communities, the results may spread to other villages by word of mouth and help generate more interest in future participation.

> "Often it comes down to the persons who are involved in the program and what relationship they build with the community. It's a process that takes time that is not easy. But I think anything that they see as being imposed on them from outside is going to meet some resistance. I would have a dedicated fisheries team to carry this out and start small, talk to a few communities. Find out what they're interested in, convince them of the need to conserve the resource, and ask them how they would solve the problem."
>
> ***— Steven Platt, Wildlife Conservation Society***

Phase 2: Develop Fisheries Regulations and Write a Management Plan

The second phase is to develop a plan that includes the management strategies that were selected in Phase 1. You will need to determine if this document will be a formal, legal regulatory document or an informal (community level) agreement. In some countries, there may be specific requirements for the contents of a formal fisheries management plan or FCZ management plan, which should be determined before you begin (see "Determine which documents are legally required" under "Identify Legal Framework and Requirements").

In general, the management plan should include the objectives of fisheries management, who will be involved and their roles, the management strategies that will be employed, the geographic scope, the specific regulations, and any consequences of not abiding by the regulations. For additional details on this process, please refer to *Guidelines for Fisheries Co-Management* (DLF and WWF 2009).

☑ Identify goals and objectives of the management plan

The goals and objectives of a management plan relate to the purpose of management and what the plan is trying to achieve. Specifically defining goals and objectives of an FCZ from the beginning based on desired benefits or outcomes will make it easier to monitor the effectiveness or success of an FCZ in the future, based on how well it is achieving its goals and objectives (Phases 4–6 of the fisheries management cycle).

FCZ goals and objectives can relate to governance and management (such as enforcement and compliance), benefits for people (such as food security, livelihoods, cultural traditions, etc.), or the ecology of the aquatic environment (how different animals and plants interact). While ecological goals, such as protecting fish popula-

> "First we have to have the village consultation workshop. What is their goal of the FCZ that they want to establish, what kind of target species do they want to conserve or general aquatic species, and what is the objective of the FCZ that they establish? That is the key point that we have to identify clearly, the purpose of the FCZ. After that, we can support the legal process to help the community to establish officially. Not only the legal process, but also connecting to cultural beliefs if possible, to make everything sustainable when the project ends."
>
> ***— Sinsamout Ounboundisane, FISHBIO (Case Study 6)***

tions to increase fish abundance or diversity, are often a main motivation for establishing an FCZ, the community may also wish to achieve socioeconomic or governance goals, such as ensuring future generations can continue to catch fish, or improving enforcement activities against illegal fishing. Understanding the goals and expectations of an FCZ is important for defining what "success" looks like and how it will be measured. For more information, see *Guidelines for Assessing Fish Conservation Zones in Lao PDR* (Loury et al. 2019).

☑ Describe the management strategies that will be employed

The management plan should describe which management strategies the community will implement. If this includes an FCZ, it should describe the attributes of the FCZ. Specifically:

- Will the FCZ be a **no-take zone** (no fishing allowed)? Or will **some fishing** be permitted, and if so, which types?
- Will the rules of the FCZ be enforced **seasonally** or **year-round**?

Under the Cambodian fisheries law, a community fisheries management plan should cover a community fishing area, which is a managed fishing area, and fish conservation area, which is a no-take FCZ. The community can regulate the types of gear that are used in their community fishing area and stop others from using destructive fishing gear in these areas. The permitted types of gear are those listed in the management plan. On Cambodia's Tonle Sap Lake, community FCZs that are established in dry season pools are often only patrolled and enforced during the dry season.

> "Normally, conservation areas are all-season no-take zones. But during the wet season, the water rises and the fish go to other areas. So the patrol activity is very limited because it's not worthwhile for fishers to invest their effort fishing in the conservation area when the water level is high. During the dry season when the water goes down, the community fishery patrol team starts to protect that area, and no fishing activities are allowed in that area."
>
> ***— Un Borin, Conservation International (Case Study 1)***

Meeting with key stakeholders on FCZ management plan, Cambodia

FCZs in the Indo-Burma Hotspot are often established as no-take zones where all fishing is prohibited year-round. One reason is because this type of management is simplest to communicate and enforce: no one should be fishing in the FCZ using any methods at any time. The pros and cons of various management strategies should be discussed with communities so they can make a decision.

> “There had been a long talk in the communities about the type of regulations. In the end, they said that if we don’t have a no-take management region, it’s difficult to enforce. They themselves don’t have the technical ability to identify whether this or that fishing practice is detrimental to which species that may be the target of protection. Or if they manage under that regime, they may end up with some bias, because they may allow some groups to go on fishing because they claim the gear is not detrimental to conservation objectives. It’s not easy to enforce. If they make it a no-take zone, it’s easier for them. If they see someone present in the conservation area, it is almost certain that the person is intending to do illegal fishing. So for practical reasons, they said to make it a no-take zone so that it’s easier for them to deal with.”
>
> ***— Mam Kosal, WorldFish (Case Study 5)***

If a community depends heavily on fisheries resources and has limited fishing areas available to them, then a managed fishing area, or an FCZ that permits some types of fishing, may be a good starting point to introduce the idea of fisheries management and conservation. Both Fauna & Flora International and Turtle Survival Alliance/Wildlife Conservation Society have adopted this approach in Myanmar, where the primary focus of the FCZs is to prevent people from fishing with destructive gear, and limit the fishing access only to people from within the community, not outsiders (Case Studies 7 and 8). Reducing fishing pressure in this way can still have benefits for fish populations.

Case Study 11: Ngao River, Thailand

While most communities in this region prohibit all fishing in their FCZs at any time, some communities treat the FCZ like a bank account which they may periodically draw upon. This could mean opening the FCZ to fishing for one day every three or five years, or treating the FCZ as an emergency supply of protein that the village can decide to access in a lean year if food availability is scarce. While such an approach provides flexibility to communities to meet their food and livelihood needs, a few days of very intensive fishing can essentially wipe out the fish population in an FCZ and reset the conservation benefits that had been gained.

Fish in a Ngao River FCZ, Thailand

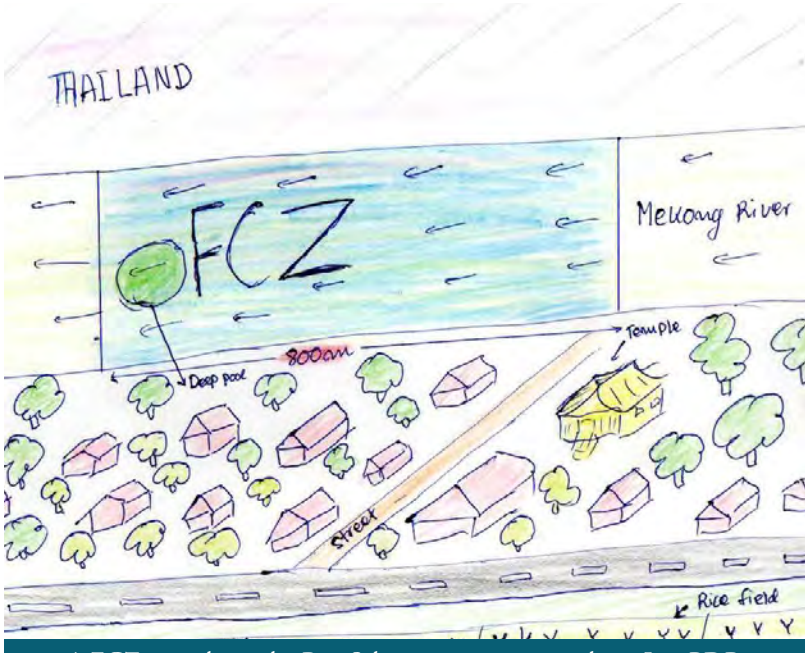
☑ Select and map a site for the FCZ based on relevant criteria

Because an FCZ is a form of spatial management, choosing its location is one of the most important decisions in the FCZ establishment process. For the FCZ to function well, the site should be ecologically important for fish species (either as a spawning, refuge, or other key habitat site) to enable fish to increase in abundance. But perhaps more importantly, it must also be a location that the community is willing and able to patrol and protect. Ultimately, some tradeoffs or compromises may be required, such as if the most ecologically important habitats for fish are located too far from the community for effective patrolling and enforcement.

A participatory resource mapping activity can be helpful at this stage. Together with community members, **draw a map** of the village in relation to the water body of interest (river, stream, lake). Have community members identify important fishing grounds and fish habitats based on their local knowledge, as well as other natural resources of interest. Based on this map, have a discussion about which location makes sense to choose for the FCZ.

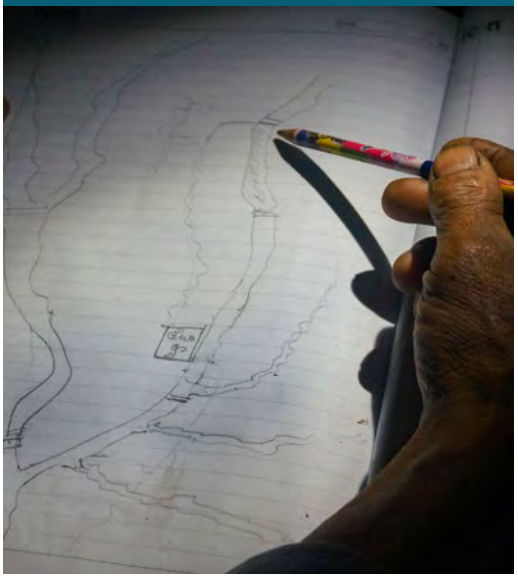
Once the site has been selected, the official **coordinates of the boundaries** should be mapped in the field and recorded with members of the community and relevant government officials, so that everyone agrees on the location of the FCZ. An official map or GPS coordinates may be required for government approval of the regulations or management plan.

> "At first we have the village consultation and do mapping of the *Probarbus* fishing area and spawning site with fishers to find the common ground of understanding on the *Probarbus* site, where they catch them. After that, we combine with the technical survey to see where the habitat is suitable to conserve or not conserve."
>
> ***— Sinsamout Ounboundisane, FISHBIO (Case Study 6)***



A FCZ map drawn by Ban Sakai community members, Lao PDR

Potential FCZ site map drawn by a villager from Ziyardam in Hponganrazi Wildlife Sanctuary, Myanmar



Case Study 5: WorldFish, Cambodia

When WorldFish helped communities in Cambodia select the locations for their FCZs, they evaluated each site based on a number of criteria. Some criteria were deemed more important and given a higher weight when scoring a site, as indicated by (x2) or (x3).

No.	Selection criteria from workshop in Koh Sneng	Selection criteria from workshop in Preah Rumkel
1	Presence of endangered species	Presence of endangered species (x2)
2	Presence of unique species	Abundance of biodiversity
3	Accessibility	Accessibility
4	Fish spawning ground (x2)	Fish spawning ground (x3)
5	Fish feeding ground	Abundance of fish important for fishery livelihoods (x2)
6	Habitat for fish refuge (x3)	Habitat for fish refuge (x3)
7	Presence of flooded forests	Presence of plant species for herbs and medicine
8	Synergy among other protected sites (x3)	Overall size of the area
9	Active Community Fishery presence (x2)	Active Community Fishery presence (x2)

Although the communities initially identified many potential FCZ sites that were important for fish biodiversity conservation, they ultimately gave precedence to the practicality of protecting those sites. WorldFish was clear from the outset that the project support would only be temporary, and afterwards communities would need to take over the process. This helped the communities focus on selecting sites that would be most feasible to patrol, such as those where community fisheries were already active.

Case Study 11: Ngao River, Thailand

Research by Aaron Koning from Cornell University on the attributes of successful FCZs in the Ngao River yielded the following best practices:

- In rivers, it is important to try to represent the **diversity of key habitats** within an FCZ, including deep pools, riffles, and runs.

> “Deep areas are good, but if you conserve deep areas to the exclusion of shallow water areas, you’re going to benefit some species and not others.”
>
> *— Aaron Koning, Cornell University*


© Aaron Koning

Villagers swimming in Ngao River

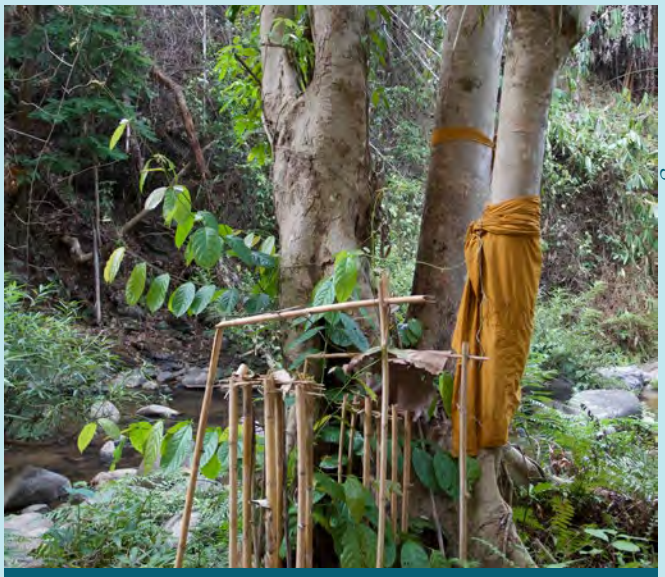
- One rule of thumb to make sure representative habitat is captured within an FCZ is to make its dimensions **10 times as long as the river is wide**, providing that the community is able to enforce an area of that size.
- Establishing multiple FCZs along the same stretch of river can provide **connectivity** for fish populations.
- **Mouths of tributaries** are key habitats that can be valuable to protect.

☑ Decide on regulations and penalties for the FCZ (and other management strategies)

Once the community has decided which activities are allowed and not allowed in the FCZ or community fishery area, penalties must be decided on for when someone breaks the rules. Sometimes these penalties are set by the government, such as fines related to fishing with illegal destructive fishing gear like electrofishing units or dynamite. In other cases, communities may be able to set their own penalties, which could be monetary fines or other consequences that are in keeping with cultural beliefs.

🔍 Case Study 11: Ngao River, Thailand

The penalties set for FCZs in this region differ depending on the religion of the local community. In Buddhist and Baptist Christian communities, violating the rules of the FCZ is accompanied by a monetary fine that often increases with each subsequent offence, spanning a range of about 15-300 USD. In animist communities, violators must make an offering to the spirit of the river, such as several bottles of rice whiskey or sacrificing a pig or chicken. Animist communities will make annual offerings to appease the river spirit and ask it to curse anyone who violates the rules of the FCZ.


© Aaron Koning

Animist offering altar and tree ordination on the Ngao River

☑ Identify and assign roles and responsibilities for FCZ management

The management plan should identify who in the community is responsible for making decisions about the FCZ. There may be a fisheries management committee that is in charge of all fisheries-related activities in the community, including the FCZ, or a separate group may be appointed specifically for overseeing the FCZ. This committee should at the least have a head or chair. Other roles could include a deputy or vice chair, a treasurer, and a secretary. According to government guidelines in Cambodia, elections should be held to appoint the leadership roles of the fisheries committee every five years, or more frequently if positions are vacated.

One of the key roles associated with an FCZ is deciding who will be responsible for patrolling and enforcing the rules. If the FCZ is within sight of the community, then many community members can participate in monitoring the FCZ for illegal activity. However, there should still be a designated body responsible for responding to reports of people violating FCZ rules. This may include village leaders, fishers, fisheries committee members, and village-level police or soldiers. Because patrolling is time consuming, it may be necessary to appoint multiple enforcement teams that can rotate.

☑ Develop patrolling and enforcement protocols

Enforcement is key to determining whether a protected area like an FCZ in is actually protected in practice. When designing the management strategies of the FCZ, the enforcement team will have to decide:

- **When** they will patrol (which times of year, as well as which times of day or night)
- **How** they will patrol (from land or by boat; roving or stationary patrols)
- How **frequently** they will patrol

These protocols should be documented in the management plan or in a separate document.

The enforcement team will also need to decide what actions they will take in different circumstances. This may be dictated by what is permitted by relevant fisheries laws or local authorities. In some cases, enforcement teams may only be able to educate fishers that they are fishing in a protected area and tell them to leave. They may also be able to issue warnings, confiscate gear, or detain offenders while relevant authorities are called. In some instances, communities can only call local authorities to respond to cases of illegal fishing.


Enforcement team protocol discussion, Lao PDR

The team should also decide what information is important to record about their patrolling activities, and how and where they will record that information.

At a minimum, information should be recorded about:

- The duration of the patrol (start and end time)
- Any observed illegal activity
- The location of such activities
- Any actions taken

This information can be valuable for assessing how compliance with FCZ regulations is changing over time. Some best practices for monitoring and patrolling include the Spatial Monitoring and Reporting Tool (SMART) approach, which includes software, capacity building, and standards for site-based protection (**www.smartconservation-tools.org**).

Meeting with patrol team and local authority at Koh Sneng to review progress and challenges, Cambodia

If the FCZ covers a large area, it may be possible for multiple communities to work together and share the responsibility either through rotating or joint patrols. This approach can take extensive coordination and relationship building, especially if the communities do not have a history of working together in the past. Clear expectations and communication channels will be key for such an approach, as well as a mechanism for resolving disputes.

On what contributes to the success of multi-village patrols: “It comes down to leadership. Initially, the communities raised so many issues, but at the end they agreed that things cannot be equal. Some of them need to work more, some may not need to work as hard as others. The point they understand is that they also have different social status or conditions in their areas. Some participants are poorer than the others, so they have to understand that not everyone can equally participate in the process. Also, not everyone would be able to provide boats for patrolling, for example, because not everyone has a boat that is suitable for patrolling. In the end, it’s about the team leader in the community providing further facilitation within the team so that they come to a mutual understanding that they have to make some compromise.”

— Mam Kosal, WorldFish (Case Study 5)

☑ Develop a budget and financing mechanism for the FCZ

There are several types of expenses associated with the management of an FCZ. For example, an initial investment may be required to install signs and boundary markers, and these will need to be periodically repaired or replaced. Funds may also be required to support the enforcement of patrol teams. At a minimum, there will likely be fuel costs associated with the patrol teams accessing and patrolling

Patrolling and enforcement equipment

the FCZ. Enforcement teams may benefit from equipment such as lights, life jackets, and walkie talkies or other communication devices. There may be other costs associated with FCZ outreach, such as organizing community events or printing fliers or other materials. Both initial investment costs and annual ongoing costs should be budgeted prior to FCZ establishment.

One challenging decision for a project is whether to pay a stipend to enforcement team members to patrol an FCZ. Based on CEPF grantee experience, payments can help ensure that patrolling happens regularly at the beginning of FCZ establishment, but community members typically stop patrolling the FCZ once funding stops. Payments can erode a community's feeling of ownership over the FCZ, and instead see it as an initiative of the facilitating organization making the payments. In contrast, Conservation International noted that residents in at least one community they work with have voluntarily started to contribute their own money or food to support the patrol teams, demonstrating that community members are willing to personally invest in fisheries management activities (Case Study 1). When WorldFish meets with communities to establish FCZs, they make it clear that project support will be temporary, and ultimately the community will need to take on the responsibility of managing the FCZ. They ask communities to think from the beginning of the project about what activities they can do on their own without external support (Case Study 5).

Once expenses have been budgeted, it is imperative to determine how ongoing FCZ management activities will be sustained into the future, especially after initial project funding from a facilitating organization ends. This has proven a challenge for many FCZs in the Indo-Burma Hotspot. In some instances, communities may be able to receive ongoing funding from local government authorities or local organizations to support natural resources management. However, if the community is expected to fund the management of the FCZ from their own resources, such as a village fund, it is crucial that the community feels a sense of ownership and responsibility for the FCZ in order to make it a funding priority. One strategy that has proven successful for generating a source of revenue to support community conservation activities in Cambodia is establishing community savings groups and trust funds (Case Studies 1, 2, and 5).


Savings group meeting, Cambodia

If communities are allowed to collect fines from people who violate FCZ regulations, these fines could be used to support FCZ management. However, they should not be counted on as a regular revenue stream, because they rely on people breaking the rules of the FCZ, which ideally should be declining in frequency over time. In Lao PDR, FISHBIO found that very few FCZ violators

were given more than a warning, and when a fine was issued, the communities needed to rely on the district government to distribute the fines. In one instance, the government authorities kept most of the fine and only reimbursed the patrol teams for the cost of their fuel (Case Study 6).

Young boys using a net to catch fish during a community fishing day in Lao PDR

One option to generate revenue from the FCZ itself is to sell the right to fish in the FCZ in a highly managed way. In order to prevent a few powerful individuals from taking advantage of this system, the FCZ could be opened to the whole community to fish for a fee as a type of fundraiser and awareness raising activity. Ideally, this could take place in a discrete section of a large FCZ on a single day, so that the impacts of fishing do not disturb the entire protected area. FISHBIO hoped to explore this idea with communities in Lao PDR, but was not able to pursue it due to changes in hydrology at the proposed fishing area in the FCZ (Case Study 6). In another FCZ funding example from Vietnam, one community decided to hire out their FCZ patrol boat for transporting goods when it was not in use, which served to generate income to support management activities (Case Study 12).

Case Study 1: Conservation International, Cambodia

Women's Savings Groups: Without access to bank loans, families in floating communities on Tonle Sap Lake may develop debts from borrowing money from local lenders or middlemen, who can charge high interest rates of up to 15% that require the borrower to take out additional loans to pay off. CI has helped communities form savings groups, or small collectives made up almost entirely of women, in which members pool their savings and offer opportunities for members to take out small loans. Savings group members received training in financial literacy, book keeping, and teamwork approaches such as resolving conflict.

Women's savings group meeting on the Tonle Sap

CI provided a one-time contribution of 1,500 USD to each savings group as a conservation fund. This serves as seed funding and the interest from this investment can be withdrawn every three months to finance conservation initiatives proposed in the workplan of the local Community Fishery Committee. On top of this, members make monthly contributions to the savings group ranging from 5,000–30,000 KHR (1.25 to 7.5 USD), and interest from these contributions is distributed among the group members at the end of one year. Group members can take out loans at an average interest rate of 1–3%. Some savings groups have decided to contribute some of their profits to support the community fisheries activities, and savings group members monitor and evaluate the conservation activities they contribute to. Being able to make financial contributions to community fisheries activities has shifted the balance of power and given women a voice in fisheries management decisions that they previously did not have.

Mini Trust Funds: In a few communities, CI has also created trust funds of 5,000 USD in bank accounts that annually generate about 375 USD in interest, which communities are able to withdraw and invest in conservation activities. The revenue from the mini trust fund prompts the community to make decisions about how to spend it and provides a sustained funding mechanism for activities like patrolling FCZs or replanting flooded forest. The mini trust fund is a platform to generate revenue for the community over the long term, and it builds a connection between community members and local authorities that oversee all activities related to the trust fund. It also provides the opportunity for communities to engage with other sources of funding in the future, provides an ability to connect with other NGOs by providing the means to attend meetings or workshops, and it allows the community to learn about money management and accounting.

> “The mini trust fund is not about the 5,000 USD, it’s about the ownership, about the engagement of local stakeholders. It is the platform that we use to bring the relevant stakeholders to be responsible for the finance and the activities of the Community Fishery.”
>
> ***— Un Borin, Conservation International***

☑ Develop a monitoring plan for the FCZ

Monitoring is a key part of the fisheries management cycle (Phases 4–6 in Figure 1), and ideally should be considered when an FCZ is established, rather than as an afterthought much later. The time period before an FCZ goes into an effect presents a valuable opportunity to collect **baseline data**, or information on both the aquatic environment and human communities prior to a conservation intervention. Environmental data should be collected at the proposed FCZ site as well as in nearby fished areas of similar habitat. These data can then be compared to future monitoring results to track changes in indicators such as fish abundance, diversity, or size over

Fish caught during FCZ assessment survey, Lao PDR

time after the FCZ is established. Baseline data are extremely valuable for analyzing the effectiveness of protected areas, but forethought and planning are needed to collect them before an FCZ is established.

To facilitate future FCZ monitoring, it is possible to identify desired indicators of FCZ effectiveness when the FCZ is first established, and these could be included in the FCZ management plan. At the very least, a goal should be set for how often FCZ performance will be monitored. For example, the management process of the FCZ (such as the performance and functioning of the management committee or enforcement team) could be assessed every year, while the ecological effects of the FCZ on fish populations could be assessed every five years. More information about developing a monitoring plan can be found in *Guidelines for Assessing Fish Conservation Zones in Lao PDR* (Loury et al. 2019).

☑ Develop a community outreach and engagement plan for the FCZ

While enforcing the rules of an FCZ are important for its success, outreach and awareness raising with community members can be just as important for ensuring community support and compliance with regulations. In the process of developing an FCZ's rules, it can be helpful to think about how those rules will be communicated to the community. It is important for the community to not just be aware of the FCZ and its rules, but to also understand why the FCZ was established and the benefits it is intended to provide. This understanding will likely be developed over time with repeated outreach and engagement.

An outreach and engagement plan can identify key stakeholder groups that should be prioritized for outreach (such as aquatic resource users and families that live near the FCZ site), identify who will be responsible for conducting outreach, and what kinds of activities will be implemented. Examples of outreach activities are included in Phase 3 under "Implement community outreach and awareness raising."

Probarbus puppet education activity, Lao PDR

“Our experience is that awareness raising and the engagement of the community with the Community Fishery work is the key to make them understand. Because we know that everyone thinks about their personal interest, especially in the communities where fishing is their important livelihood. So, they want a lot of fishing grounds to support their livelihood. The key is to get people to understand about the importance of protection, of conservation, how that benefits their community. If the community understands how it benefits them ecologically, socially, economically, they will compromise, they will participate and provide the area that is designated for conservation.”

— Un Borin, Conservation International (Case Study 1)

☑ Determine the process for changing FCZ regulations

Ideally, FCZs should function as a form of adaptive management, meaning that they can be changed or adjusted over time based on successes or challenges. At this stage it is valuable to identify the process by which such changes can be made at the community level, and how to receive government approval for such changes if needed. This could include identifying who is responsible for making decisions to change the regulations, and any criteria that should be met. The ability to adapt FCZ regulations is particularly important for observing social safeguards, as communities working with WorldFish demonstrated in Cambodia (Case Study 5).

☑ Obtain community approval of FCZ regulations and management plan

Once the management plan and regulations have been written, they should be reviewed with a broad representation of the community to obtain feedback and adjust them as needed. It may be helpful hold separate meetings by gender or other groupings to receive full community input. This step is important to support community satisfaction and compliance with the FCZ regulations. Depending on the legal framework for establishing FCZs, the finalized management plan and regulations will likely need to be formally approved. This may include obtaining the signature of the community leader or key members of the fisheries management committee.

FCZ regulation meeting with community, Lao PDR

Community member reviewing FCZ regulations, Lao PDR

☑ Obtain relevant government approval of FCZ regulations and management plan

If the FCZ is being established under a co-management framework, it will need to be approved by relevant government authorities, such as the head of the local fisheries office or higher officials. These officials may provide feedback and adjustments to the management plan, such as modifications to the FCZ location or penalties. Multiple rounds or levels of approval may be needed, which is why it is valuable to seek clarity about the approval process and anticipated timeline before you begin.

> "The first thing is to work together with the community, build trust, and explain the FCZ concept to the government very clearly. Then we choose the important areas to establish Fish Conservation Zones with agreement from the local community. We develop a map and submit to the local Fisheries Department together with community signatures. Then the local Fisheries Department distributes to the relevant government agencies for agreement. After that, the Fisheries Department combines all of the agreements and submits them to the state level Fisheries Department, and the state level has to submit to the state parliament for approval. That is the process."
>
> ***— Zau Lunn, Fauna & Flora International, Myanmar (Case Study 8)***

FFI staff discussing FCZ sites with local officials and community members in Indawgyi Lake, Myanmar

Zau Lunn from FFI discussing potential FCZ sites with Indawgyi Lake community, Myanmar

Phase 3: Implement Management Strategies

Implementing the management strategies associated with an FCZ is what ensures the protected area is actively protected, rather than remaining merely a "paper park" in name only. While there may be an initial investment in effort to implement activities when an FCZ is first established, nearly all of these activities will need to be repeated either regularly or periodically throughout the "life" of the FCZ.

☑ Demarcate FCZ boundaries

Clearly marking the boundaries of the FCZ is important to remove any ambiguity about which location is protected. Cement structures, bamboo poles with flags, or floats (such as five-gallon water bottles) can all be used to mark FCZ boundaries. However, securing boundary markers can be challenging in dynamic river systems that may dramatically change water levels between seasons. In smaller rivers, a high cable can be strung from trees or other structures on either bank and hung with flags or signs to mark the boundaries.

It can also be helpful if the boundaries of the FCZ are made in relation to local landmarks or natural features that people in the community are can readily identify, such as stream mouths, large trees, or rock formations. In the Ngao River in Thailand, FCZs are often established in the river alongside a village from the most upstream house to the most downstream house (Case Study 11).

Appropriate signage can also help clarify where the FCZ boundaries are located and communicate the regulations. Signboards can include a map of the FCZ and a list of the regulations and penalties. Smaller signs can be used to denote the location of boundaries or the dimensions of the FCZ.

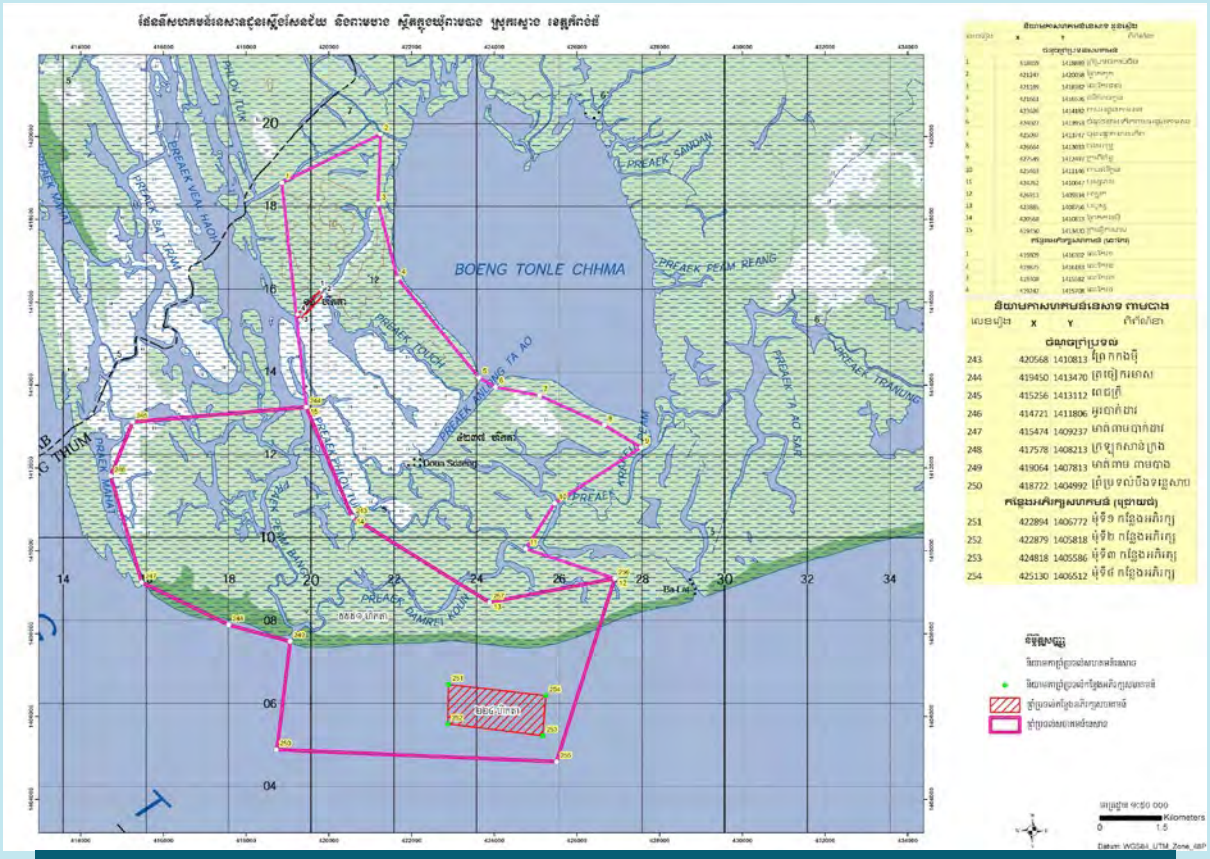
Two villagers from Ban Kengmeaw standing next to a new FCZ boundary sign, Lao PDR

Cable marking FCZ boundary on Ngao River, Thailand

Case Study 3: The Learning Institute, Cambodia

As part of the consultation process around FCZ establishment with communities, The Learning Institute facilitated discussions to ask community members to draw maps of both the new FCZ locations and the fishing areas to be managed by the community. These drawings were then transferred to scaled technical maps and discussed at the commune level. Ground-truthing trips were made to map the FCZ boundaries in the field and record UTM coordinates, which were used to produce a **final map** that was presented at a final consultation with the communities, local government officials, and nearby communities to share the new FCZ location. Finally, the four corners of the boundary were marked using tripods of wooden poles (which will last for about five years), with community members and relevant stakeholders verifying that the locations were correct. Sign boards were also installed for each FCZ to identify where the no-fishing area is located.

Fish Conservation Area boundary marker in Peam Bang community, Cambodia



Technical map of FCZ boundaries (shown in red) and community fishing area boundaries (shown in pink)

☑ Disseminate regulations widely

Once an FCZ has been formally approved, an important first step is to make sure that community members are aware of the FCZ, where it is located, which activities are and are not allowed in the FCZ, and the consequences of breaking the rules. They should also learn who they can report instances of illegal fishing to (such as members of the FCZ enforcement team, fisheries management committee, or village committee), and should be encouraged to participate in this kind of enforcement.

Community outreach can be accomplished by holding a dissemination workshop to announce the regulations, as well as posting the regulations in important community venues (e.g. meeting halls, schools, libraries, etc.). It is important to disseminate the regulations beyond just the community that is establishing the FCZ, and also include neighboring communities that may come to fish in the FCZ area.

FCZ regulation dissemination workshop, Lao PDR

☑ Implement community outreach and awareness raising

Although formal efforts may be made to officially disseminate the regulations one time in the community, raising awareness and understanding about the FCZ is an ongoing process. In addition to educating people about the FCZ, this effort can help build a broad understanding of aquatic resources, management, and conservation among community members. Topics could include the types and importance of aquatic resources used by the community, basic concepts of fish biology such as spawning, the function and benefits of an FCZ, and the harms of overfishing or destructive fishing.

Many fun and creative approaches can be used to help raise awareness about FCZs and aquatic resources, including films, games, and performances. In addition to sharing information through formal events, FCZs can also be made a topic of general discussion at temples, social gatherings, and village meetings. Information about fisheries management activities can be integrated into the community's regular information dissemination system about village activities.

Teaching students about endangered fish species, Lao PDR

Filming a committee member for an outreach film, Lao PDR

Case Study 1: Conservation International, Cambodia

Among other community outreach tools, CI uses a **board game** that **simulates fishing activities**. The game includes risks such as fishing gear being stolen, storms destroying gear, or fish spoiling. Players may choose to invest in conserving FCZs or replanting flooded forest, and these actions can result in the players obtaining more fish. The game also demonstrates that investing in collective resources can benefit everyone more than focusing on individual gains. The fishing game is played in small groups with a facilitator, who **asks questions** to understand why players make certain decisions. The game can potentially be used as an assessment tool to measure the community's perceptions about natural resources at the beginning and end of a project.

Fishing activity board game, Cambodia

Case Study 6: FISHBIO, Lao PDR

Students playing an FCZ tag game, Lao PDR

The World Fish Migration Day celebrations in 2016 and 2018 provided opportunities to raise community awareness about migratory *Probarbus* fishes and the function of FCZs with local school children. This included creating *Probarbus* **paper puppets** and playing a **tag game** to illustrate the concept of FCZs. A few children were chosen to be "fishers" and the rest were "fish." The fish had to run from a "feeding area" to a "spawning area" without being tagged by the fishers. During the second round of the game, a few FCZs outlined with rope were introduced as "safe zones" in which the fish could not be tagged. The number of fish that survived from the feeding area to the spawning area is compared between rounds, and can be used to discuss the function and benefit of FCZs with the players.

Case Study 12: WARECOD, Vietnam

Throughout their projects, WARECOD has used creative games and events to raise community awareness about the importance of natural resources.

This included a cooking contest called "Na Hang Kitchen Queen," which consisted of five teams representing the five villages in Na Hang Town. Three women on each team had two hours to complete the cooking contest using local food from the river. The event was the first of its kind in the community, and attracted a lot of attention. It provided an opportunity to encourage people to give up destructive fishing practices, promote local cultural foods, and honor women's roles connected to aquatic resources.

© WARECOD

Cooking contest in Na Hang Town

© WARECOD

Fisherman Millionaire Contest

© WARECOD

Theater forum performed by community members

WARECOD organized a quiz event called "Fishermen Millionaire Contest" in villages where there were the most concerns about the use of destructive illegal fishing. This event required fishers to answer quizzes and solve puzzles, which demonstrated their knowledge and understanding about aquatic resources. It served as an opportunity to remind communities about aquatic resource protection.

WARECOD also worked with community members to create a theater forum production by writing various scenes based on shared concerns about aquatic resources conservation. These scenarios included poor households still using illegal electric fishing gear, and shopkeepers with low environmental awareness not reminding customers to keep the reservoir clean. Each scene included protagonists and antagonists. During the play, the antagonists would give different arguments about not following the co-management regulations, while the protagonists would use different ways to persuade them. If the protagonist could not handle the conflict, other participants with better solutions would come to the stage and replace them. These plays helped remind community members about the aquatic co-management regulations.

☑ Integrate cultural beliefs with management

Some communities have long histories of protecting natural areas or species for spiritual or cultural reasons. Integrating an FCZ with these beliefs can help increase community acceptance and support. Incorporating Buddhist beliefs into FCZ management has been a successful strategy in predominantly Buddhist areas. Buddhist temples often have a "merit zone" in their vicinity in which killing of any kind (hunting or fishing) is not allowed. Temples next to rivers may therefore traditionally have a "no killing zone" that acts as an FCZ. Establishing FCZs near village temples also means that monks can help keep an eye on the FCZ, and community members may be more inclined to respect the regulations. Even if an FCZ is not located near a temple, other events can be used to integrate the FCZ with local cultural or spiritual beliefs.

🔍 Case Study 6: FISHBIO, Lao PDR

FISHBIO has worked with communities to conduct Buddhist monk blessing ceremonies, release fish fingerlings into the FCZ, and install spirit houses at FCZ sites in keeping with local Buddhist beliefs. If fish are released into the FCZ, care should be taken to release only native species.

> "What we are trying to do is bring our religions, especially Buddhist beliefs and the community beliefs, to be part of the process of FCZ conservation. That will help very much when the project ends and everyone in the community can feel ownership of the conservation program."
>
> *— Sinsamout Ounboundisane, FISHBIO*

Buddhist FCZ blessing ceremony, Lao PDR

🔍 Case Study 10: Living River Association, Thailand

Buddhist activities have been adapted for conservation over the past several decades as part of the Thai environmental movement. This includes the practice of tree ordination, a blessing ceremony in which monk robes are placed around a tree, and the tree is ordained the same way that people are ordained to become monks. Similarly, river ordinations can be performed at FCZs, in which a cable is strung across the river and hung with a monk's robes. In addition to helping communities set up new FCZs, Living

© Living River Association

River ordination, Thailand

River Association helped strengthen the management of existing FCZs by organizing river ordinations in Buddhist communities and other blessing ceremonies in Christian communities. Communities typically try to conduct a river ordination at the FCZs every year to reinforce community awareness and respect for the area.

☑ Provide capacity building and training

Communities may need training in certain skills in order to become effective managers of their aquatic resources. Facilitating organizations can help communities identify areas for skill development and capacity building, and implement relevant trainings. Although there may be particular needs for training when an FCZ is first established and management is first implemented, refreshers or continued training may be needed later on.

🔍 Case Study 3: The Learning Institute, Cambodia

To help build community capacity, The Learning Institute conducted a training needs assessment in project communities, then reviewed their findings with community members to rank their top priority needs. The Learning Institute then provided trainings about developing community fisheries management plans, financial management, proposal and report writing, conflict resolution, and benefit sharing. These trainings helped teach fisheries management committees how to report their activities to the local commune, with the goal of motivating the communities to share their ideas with local authorities.

A "learning by doing" approach can be helpful for communities to adapt project activities based on their experiences. The Learning Institute helped communities develop action plans and prepare agendas for monthly meetings, but let the communities themselves facilitate the meetings, while Learning Institute staff observed and later provided feedback for improvement. Similarly, when community members asked questions during trainings, The Learning Institute would try to get other participants to answer the questions first. This approach helped increase the confidence of communities to take ownership of the process, rather than always relying on or deferring to project staff.

> "Capacity building is still very important for the community. If people have knowledge and skills, they are able to talk with other stakeholders, with other development partners, with other donors if they need the funds."
>
> *— Srey Marona, The Learning Institute*

☑ Train patrolling or enforcement team

One key group that will require training and capacity building is those who have been selected to patrol the FCZ and enforce its regulations. The enforcement team should be trained in relevant protocols, such as:

- How, when, and where to patrol
- How to communicate with each other
- How to approach offenders
- How to record their activities
- How to coordinate with local government officials

Ideally, enforcement teams should be trained to keep detailed records of instances of illegal fishing and their interactions with people in the FCZ, warnings issued, whether any gear was confiscated, and whether any fines were collected. These records can be important for assessing the effectiveness of the FCZ.

Enforcement teams may need equipment to conduct their activities, such as a boat, life jackets, flashlights, megaphones, and communication devices (phones or walkie talkies). The ongoing costs of patrolling, such as fuel, will depend on how far the FCZ is from the village and how difficult it is to access. If funds for patrolling are limited, the enforcement team might limit their activities to responding to reports of illegal fishing from community members. If the FCZ is located far from the village, a guard house could be constructed at the site to facilitate overnight stays by the patrol team and provide shelter from the weather.

Training patrol team on how to use walkie-talkies, Lao PDR

> "For the enforcement team we provide training on the monitoring process, on how to record the incidents of illegal fishers, how to provide the warning system, how to give punishment to the illegal fishers, and also reporting and communication."
>
> ***— Sinsamout Ounboundisane, FISHBIO (Case Study 6)***

☑ Implement patrolling and enforcement

Enforcement activities will vary depending on the legal authority conferred to the communities for fisheries management. In some instances, communities may have the authority to do everything from confiscating gear and detaining offenders to issuing and collecting fines. A member of community law enforcement may need to be present to accomplish this. In other cases, community authority may be limited to issuing verbal warnings to people seen fishing in the FCZ, and community enforcement teams must report

Patrolling FCZ, Lao PDR

instances of illegal fishing to local government authorities who have the ability to confiscate and fine.

Enforcing the FCZ ideally should involve some amount of regular patrolling, especially after it is first established. However, it could be useful for the enforcement team to vary their schedule without making it known to the rest of the community, so that people who fish illegally cannot easily avoid the patrolling schedule. Patrolling may especially be needed at night, when illegal activity may be more likely to take place.


Confiscated illegal electrofishing gear, Lao PDR

Some types of destructive fishing (such as fishing with electricity or dynamite) may be illegal anywhere (both inside and outside the FCZ), while certain types of traditional fishing may be permitted in most locations, but may be prohibited inside a "no-take" FCZ. If illegal destructive fishing is prevalent in an area, it may be challenging to expect a local FCZ enforcement team to enforce these general fisheries regulations outside of the FCZ area without support from local government officials.

Case Study 5: WorldFish, Cambodia

Multiple communities in the Stung Treng Ramsar site learned how to work together to jointly patrol a large, shared FCZ area, such as stationing teams at different sites so that all teams did not have to patrol the entire area. Illegal fishing activities in the areas evolved such that illegal fishers started coming in large groups of about 10 boats at a time, and were sometimes armed, which individual communities could not address alone. Having the ability to patrol an area together in larger groups gave the communities the flexibility to better address this evolving threat. However, this reduced the frequency of patrols, as the number of patrol team members in each community and their availability remained the same.

The communities learned that sometimes when their patrol was joined by members from other

> "They know that if they don't work together, it's difficult for them to not only make their patrol effective, but to keep themselves safe. It's not necessarily about confronting or challenging the offenders directly, it's about making sure that everyone knows that the team is working on the ground, and the team would be able to receive support from other groups as necessary, including from local authorities or rangers. The team is not so big, but if they are physically present in the water, the offenders tend to be scared away."
>
> ***— Mam Kosal, WorldFish***

stakeholder groups, information would leak to illegal fishers, who would then avoid the patrols. To try to prevent information leaks, they instituted a rule that only one mobile phone for the patrol team could be switched on during the patrol, and all others should be switched off.

Community members are not able to arrest illegal fishers, issue fines, or confiscate gear – only certain government authorities are able to do that. However, simply having their presence on the water can serve as a deterrent to illegal fishers. The communities also had the idea of implementing physical deterrents in the FCZ as part of their enforcement, and submerged spiky bamboo structures inside the FCZ that would snag fishing nets and therefore discourage fishing activity.

© WorldFish

Bamboo structure used to deter illegal fishing, Cambodia

☑ Implement a strategy for addressing conflict as it arises

As with any activity that restricts access to natural resources, or that might involve illegal activities, some amount of conflicts may arise over the management of an FCZ. Conflicts could arise due to community members being dissatisfied with the restrictions posed by the FCZ, or how the management is carried out. Conflicts may also develop between FCZ enforcement team members and the fishers they encounter in or around the FCZ. It is valuable to discuss these issues with communities throughout the FCZ establishment process and make a plan of how to address them as they arise. This requires all community members being aware of what avenues and resources they have to address conflicts, including the role that local authorities can play in settling disputes. Community engagement and outreach can be an important tool to try to prevent conflicts from arising, or to try to address them once they have arisen. Having support from local authorities is essential to confront illegal fishers in situations where community patrol members might feel unsafe.

🔍 Case Study 5: WorldFish, Cambodia

“We found out that engaging local authorities in the first place was not only important for the initial designation of the site but also in addressing problems later. The commune chief in particular was instrumental in inviting all participants to the negotiation session.”

— Mam Kosal, WorldFish

When some community members were dissatisfied with the regulations of an FCZ after it had been established, local authorities played a key role in convening the community in a forum to renegotiate the rules of the FCZ. Ultimately, the communities decided to make exceptions to allow the most vulnerable households to fish in restricted areas of the FCZ.

Training by Environment and Fisheries Officials on relevant legal provisions and patrolling, Cambodia

© WorldFish

The project also experienced conflict between fishers and the enforcement teams. In retaliation for confiscation of boats and illegal fishing gear, one patrol member had his boat sunk and his farmhouse set on fire. To overcome this setback, WorldFish highlighted the importance of having a strong commitment and collaborative effort from community members.

> "We raised awareness with them by pointing out that they would be the ones who bear most of the cost if resources are lost. Working with local authorities is also indispensable to ensure the offenders are identified and blacklisted. Having community leaders attend monthly meetings with the commune chief is another way to address such issues."
>
> *— Mam Kosal, WorldFish*

Case Study 6: FISHBIO, Lao PDR

Conflict management training, Lao PDR

In two instances, fishers who had their gill nets confiscated from FCZs retaliated against a patrol team member either by sinking their boat or cutting it loose. FISHIBO partnered with a conflict management consultant to work with project staff on techniques such as mapping sources of conflicts and identifying all of the relevant players, as well as channels for resolution. One suggestion from the consultant was following up with dissatisfied individuals in the community, because sometimes just being able to voice dissatisfaction and feel heard, even if just by project staff, can help appease that individual, even if there is not a readily apparent way to resolve the issue. When FISHBIO conducted conflict management training with community members, many identified that increased education and outreach was needed to help villagers understand the rules and purpose of the FCZ.

☑ Conduct habitat restoration or improvement

If the aquatic habitat in or around an FCZ has become degraded, one potential management activity can be to restore the habitat, such as by planting key species of vegetation that offer food or shelter for fish. As another example, some of the communities working with Living River Association in Thailand add large pieces of wood to an FCZ to provide structure and shelter for fish if there is not much vegetation in the area (Case Study 10).

🔍 Case Study 1: Conservation International, Cambodia

The flooded forests of Tonle Sap Lake are critical habitat for the fish that rear and spawn there; however, deforestation is happening at a rapid rate due to agriculture and harvesting wood for fuel and other products. In addition to training communities in sustainable ways to harvest wood that will not kill the trees, CI has engaged community fisheries committees in habitat restoration by raising, planting, and maintaining seedlings of key flooded forest species.

Each committee collects seeds from the surrounding flooded forest and cares for a nursery of seedlings. They also care for the seedlings once planted and replace those that have died. Some have been able to sell seedlings to outside buyers as a source of income. FCZ patrol teams are trained to stop people from cutting wood illegally if they see it during their patrols.

Seedling nursery, Cambodia

Community member planting seedlings, Cambodia

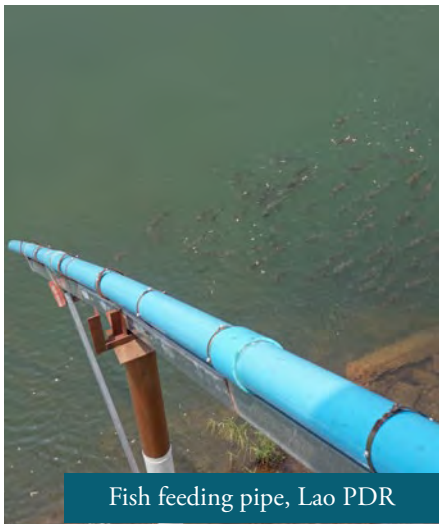
☑ Integrate management with tourism or other alternative livelihoods

Depending on the location of the FCZ and a community's resources, it may be possible to integrate FCZs with ecotourism activities. Ecotourism related to the aquatic environment can help generate revenue for the community and provide an incentive for continuing conservation activities. Both the community and the FCZ will need to be accessible and have adequate infrastructure for visitors in order for ecotourism to be a viable option. Tourism will need to be managed so as not to damage the aquatic environment in the FCZ through pollution,

Fish feeding platform, Lao PDR

excessively disturbing aquatic species, or other visitor impacts. Efforts will also need to be made to ensure that the benefits of tourism can be distributed equitably in the community, and not just benefit a few households with the most capacity or connections.

Several communities in Lao PDR have installed **fish feeding platforms** at their FCZs, where visitors can either purchase or make a donation for food pellets to feed the fish in the FCZ. If the water is clear at least part of the year and the conditions around the FCZ are safe for swimming, snorkeling gear could be rented to visitors so they can observe fish in or around the FCZ. Catch-and-release fishing, boat tours, interpretive signs describing the FCZ and its fish species, and fish statues are other tourism elements that could be incorporated.



Fish feeding pipe, Lao PDR

Case Study 11: Ngao River, Thailand

The recovery of species such as mahseer (*Tor* spp. and *Neolissochilus stracheyi*) in community FCZs on the Ngao River has made it possible for recreational fishing tourism to develop at some locations. Anglers hire local community guides who facilitate catch-and-release fly fishing inside the FCZs, and these visitors pay a fee to the communities for this access, in addition to purchasing food and paying for local guides and transportation.

Visiting angler

Mahseer in Ngao River, Thailand

☑ Seek networking opportunities

Networking can be a valuable activity to strengthen the capacity of community fisheries management. Sometimes the management of large FCZs needs to be coordinated among multiple villages. This can take the form of joint or rotating patrolling of the FCZ with members from various villages. Study tours or exchange visits are another way for community fisheries groups to visit each other's sites and learn from each other's experiences. Social media platforms also provide an opportunity for creating online communication networks where community members can interact with and support each other online by seeking solutions to shared challenges. Networking can also strengthen the collective voice of communities when engaging with government officials.

Case Study 6: FISHBIO, Lao PDR

FISHBIO has organized four villages to share patrolling of the large Kengmai Rapids FCZ on the Mekong River. Given the large size of the 5-km-long FCZ, the four responsible villages decided to split patrolling into the upstream and downstream areas, based on where the villages were located. Two study tours helped bring together a total of nine villages to learn about project experiences, and the community members have been connected through Facebook and a WhatsApp message group.

Study tour on the Mekong River, Lao PDR

Night patrol team, Lao PDR

Case Study 10: Living River Association, Thailand

In 2013, LRA helped communities establish a local network called the People Council of Ing River Basin (PCIRB), through which communities can support each other and learn from each other's experiences in river management, and collectively raise issues with local government authorities. In 2015, PCIRB organized a Green Walk, an event in which 23 organizations walked 25 km along the Ing River to raise awareness about Ing River conservation and PCIRB.

LRA helped connect the network with the fisheries department and other local authorities, and created a chat group using the app Line so that communities could talk with each other. Not only do the communities discuss FCZ issues, they may invite each other to attend river ordination ceremonies or other cultural events, and strengthen the relationships between villages. LRA also helped organize an Ing Forum in 2017 collaboratively with nine other organizations, including local community networks. This forum consisted of six workshops and was attended by 300 people to discuss sustainable river resource management.

The first Green Walk for Ing River, Thailand

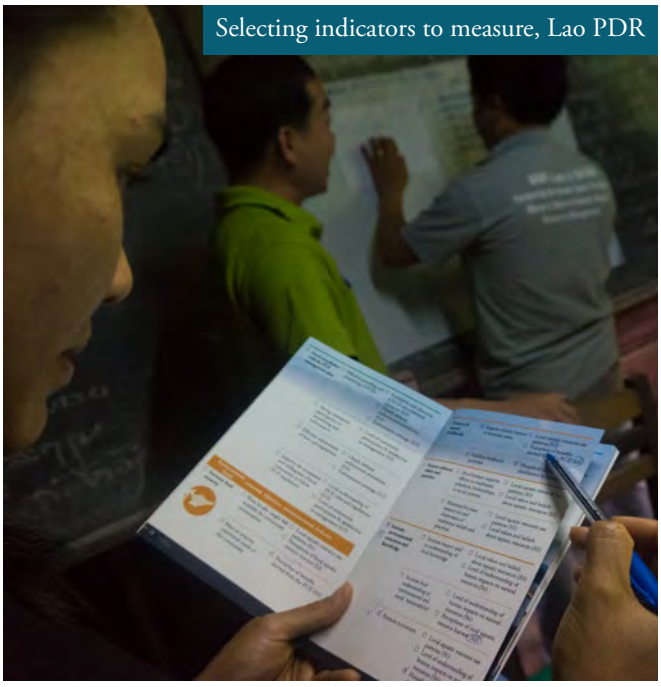
> “An FCZ is an effective tool not only for fish habitat restoration and environmental conservation, but it also is a social tool. It’s a tool for networking, for capacity building.”
>
> *— Teerapong Pomun, Living River Association*

Phase 4: Monitoring - Collect Data for FCZ Effectiveness Assessment

Any management strategy requires periodic assessment or evaluation to determine if it is effectively meeting its goals. This can be accomplished by regular monitoring or through a targeted assessment. General steps are outlined below, while detailed instructions for performing an FCZ assessment can be found in *Guidelines for Assessing Fish Conservation Zones in Lao PDR* (Loury et al. 2019).

☑ Identify relevant indicators of FCZ effectiveness

The purpose of an FCZ assessment is to determine whether the FCZ is successfully meeting its goals or functioning as it was intended. Assessing the success of an FCZ means first deciding how to define and measure success. Defining success requires identifying the purpose of the FCZ, and which goals and objectives the FCZ is intended to accomplish. These will be different for each FCZ, and should be specific to the local context. Having an FCZ's goals and objectives stated clearly in the management plan can help guide the assessment process.


Selecting indicators to measure, Lao PDR

Based on an FCZ's goals, the next step is to select indicators that can be used to measure progress towards successfully meeting those goals. **Indicators** are attributes of the ecological, socioeconomic, or governance system related to the FCZ that you will measure as part of an assessment. An indicator typically has a unit of measurement or scale, such as the number of successfully apprehended violators, catch per unit effort of fish outside the FCZ in kilograms per fishing hour, or number of fish observed per cubic meter of water. In his assessment of fish populations inside and outside FCZs in the Ngao River, Dr. Aaron Koning measured indicators of fish diversity, density, and biomass, among others (Case Study 11). You should select indicators that are feasible to measure given the capacity and resources of the team conducting the FCZ assessment. Example indicators can be found in *Guidelines for Assessing Fish Conservation Zones in Lao PDR* (Loury et al. 2019).

Case Study 6: FISHBIO, Lao PDR

During an FCZ assessment in Kengmeaw Village in Savannakhet Province, the community wanted to know, among other things, whether the community was successfully following up on all violations against the FCZ regulations. Based on this objective, FISHBIO decided to measure the indicators "*Clear enforcement procedures and level of patrolling effort*," and *"Level of compliance with FCZ regulations"* (indicators G6 and G7 from *Guidelines to Assessing Fish Conservation Zones in Lao PDR,* Loury et al. 2019).

☑ Develop an assessment plan and select methods to measure indicators

Conducting an assessment requires many kinds of resources, including time, people, and funding. Developing an assessment plan before you begin can help determine whether you have enough of each of these resources. This includes identifying the members of an assessment team, whose roles can include planning the assessment, collecting the data, and analyzing and communicating the results. If your organization does not have all the relevant expertise needed to conduct an FCZ assessment, this may require partnering with other organizations or consulting with technical experts for their advice. It is also valuable for community members, such as fishers or other stakeholders, to participate in the assessment team.

Fish sampling, Lao PDR

Collecting fish data, Lao PDR

Part of planning an assessment is to determine which methods you will use to measure each indicator of interest and how. You should also determine a sampling schedule that includes when surveys or sampling will be conducted, and what sample sizes will be needed. Methods to assess some indicators may be possible to complete in a single day (such as interview surveys), while others may take several days and may need to be repeated throughout the year (such as fish sampling). Some data may be collected repeatedly as part of a long-term monitoring plan, while others may just be included in a one-time assessment. A plan should be made for how data will be stored and managed so they can be compared to the results of future assessments. The assessment plan should be documented in writing and any modifications should be noted.

Fish collected during an FCZ assessment survey, Lao PDR

Case Study 11: Ngao River, Thailand

© Aaron Koning

Snorkel survey on the Ngao River, Thailand

Researcher Dr. Aaron Koning has been studying FCZs in the Ngao River since 2012. During the dry season between December 2017 and March 2018, he implemented a rigorous ecological monitoring effort to assess the effects of the FCZs on fish populations. During the study, he surveyed 23 of the Ngao River FCZs that were randomly selected, as well as an unprotected area located 100-250 m downstream of each FCZ. The Ngao River becomes clear in the dry season, which makes it possible to count fish by visual observation. Dr. Koning used a mask and snorkel to conduct a visual census of fish, which involved swimming transects through each study area, counting fish, and estimating their sizes.

☑ Implement sampling methods to collect data

The data collection process will depend on the indicators and methods selected. This could involve interviewing community members, observing the activities of a patrol team, or conducting a fish sampling survey inside and outside of the FCZ. Information should be carefully recorded in writing from each assessment activity. Once the data collection step is complete, it may be helpful for the assessment team to have a discussion of the strengths, weaknesses, and constraints of the assessment, and lessons learned from the experience. Information from this discussion should be recorded and stored for reference to help inform future assessments.

Interviewing community members, Lao PDR

Case Study 6: FISHBIO, Lao PDR

To measure indicators about FCZ enforcement protocols and compliance, FISHBIO and the Japan International Volunteer Center conducted a focus group interview with the Kengmeaw Village enforcement team. The following information was documented about the village's enforcement procedures:

> *The whole community is involved with reporting illegal fishing in the FCZ. During the day time, the enforcement team follows up on reports of illegal fishing that they receive from members of the community. During the night time, the enforcement team conducts regular patrolling. There are four patrol teams in the village. One patrol team works every night, and a new team works the following night. Each team consists of five people: three village soldiers and two village police.*
>
> *Nighttime patrols last from 6 PM until 6 AM the next day. During each patrol, the team conducts four rounds of inspection, and each round lasts about 30 minutes. Due to the small size of the FCZ, the team does their patrolling on foot rather than by boat. The patrol team walks to the FCZ during each inspection, which is a distance of about 125 m from the village. There are two critical points where violators tend to fish in the FCZ: one in the upstream section and one in the downstream section. The patrol team uses flashlights during their inspection and cell phones to facilitate communication.*

To measure compliance, the assessment team asked the Kengmeaw enforcement team about the number of officially reported violations that resulted in fines. The answers were:

1. In 2010, 1 person from the village using a gill net was fined 500,000 LAK (~60 USD)
2. In 2011, 1 person from the village using a gill net was fined 500,000 LAK
3. In 2014, 1 person from the village using a cast net was fined 500,000 LAK
4. In 2017, 1 person from outside the village using hook and line was fined 500,000 LAK. He said he did not see the FCZ signboard.

FCZ enforcement team, Lao PDR

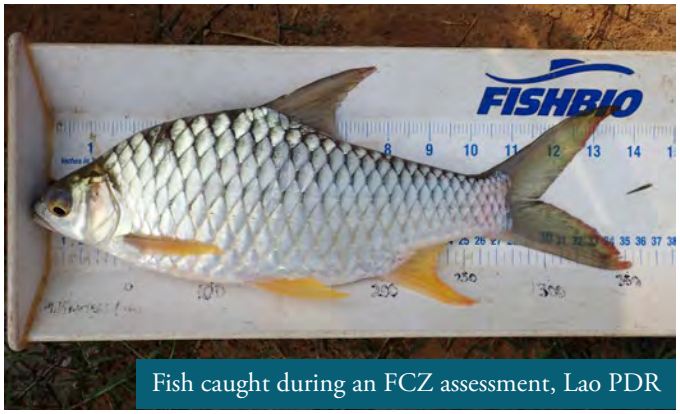
Phase 5: Evaluation – Analyze Assessment Results

☑ Perform quality control of data

Quality Assurance/Quality Control (QA/QC) is an integral part of data collection and should be conducted at multiple points throughout the assessment process. After data are collected in the field each day during the assessment, an assessment team member should review each data sheet to ensure that all the writing is legible and no data are missing, check for and correct obvious errors, and make note of any unusual circumstances that could influence how the data are interpreted in the future.

After the data have been entered into a database or other electronic format, these data entries should be carefully checked against the paper data sheets to correct any errors made during the data entry process. Finally, before the data are analyzed, some simple tests or queries can be run to check for outliers, such as unrealistically high or low values, and these questionable data can be omitted from the analysis. Such steps are important to ensure the integrity of the data set and the validity of any analyses performed with the data.

FISHBIO staff assisting with data collection, Lao PDR



Fish caught during an FCZ assessment, Lao PDR

☑ Perform analysis of the data at regular intervals (e.g., seasonally, annually)

Collecting data alone is not sufficient to complete an assessment – the data must be analyzed and interpreted in order to inform FCZ management. Assistance from a technical expert may be needed to analyze the assessment results. These results may be summarized as tables, charts, graphs, diagrams or written descriptions. Statistical analyses may be performed to compare differences inside and outside of FCZs, or before and after FCZs were established. Analyses should provide information on whether the FCZ is successfully achieving its goals and objectives.

Case Study 11: Ngao River, Thailand

Key results from Dr. Aaron Koning's assessment of FCZs in the Ngao River:

- **More Fish:** FCZs surveyed during the study had higher fish diversity, density, and biomass than nearby fished areas. The increase in biomass was more than 20 times higher on average, indicating that the reserves are benefiting all fishes, but particularly larger species (>20 cm maximum length).
- **Small Can be Effective:** Although larger FCZs demonstrated the greatest changes in fish biomass, FCZs as small as 0.3 ha were shown to have higher fish biomass compared to nearby unprotected areas.
- **Benefit of Proximity:** FCZs located close to villages had higher fish biomass than those located farther away, presumably because the proximity of the FCZs made them easier to enforce.
- **Benefit of Penalties:** FCZs with explicit penalties for violating regulations (whether a monetary fine or offering an animal sacrifice or libations) had higher densities of small fishes than those without penalties.
- **Spillover of Small Fish:** After a few years, as the number of large and predatory fishes inside the FCZs increases, smaller fishes (length ≤20 cm) may start to move outside of the reserves to avoid predation.

☑ Evaluate the strengths and weaknesses of the FCZ based on assessment results

There is no single definition of a successful FCZ because the definition of "success" depends on each individual community's vision and goals for their FCZ. The results of the assessment should be interpreted based on the local context and conditions that determine which outcomes are desirable or undesirable. It may be that the FCZ is successful in achieving one goal or desired benefit, and not successful in achieving others. The results of the assessment can be used to create a list of FCZ strengths and weaknesses. The assessment team should use this process to decide on the key message or story they want to share about the FCZ and their findings.

Kengmeaw FCZ, Lao PDR

Phase 6: Reporting - Communicate and Disseminate Results

☑ Identify stakeholder groups to communicate results to

The assessment team should share their findings broadly with the fisheries management committee and as well as other members of the community, so that all can understand how the FCZ is performing. Assessment findings can also be shared with relevant government officials, other organizations or collaborators, and project donors.

☑ Summarize results in formats appropriate for each stakeholder group

Different approaches may be needed to communicate with various stakeholders. Results may be communicated to communities through meetings and regular village communication channels. Additional approaches such as fliers, brochures, social media, radio broadcasts, or other methods may also be used ensure that many community members have heard the information. After hearing assessment results, community members can offer their own ideas to the fisheries management committee on next steps that could be taken for FCZ management. Written reports, videos, posters, and photos are other methods for communicating results to various stakeholders.

Case Study 2: FACT, Cambodia

FACT supports monthly fish catch data collection by a fish-catch monitoring team of selected local fishers at project sites to understand about the impact of project implementation and catch trends. The fish catch monitors regularly submit data to responsible project staff for data checking and verification. The project staff then submit the data to a monitoring & evaluation officer at FACT who is responsible for data management and analysis. These data are published in FACT's Fisher's Voice magazine at least once per year, and are publicly shared with other important stakeholders such as communities, members of the Cambodia Fisheries Network, NGO partners, donors and development partners, and related government agencies.

Quarterly fish catch monitoring meeting, Cambodia

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☑ Present any recommendations for management based on assessment results

A key stakeholder group to communicate the results of an FCZ assessment to is the group responsible for making decisions about an FCZ. In particular, the assessment team should identify any recommendations suggested by the assessment results. Strengths in FCZ management identified by the assessment can be supported or expanded, while weaknesses can be changed, or more funding and support can be sought to improve them.

Case Study 11: Ngao River, Thailand

"In general, when I discuss the findings of my study with community leaders, they are pretty interested. Their primary interest is in knowing how many species are found in the reserve. They already understand that the reserves work to increase fish biomass and density, because they can see that with their own eyes. I've tried to discuss how increasing the sizes of reserves could increase their benefits, but the initial response from leaders has largely been that expanding them isn't really feasible given community considerations. This is something that would more easily be addressed at a meeting in which this could be discussed with multiple villages from within the basin."

— Aaron Koning, Cornell University

© Aaron Koning

Hypsibarbus salweenensis spawning in the Ngao River, Thailand

Phase 7: Adjust FCZ Objectives and Management Strategies

☑ Discuss with the management committee whether and how to adjust FCZ regulations or management protocols

If the community is satisfied with the performance of the FCZ based on the assessment, no changes may be needed to adapt FCZ management. However, if the assessment identifies areas that need improvement, the village fisheries management committee or relevant management group can decide on changes that are needed to improve FCZ management. These changes could be large, such as moving the FCZ boundaries, or could be small, such as adjustments to the enforcement protocols. Management activities could also include increased outreach to key groups who may be dissatisfied with the FCZ or may not fully understand the regulations.

If the fisheries management committee decides that changes to the official FCZ regulations are required (such as changing the FCZ boundaries, rules, or penalties), then the fisheries management committee should work with government officials as needed to make changes following the relevant legal process.

Case Study 7: FISHBIO, Lao PDR

FCZ sign in Kengmeaw Village, Lao PDR

Based on an assessment of the Kengmeaw FCZ, the enforcement team appeared to have clear procedures and regular enforcement effort, but these procedures were not documented in writing. The assessment team recommended that the enforcement team formalize their patrolling procedures in writing and keep a logbook of their patrols so they can document their enforcement effort and make notes about what they encounter during their patrols.

Based on the most recent fine issued by the enforcement team to a fisher from a neighboring village who said he did not see the FCZ sign, FISHBIO recom-

mended to the Kengmeaw fisheries management committee to make sure the signs demarcating the FCZ are clearly visible and legible, and to conduct outreach about the FCZ with neighboring villages. During a final visit to the community, FISHBIO brought new signs to replace the village's old and faded FCZ signs.

Old wooden FCZ sign

New metal FCZ sign

☑ Implement any agreed-to changes (repeat Phase 3)

Any changes agreed to by the management committee should be then be carried out by the relevant individuals. If the community does not currently have the resources to make desired changes, a plan can be made to obtain funding.

☑ Plan for the next FCZ assessment and repeat Phases 4–7

If changes are made to improve FCZ management, a follow-up assessment should be conducted to see if the changes are having the desired effect. Even if no changes are made, some form of assessment should be performed regularly to ensure that an FCZ is continuing to meet its goals. Once an assessment is completed, lessons learned should be documented and stored with the assessment plan to inform a future assessment, when Phases 4–7 of the fisheries management cycle are repeated.

Community surveys, Lao PDR

General Lessons Learned

CEPF grantees have built up an extensive body of knowledge based on their experiences implementing FCZs in the Indo-Burma Hotspot. Full case studies from 10 CEPF grantees and other conservation practitioners are summarized in the following pages. Below are a few general lessons learned from their experiences.

- **Community ownership** of an FCZ is perhaps the most important element for sustaining FCZs in the long term. It can take time and extensive outreach around conservation concepts for communities to fully understand the benefits of an FCZ and feel a sense of responsibility to sustain one. Therefore, community ideas should lead the FCZ establishment process, and they should be empowered to manage it effectively.

> “Maybe the most important tool is a rights-based approach. For sustainable fishery resources, the most important thing may be the empowerment of the grassroots community. Let them have ownership of the local resources, since they are the owners. If they have very strong ownership of the local resources, then the local fishery will be sustainably and well managed. The dependence on funding support from the external stakeholders is not sustainable enough. What is really the most important factor contributing to the sustainability is the ownership of the local community.”
>
> ***— Youk Senglong, Fisheries Action Coalition Team (Case Study 2)***

- **Building trust** with communities is very important. It can take many repeated visits by CSOs and spending quality time together to build a relationship with a community and fully understand the issues they are facing.

> “Whenever we went and surveyed, we stayed in their houses. In the nighttime, we have free time and we talk with them, we chat with them about many things and also we explain about our surveys, “We went there today and then we found these fish species.” To chat very closely and friendly with them, that is very important. We get some ideas of the situation from them, what was happening in former times.”
>
> ***— Zau Lunn, Fauna & Flora International (Case Study 8)***

- If managed well, FCZs can start to show increased fish populations **within a few years**. However, it may take longer for all members of a community to fully accept and understand the FCZ regulations.

> “In areas where the primary threat to fish is unsustainable harvest, I think you can see these effects occurring probably in the span of three to five years. You actually start picking up enough fish biomass to have a noticeable change.”
>
> ***— Aaron Koning, Cornell University (Case Study 11)***

> “Fish are unlike forests. If effective protection can take place for one to two years, the fish can come back. But not all species benefit from that. Mostly shorter life-cycle fish species tend to recover faster.”
>
> ***— Mam Kosal, WorldFish (Case Study 5)***

> “In some cases it takes about five years to 10 years to get accepted by all villagers, to make other villagers see the results of the zones – that they can get more fish, and the FCZ benefits their fishing, not limiting their access.”
>
> ***— Teerapong Pomun, Living River Association (Case Study 10)***

- FCZs are a **long-term intervention** that may take extensive commitment and investment to maintain and monitor.

> “You can’t go up there in one funding cycle and expect to set up all this stuff and then walk away and expect it’s going to run smoothly from here on out. Once you commit to these projects… you’re pretty much in this for the long haul.”
>
> ***— Steven Platt, Wildlife Conservation Society (Case Study 9)***

- FCZs are one type of fisheries management strategy and **other strategies** may also be useful or more appropriate for a given situation. Sufficiently evaluating your chosen management strategies is the best way to ensure that they are working to achieve the objectives.
- It is important to create an **enabling environment** for the communities to succeed. This can include harmonizing activities with existing projects in the region, working with authorities to provide support for the communities, providing consistent advice and facilitation, and informing communities about outside events or opportunities that they can join to learn from.
- Implementing FCZS can be challenging, and compliance may never be one hundred percent. But **imperfect can still be beneficial.** Even if illegal fishing still occurs in an FCZ occasionally, the protected area can still have an overall positive impact both on fish populations and local communities.

While FCZs may be challenging to implement, can require long-term investment, and are not the solution to every problem, they do show great promise for engaging communities in natural resource management and improving the resilience of aquatic populations. It is hoped that the lessons learned from the Indo-Burma Hotspot can serve as a model to guide the establishment of FCZs in freshwater ecosystems around the world.

Stung Treng Ramsar Site, Cambodia

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Supplemental Materials

A Conversation with Ian Baird

In 1993, Ian Baird established the Lao Community Fisheries and Dolphin Project, a project of the Earth Island Institute of Thailand, a Thailand-based NGO. The project's intention was to support fisheries co-management in Khong District, Champasak Province, southern Lao PDR. He spent seven years living and working with Lao communities as part of the project. After the first few months of working together, villagers suggested that the best idea for management would be to protect deep-water pools in the Mekong River that serve as fish refuges during the dry season, based on their Local Ecological Knowledge of fish behavior. The project helped facilitate government recognition of community-designated regulations for the first co-managed FCZs in Lao PDR. This effort eventually spread to 60 villages that established 72 FCZs in the district, and informed the inclusion of FCZs in the Lao Fisheries Law, as well as fisheries co-management initiatives throughout the Mekong Basin.

Ian Baird with community members from the Lao Community Fisheries and Dolphin Project

© Ian Baird

The following is an edited conversation with Dr. Baird, who is now a professor at the University of Wisconsin-Madison, about his experiences and perspectives related to the establishment of FCZs.

Why do you think FCZs have become so widespread in Lao PDR?

I think this is something that was ready to happen. It's something that's based on local knowledge that makes sense to people and fits with their belief systems and ecological understandings. It's also practically manageable from a village perspective, it's something you can do at a local level.

What role did the Lao Community Fisheries and Dolphin Project play in establishing the FCZ model in Lao PDR?

We didn't go into this with an idea of creating FCZs. We used a model which stipulated that we were going to spend some time with fishers to figure out from them what they think is the best way forward. They were the ones who alerted us to the importance of deep-water pools.

The main thing we did was introduce the villagers to the government people, and the government said, "We're empowering you to enforce these rules that you're making up yourself." That was something that they had never had the power to do in the past, and that was very critical.

How should organizations broach the topic of aquatic management with communities?

The initial conversation needs to be a problem assessment. Firstly, "Do you think fisheries are in

decline?" People aren't going to do anything if they don't think there's a problem. You have to figure out what the problem is in their view. Then you have to consider what is possible to address the problem, what are the tradeoffs, and then you work with what's feasible.

The problem assessment can't just be about protecting endangered species or charismatic species. It needs to be about the fish that local people think are important. You want to start with species that people are going to see quick results on, and that will make them encouraged to do more.

Were there any guidelines about the regulations communities could make?

The big lesson was something the local government insisted on: that local people were not allowed to make discriminatory rules, meaning they couldn't put any rules in place that they were not willing to follow themselves. So if you say we can't use a certain fishing gear, nobody uses it – your village and other villages. Then they can justify it morally and it makes it possible for them to enforce it.

What was your process of helping communities develop FCZs?

Firstly, the villages invited us. When we showed up in the villages, we would give them some advice and tell them what other people had been doing related to FCZs in other villages. We'd tell them what they needed to do to get government support, that they couldn't do discriminatory rules. We told them they needed to find a balance between their own livelihoods and fish protection. I'd tell them not to protect too much: "You've got to eat in the future, but you've got to eat now as well. So what do you need to be able to do both?" And then we said, "OK, we're going, see you in a month." We left them to figure it out themselves. We realized that people aren't going to speak openly when there are outsiders there.

Ian Baird meeting with community members in Thailand

What happened after you came back to the villages?

When we came back, they organized the official meeting, but by that time they had already drafted the rules. We separated them into women and men groups for discussion, and sometimes in that process rules were added, removed, or adjusted. And the women would come up with some ideas that the men hadn't been thinking about, like having to do with tadpoles and frogs, and other types of aquatic animals that were in different habitats. The men were interested in the big fish and the big rivers and the big gears, and women were interested in smaller things, but equally important and sometimes even more important. And there's a lot you can do to make a difference if you put some regulations in place at certain times of the year.

What other types of regulations could be used along with FCZs?

FCZs were just one of the tools we used out of many. Villagers had a whole package of things they could do. They were banning certain traps when fish were migrating up the streams, they were regulating frog harvest. FCZs became the famous part of it, but it should really be a holistic strategy. There are some places where FCZs are not going to be the right solution, where there are other things that people need to do instead.

What are some of the limitations of FCZs?

There are cases where FCZs are incapable of dealing with problems that are created from an outside area. If you have serious water pollution or other kinds of impacts that are coming from another area, an FCZ is not going to solve those. Or if a massive dam wipes out the vast majority of fish, FCZs can make life a little bit better, but they aren't going to solve the problem. You have to be realistic about what FCZs can do and what they can't do. FCZs are locally based, so they don't provide for larger scale planning over larger landscapes. There may be highly migratory species that can only be partially protected by FCZs.

What are some of the hallmarks of bottom-up FCZ establishment?

In the 60 villages we worked with, every one had different rules. If I go anywhere and see two villages with the same rules, I know there's a real problem. That shouldn't be the case because it's top down, you know it right away: this is not something the villagers came up with, this has been imposed on them, it's not going to work. FCZs should never be "one size fits all." They should never be implemented in the same way, they need to be flexible. I've never seen a fish conservation zone imposed by anybody that has been successful in the long term.

What do you think could be done to improve the management of FCZs?

The thing that we always emphasized which I don't think has been emphasized much since then is the idea that you could change the boundaries or rules depending on circumstances. Because the reality is you could get the boundaries or rules wrong, it might not be feasible for different reasons. You need to be able to adjust things once you see how they work. It needs to be adaptive in theory.

What helped FCZs succeed?

A lot of it had to do with certain charismatic individuals who were supportive of the idea, who were leaders that were able to take this to the community and be able to convince them. When a few FCZs were put in place, they started to work pretty quickly, because fish reproduce pretty fast. Unlike many other conservation efforts that take years to get results, when it comes to fish, it happens quickly. I think this is another big reason for the success is that you can see results quickly.

What kind of support can facilitating organizations provide to communities?

You need to anticipate social problems that you're going to encounter – with the government, with neighboring villages, with outsiders, with people within your own community – and you've got to have a plan to deal with those in advance. That's the main role we played as an NGO, not trying to tell them what kind of rules they could establish, but telling them the types of experiences that other people had already had, so they wouldn't make those same mistakes. Ultimately it was their own decision on how they were going to do it, but we were providing more knowledge to base their decisions on.

What sort of perspective do you wish people had about FCZs?

People need to start out with the idea that this is about protecting communities to begin with. It's not about protecting fish, it's about protecting communities. But the only way you can protect the community is to protect the fish, because that's what the people rely on.

With these sorts of systems, you can't base it on science alone, you have to base it on what local people think is feasible, because they are the ones who are ultimately going to be doing it. The perspective shouldn't be, "We're going into these villages to do FCZs." It should be, "We're going into these village to deal with aquatic management issues, and maybe FCZs are one thing we might apply, but there's also a whole bunch of other things." ◆

List of Case Studies

Cambodia

Case Study 1: Conservation International

Case Study 2: Fisheries Action Coalition Team (FACT)

Case Study 3: The Learning Institute

Case Study 4: Royal University of Phnom Penh

Case Study 5: WorldFish

Lao PDR

Case Study 6: FISHBIO

Case Study 7: FISHBIO

Myanmar

Case Study 8: Fauna & Flora International

Case Study 9: Turtle Survival Alliance/Wildlife Conservation Society

Thailand

Case Study 10: Living River Association

Case Study 11: Ngao River

Vietnam

Case Study 12: WARECOD

Case Studies

CAMBODIA

Case Study 1

CONSERVATION INTERNATIONAL

Conservation International

Country: Cambodia
FCZ Locations: Tonle Sap Lake, Pursat and Kampong Thom provinces
Number of FCZs: 6
Number of Communities Involved: 6

Cambodia's Tonle Sap Lake is the largest lake in Southeast Asia and is an incredibly productive system driven by an annual flood pulse that expands the size of the lake by up to five times in the rainy season. Fishing is very important to families who live along the lake, especially those in floating houses who are landless. Without access to land, villagers must often sell fish in order to buy rice and other food. Since 2008, Conservation International (CI) has been working with floating villages in Pursat and Kampong Thom provinces using an integrated approach to improve livelihoods and community resilience, while aligning activities to promote conservation outcomes. A central piece of this work has been reinvigorating Community Fisheries groups to conduct local fisheries management, including the enforcement of designated no-fishing areas called Community Fish Conservation Areas (i.e., FCZs).

FCZ agreement signing between community and government officials

Community fisheries were initially established by the Cambodian government between 2002 and 2013 with the reform of fisheries laws and the end of a privatized system of fishing lots. Community Fisheries include a community fishing area where fishing is allowed with certain gear restrictions (ranging in size from 208–3,680 ha in the communities where CI works), and community fish conservation areas (i.e., FCZs) where fishing is not allowed (ranging in size from 0.7–3.9 ha in the communities where CI works). The rules and activities of the community fishery are set forth in a management plan. However, communities may not have the capacity and resources to legally register their community fishery with the government, or to carry out the activities included in their management plans. Additionally, the location of community fish conservation areas initially designated by the government may no longer be suitable because of changes in water level or the

encroachment of other activities such as farming or settlements. CI plays a facilitating role to help communities develop or revise their fisheries management plans (with the help of a consultant from the Fisheries Administration who specializes in writing such plans) and builds their capacity to manage fisheries resources.

Consultation Process: The first step of the consultation process begins with a meeting with key individuals, such as the village chief, elders, and the fisheries committee. This is followed by a meeting with the entire community to discuss the local situation and develop an action plan based on community needs and motivations. CI then helps communities implement a suite of activities (described in the Successes section), which may directly or indirectly benefit FCZ management. These activities will depend on the community's interest, and may include women's savings groups, establishment of a mini trust fund, fish processing groups, and habitat restoration.

Selecting and Marking an FCZ Location: Through facilitation, CI helps communities identify which areas they want to use for fishing, and which they want to designate as FCZs. FCZs are often located at deep pools or ponds in the floodplain that retain water during the dry season, and may also include flooded forest habitat or streams. When selecting an area for an FCZ, some compromises need to be made. The community may want to keep the area closest to their homes or the most productive areas open to fishing. The FCZ should also be close enough that the community can patrol it effectively. In one community where the conservation area is an hour's boat ride away, the community members must make a rotating schedule and plan to stay there overnight. The borders of the FCZs are marked with red flags or pieces of cloth on bamboo poles, as well as sign boards to make people aware of the conservation area

Enforcement and Monitoring: Typically, the FCZs are only patrolled during the dry season; during the rainy season, the water level rises, and fish move to other areas, making it less likely that people will try to fish in the FCZ. CI trains communities to patrol FCZs using Spatial Monitoring and Reporting Tool (SMART) protocols, which they can use to monitor both illegal activities and the presence of wildlife in their conservation areas. To help monitor the effects of the FCZs, CI trained some communities to conduct daily or weekly fish catch monitoring. Additionally, CI has installed camera traps and observes wildlife around the community fishing areas.

Outreach: Awareness raising is important for ensuring that communities understand the connection between their livelihoods and the conservation of natural resources. Among other tools, CI uses a

Demarcation verification by relevant stakeholders

> “Our experience is that awareness raising and the engagement of the community with the Community Fishery work is the key to make them understand. Because we know that everyone thinks about their personal interest, especially in the communities where fishing is their important livelihood. So, they want a lot of fishing grounds to support their livelihood. The key is to get people to understand about the importance of protection, of conservation, how that benefits their community. If the community understands how it benefits them ecologically, socially, economically, they will compromise, they will participate and provide the area that is designated for conservation.”
>
> ***— Un Borin, Conservation International***

fishing **board game** which simulates **fishing activities**, and includes risks such as fishing gear being stolen, storms destroying gear, or fish spoiling. Players may choose to invest in conserving FCZs or replanting flooded forest, and these actions can result in the players obtaining more fish. The game also demonstrates that investing in collective resources can benefit everyone more than focusing on individual gains. The fishing game is played in small groups with a facilitator, who **asks questions** to understand why players make certain decisions. The game can potentially be used as an assessment tool to measure the community's perceptions about natural resources at the beginning and end of a project.

To help facilitate trust building and coordination between communities and government officials, CI has helped develop Fisheries Coordination Teams, which are a forum for communities to raise issues with district authorities, or if solutions cannot be found, at the provincial level.

Community playing fishing activity board game

Funding for this work over the last 10 years has been provided by the United Nations Development Program on Cambodian Climate Change Action Trust (CCCA), USAID's HARVEST project, Fondation Ensemble, the MacArthur Foundation, the Manna Foundation, the Silicon Valley Community Foundation, Margaret A. Cargill Philanthropies, and the PISCES Foundation.

Challenges

- **Legal Authority:** While the communities are given the responsibility to manage their community fisheries and stop people fishing illegally, they do not have the legal authority to confiscate gear or issue fines or other penalties, and still depend on government authorities to prosecute violators.
- **Government Responsiveness:** Large-scale illegal fishing, such as the construction of arrow traps or the use of large nets with high-speed boats is too difficult for community members to

address on their own. When under-resourced government officials do not respond to community reports of illegal fishing, this can discourage community participation in fisheries management. The Fisheries Coordination Team is one mechanism to try to improve communication between community members and government officials, as well as encourage government staff to respond to community needs.

- **Fair Access:** If community fisheries and FCZs are not managed properly, issues of fair access can create conflict within the community – for instance, if wealthy people with power from outside the community take over the community fishing ground and the fisheries committee does not stop them, village support for the community fishery process may decline.
- **Competition for Water:** FCZs are often located in areas that have water during the dry season. However, sometimes there is competition to use this water for other purposes, such as pumping it for rice farming. Water scarcity can be a particularly challenging issue during periods of drought.
- **Fish Catch Monitoring:** Encouraging communities to conduct fish catch monitoring can be challenging because the fish catch may spoil while the fishers are recording the data. The data from daily fish catch monitoring can also be unwieldy and challenging to draw conclusions from.
- **Issues of Scale:** Although many of CI's interventions have been successful, there are at least 175 community fisheries around Tonle Sap Lake alone, and more effort is needed to try to scale up the interventions. Without external support, it can take years for community members to try to get their community fisheries recognized on their own.

Successes

- **Women's Savings Groups:** Without access to bank loans, families in floating communities may develop debts from borrowing money from local lenders or middlemen, who can charge high interest rates of up to 15% that require the borrower to take out additional loans to pay off. CI has helped communities form savings groups, or small collectives made up almost entirely of women, in which members pool their savings and offer opportunities for members to take out small loans. The members received training in financial literacy, book keeping, and teamwork approaches such as resolving conflict.


Women's savings group meeting

CI provided a one-time investment of 1,500 USD to each savings group as a conservation fund. This serves as seed funding and the interest from this investment can be withdrawn every three months to finance conservation initiatives proposed in the workplan of the local community fishery committee. On top of this, members make monthly contributions to the savings group ranging from 5,000-30,000 KHR (1.25 to 7.5 USD), and interest from these contributions is distrib-

uted among the group members at the end of one year. Group members can take out loans at an average interest rate of 1–3%. Some savings groups have decided to contribute some of their profits to support the community fisheries activities, thereby playing a role in mobilizing resources to support community fisheries work, and savings group members monitor and evaluate the conservation activities they contribute to.

- **Mini Trust Funds:** In a few communities, CI has also created trust funds of 5,000 USD in bank accounts that annually generate about 375 USD in interest, which communities are able to withdraw and invest in conservation activities. The revenue from the mini trust fund prompts the community to make decisions about how to spend it and provides a sustained funding mechanism for activities like patrolling FCZs or replanting flooded forest. The mini trust fund is a platform to generate revenue for the community over the long term, and it builds a connection between community members and local authorities that oversee all activities related to the trust fund. It also provides the opportunity for communities to engage with other sources of funding in the future, provides an ability to connect with other NGOs by providing the means to attend meetings or workshops, and it allows the community to learn about money management and accounting.

> "The mini trust fund is not about the 5,000 USD, it's about the ownership, about the engagement of local stakeholders. It is the platform that we use to bring the relevant stakeholders to be responsible for the finance and the activities of the Community Fishery."
>
> ***— Un Borin, Conservation International***

- **Women's Fish Processing Groups:** Fish processing is an important source of income for floating villages, and these activities are managed almost solely by women. CI discovered that women were largely working and solving problems independently, and that much could be gained by encouraging women to work together. They provided training in good hygiene practices, and helped them develop business skills including financial literacy, record keeping, marketing, conflict resolution, and negotiation. They also supported the women to attend trade fairs to market their products, including smoked, dried, and fermented fish, and some have been able to secure large buyers in Phnom Penh as well as local markets. By working together, the women have been able to share fuel and transport costs and increase their revenues, which they have used to build fish process-

Tonle Sap woman drying fish

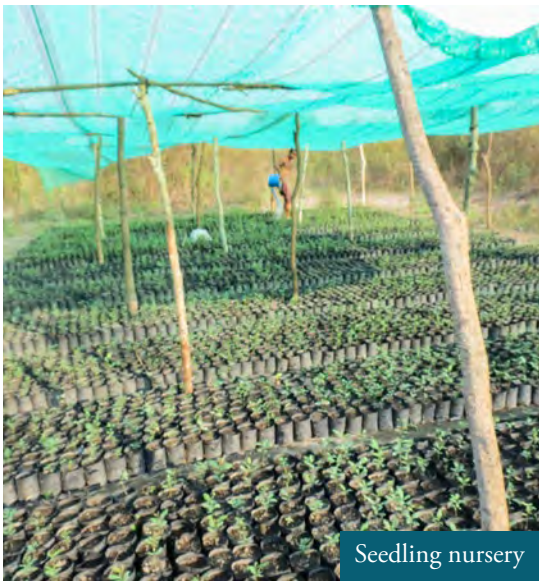
Tonle Sap women processing fish

ing workshops or storage for products. Being able to process more fish rather than sell it fresh increases overall revenue.

- **Habitat Restoration:** Tonle Sap's flooded forests are critical habitat for the fish that rear and breed there; however, deforestation is happening at a rapid rate due to agriculture and harvesting wood for fuel and other products. In addition to training communities in sustainable ways to harvest wood that will not kill the trees, CI has engaged community fisheries committees in habitat restoration by raising, planting, and maintaining seedlings of key flooded forest species. Each committee collects seeds from the surrounding flooded forest and cares for a nursery of seedlings. They also care for the seedlings once planted and replace those that have died. Some have been able to sell seedlings to outside buyers as a source of income. FCZ patrol teams are trained to stop people from cutting wood illegally if they see it during their patrols.
- **Community Ownership:** As a sign of ownership, residents of at least one community have voluntarily started to contribute their own money or food to support the patrol teams, without prompting from CI. This suggests that community members understand and appreciate the benefits they derive from effective FCZ management.
- **Benefits to Wildlife:** Based on camera trap monitoring and other surveys, wildlife abundance, particularly of water birds and otters, appears to have increased around community FCZs since the beginning of their protection.

Lessons Learned

- **Empowering Women:** Although women often do not have formal roles in the management of a community fishery, their support can be very important. Some may have to take on additional work to allow their family members to participate in FCZ patrolling or management. Being able to participate in savings groups and therefore make financial contributions to community fisheries activities has shifted the balance of power


Seedling nursery


Community member planting seedlings


Savings group meeting

and given women a voice in fisheries management decisions that they previously did not have. The economic empowerment of women has allowed them to play an important role in supporting family livelihoods, which can challenge stereotypes and change male behavior. As a result, rates of domestic violence can decrease, and more children can be sent to school.

- **Pitfalls of Paying for Participation:** Although CI originally paid an allowance to community FCZ patrol teams, patrolling effort stopped once the payments ended, which did not engender a feeling of community ownership for enforcing the FCZs. Therefore, CI stopped this practice and instead implemented the mini trust fund system.
- **Sustainable Financing:** A sustainable financing mechanism is critical to ensure the success of conservation efforts. Giving the communities a modest amount of financial support, such as the interest from a mini trust fund, can help the community fishery remain active and also attract additional funds from the government, other NGOs, and within the community. Furthermore, this encourages government officials to pay attention to community activities.
- **Engaging Local Authorities:** Engaging local authorities and government staff with community fisheries can be important for supporting fisheries management. For example, commune councils receive funds for natural resource management as part of their commune investment plans, but often it may not be spent for this purpose. Relationships with local government can dictate how much authority communities have to enforce their community fisheries regulations, and such relationships can vary widely on a case-by-case basis. Addressing illegal fishing issues will ultimately require more government resources and action.

FCZ boundary map produced by local authorities and community members

- **Elevating Community Voices:** Regular interactions with government officials through the Fisheries Coordination Team has helped increase the confidence of community members, and some have even initiated meetings with the Fisheries Administration to resolve issues.
- **Community-Driven Process:** For community fisheries activities to succeed, it is crucial that the effort be driven by the communities, with the NGO playing a facilitating role. Without strong commitment from the communities, the conservation initiatives will not succeed.
- **Replicating Success:** CI's approach is to start with a small community or a small number of communities and implement strong conservation programs that demonstrate the benefits to the community. This encourages community members to participate and engage with the project, and the successes can then be used as a learning example for other communities or NGOs.

> "One of our important criteria in doing this is to have a strong and functioning community with good leadership, because they need to be able to carry it through. It just doesn't work if we try and impose it from outside."
>
> *— Nick Souter, Conservation International*

FCZ Community members

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Case Study 2

Fisheries Action Coalition Team (FACT)

Country: Cambodia
FCZ Locations: Tonle Sap Lake (Kampong Thom, Siem Reap, Battambang, Pursat, and Kampong Chhang provinces), Mekong River (Kampong Cham and Stung Treng provinces), and coastal areas (Preah Sihanouk, Koh Kong, Kampot, and Kep provinces)
Number of FCZs: 79
Number of Communities Involved: 55

The Fisheries Action Coalition Team (FACT) is a Cambodian NGO that has been working to support fisheries issues since 2000. They currently support 55 community fisheries in the Tonle Sap Lake and Mekong River that manage a total of 79 FCZs. Many communities on Tonle Sap Lake may have more than one FCZ that they manage, such as an open water area on the lake as well as a dry-season pond on the floodplain. The communities range in size from 300–1,000 households and the FCZs established range in size from 1–1,130 ha. FACT also works to build civil society networks, and received a CEPF grant from 2014–2016 to strengthen community advocacy in the Sekong-Sesan-Srepok (3S) River Basin in response to the construction of the Lower Sesan 2 hydropower dam.

Small Grants: FACT currently awards more than $100,000 annually in small grants to the community fisheries they work with, amounting to $2,000–$2,500 per year for each community fishery. These grants have been used to:

1. Support fisheries activities, such as the construction of guard houses and fish attraction devices, as well as patrolling of FCZs.
2. Connect the community fisheries to other national and regional networks, such as three national networks hosted by FACT, including:
    - The 48-member (national and international NGOs) **NGO Coalition on Fisheries** (NGO-CF)
    - The 55-member (community fisheries) **Coalition of Cambodia Fishers** (CCF)
    - The 120-member (48 NGO-CF members, 55 CCF members, one national Fisheries Administration, and 16 provincial Fisheries Administration Cantonments) **Cambodia Fisheries Network** (CFN)
3. Build/strengthen capacity of community fisheries committees.
4. Contribute to savings accounts/self-help groups. If the community is able to obtain other support for their fisheries activities, they may use the grants from FACT for livelihood improvements, or to reinvest in community savings accounts.

Building Capacity: FACT makes decisions about whether to support a particular community fishery based on whether the group meets the following criteria of community fishery effectiveness. These

criteria were jointly developed by FACT and four other NGOs to assess the capacity of community fisheries.

1. Institution organization/capacity
2. Legality
3. Management plan
4. Capacity and skill
5. Relationships, cooperation, and networking
6. Participation and support
7. Sustainability strategy
8. Participation, monitoring, and evaluation

When consulting with communities about fisheries and FCZ management issues, communities may raise concerns about their own capacity needed to educate and raise awareness in the community about the importance of conservation, as well as manage the budget of the small grants. FACT therefore works with communities to build and strengthen capacity in areas such as networking and communication, fundraising and mobilizing resources, community fisheries management, planning, and reporting. Communities also express hesitations about partnering with local authorities. They are concerned about illegal fishing in their communities by people who are focused on meeting the basic needs of their family, but who may not think about the communal benefits derived from supporting the community fishery. However, community fisheries leaders are often motivated to protect their fisheries resources because they see large-scale changes happening due to climate change and hydropower development, while village populations and the resulting demand for fish continue to increase.

Patrolling and Enforcement: One of the key activities of the community fisheries is to patrol their FCZs. Some communities have permission to detain illegal fishers while they call for the government officials to come to respond to the case. If illegal fishers are poor and only fishing for food, the enforcement teams may only give them a warning and have them sign a letter promising not to fish illegally again. Such warnings alone may not be enough to discourage people from fishing illegally, however. If the offenders are a large group that may be equipped with weapons, the patrol teams may not engage them, but instead will call the government to respond. The success of this enforcement depends on how responsive the local authority is to community reports.


Patrol team © FACT


Night patrol © FACT

Fish Catch Monitoring: FACT supports monthly fish catch data collection by a fish-catch monitoring team of selected local fishers at project sites to understand about the impact of project implementation and catch trends. The fish catch monitors regularly submit data to responsible project staff for data checking and verification. The project staff

> “There is some concern or pressures on the fisheries resources. So that’s why the people have their own commitment from their heart. They have to stand up, they have to conserve the fishery resources, otherwise there might be no more fish in the future. If there is no intervention from the adult generation at the moment, there might be no more fishery resources for the young generation to come.”
>
> *— Youk Senglong, FACT*

then submit the data to a monitoring & evaluation officer at FACT who is responsible for data management and analysis. These data are published in FACT’s *Fisher’s Voice* magazine at least once per year, and are publicly shared with other important stakeholders such as communities, members of the Cambodia Fisheries Network, NGO partners, donors and development partners, and related government agencies. The report is also very important for influencing policy.

© FACT

Quarterly fish catch monitoring meeting in Bak Rotes

Savings Groups: Before 2009, members of the target community fisheries borrowed loans from micro-finance groups or middlemen with very high interest rates of 7–20% for their urgent needs. In 2009, FACT introduced the initiative of establishing savings groups/self-help groups, and provided sub-grants that have been partially used to capitalize the savings accounts of the savings groups. Members of the savings groups also invested their own contributions to the capital, and can take out loans from a revolving fund with a very low interest rate of 1–3% per month to pay off their debts. The initiative not only improved the living conditions and debt situation in the communities, but also contributes to the conservation and management of the fisheries resources. An interest rate of 0.5–1.5% earned from the revolving fund is shared with members of the savings group, and another 0.5–1.5% contributes to conservation work, including administration costs of the relevant community fisheries.

Regular Meetings: FACT conducts regular monitoring to check in with several of the FCZs they help support, including monthly meetings to get reports and updates from communities involved in fish catch monitoring. These updates include fish catch volume, duration of fish catch, type of fishing gears used, and types of fish caught. FACT also conducts a quarterly focus group discussion with stakeholders such as community fishery members, representatives of the commune council, representatives of fish buyers and middlemen, and the local fisheries authorities to discuss issues happening on the ground.

Community members

© FACT

Challenges

- **Varying Legal Interpretations:** Local authorities often interpret the meaning of the fisheries law and the rights of the communities in different ways. This can create challenges both for communities and for civil society groups working in the fisheries sector.
- **Political Will:** Local authorities may sometimes shift their focus away from areas supported by development partners and civil society groups, and leave the responsibility for management to civil society. This creates challenges for instances when government intervention is needed to address large-scale illegal fishing.
- **Sufficient Resources:** Most community fisheries do not have sufficient resources to properly manage their fisheries. The budget for a single FCZ alone may be $1,000 a year, so the $2,000–$2,500 grants from FACT may not be enough to really support all fisheries management

Successes

- **Increasing Fish Catch:** Based on fish catch monitoring, FACT has observed that fisher catches have increased at a number of FCZs. For example, average daily catch at Boeung Bak Rotes in 2017 was 6.6 kg/day compared to the baseline of 3.3 kg/day, while the average daily catch at Boeung Phsaot was 16.1 kg/day in 2017 compared to the baseline of 15.1 kg/day.
- **Community Capacity:** With sufficient budget and support, community fishery groups have the ability to patrol regularly and crack down on illegal fishing activity, as well as conduct awareness raising among their own members and other villages about the FCZ.
- **Financial Sustainability:** One of the most apparent differences between community fisheries that get support from CSOs or development partners and those that do not is the level of debt in the community, especially among villages in the Tonle Sap Lake. Strengthening community savings groups and self-help groups has played a very important role to resolve the debts of the targeted communities.

Lessons Learned

- **Community Ownership:** Dependence on external funding support is not sustainable, and therefore community ownership is one of the most important aspects of sustainable fisheries management. This can be accomplished through a rights-based approach that helps to empower grass-roots community efforts.
- **Political Advocacy:** Although the national government allocates money to commune councils, nearly all of it is prioritized for infrastructure, and no set amount is required for fisheries conservation or livelihood improvement. FACT has been meeting with national-level officials to encourage guidance for the subnational government to allocate funding for fisheries and natural resources management.

“Maybe the most important tool is a rights-based approach. For sustainable fishery resources, the most important thing may be the empowerment of the grassroots community. Let them have ownership of the local resources, since they are the owners. If they have very strong ownership of the local resources, then the local fishery will be sustainably and well managed. The dependence on funding support from the external stakeholders is not sustainable enough. What is really the most important factor contributing to the sustainability is the ownership of the local community.”

— Youk Senglong, FACT

A woman sitting on her porch on Tonle Sap Lake, Cambodia

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Case Study 3

The Learning Institute

Country: Cambodia
FCZ Locations: Boeung Chhmar Moat Khla Area near Tonle Sap Lake, Kampong Thom Province
Number of FCZs: 2
Number of Communities Involved: 2 as target project sites, and networking with another 3

Boeung Chhmar is a wetland of international importance (Ramsar Site) and one of three core areas located in the Tonle Sap Biosphere Reserve. Although FCZs had been previously designated by the government in the area, they were located in shallow water, which may not protect many fish, and the communities had not been able to implement the FCZs in practice. From 2016–2019, The Learning Institute received a grant from CEPF to work with five communities (Peam Bang, Doun Sdeung, Balot, Pov Veuy, and Pichakrey) with a focus on the community fisheries in Peam Bang (population 970) and Doun Sdueng (population 729), to help improve community fisheries management, including designating new boundaries for FCZs.

Fish conservation area in Doun Sdueng

Consultation Process: The Learning Institute followed a four-step consultation process to re-designate the FCZs:

1. **Step 1:** Meet with the community fisheries group to draw maps of the new proposed FCZ area and community fishing areas. Identify challenges and develop an action plan for the process.
2. **Step 2:** Meet with community fishing families to get their perceptions and insights related to the government-established FCZ, and build consensus for changing the FCZ location.
3. **Step 3:** Present the results from Steps 1 and 2 with the local authorities (commune committee) and local Fisheries Administration staff. Get agreements and solutions from the local authorities to allow communities to patrol the FCZ.
4. **Step 4:** Hold public meeting (forum) to present the finalized new FCZ area to the target communities, local authorities (commune council and village head), local Fisheries Administration staff, and neighboring communities. Develop collaborations for patrolling.

Designating and Mapping the FCZ: As part of Step 1, the Learning Institute led facilitated discussions to ask community members to draw maps of both the new FCZ locations and the fishing areas to be managed by the community. These drawings were then transferred to scaled technical maps and discussed at the commune level. Ground-truthing trips were made to map the FCZ boundaries in the field and record UTM coordinates, which were used to produce a **final map** that was presented at a final consultation (Step 4) with the communities, local government officials, and nearby communities to share the new FCZ location. Finally, the four corners of the boundary were marked using tripods of wooden poles (which will last for about five years), with community members and relevant stakeholders verifying that the locations were correct. Sign boards were also installed for each FCZ to identify where the no-fishing area is located.

Technical map of FCZ boundaries (red) and community fishing area (pink)

© The Learning Institute

Fish conservation zone boundary marker with signboard in Doun Sdueng

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The new Peam Bang FCZ totals 224 ha and the Doun Sdueng FCZ totals 11 ha in area. These locations were selected because they have deep pools that could serve as fish refuges, many fish species are found there (based on local knowledge), and the areas were close enough to the village to patrol, but not too close to the community fishing area to minimize the impact of fishing activities.

Addressing Community Concerns: A few families who normally fished in the proposed FCZ area objected to the new FCZs at first. The Learning Institute encouraged the community fisheries committees to take the lead in meeting with fisher families and have face-to-face discussions to hear their concerns. In these discussions, committee members explained why the new FCZ area was important to conserve, how the whole community had agreed to conserve that area, and that the families could fish in other areas, including near the FCZ. They also explained that once the fish population started to increase, fish would move out of the FCZ and the families would be able to catch more. Eventually, these community members came to agree with the idea.

Fisherman from Doun Sdueng and his family

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Developing Management Plans: The Learning Institute helped communities develop management plans for their community fisheries and the FCZs. This included brainstorming sessions to decide on aspects such as which fishing gears would be allowed in the community fishing area. Membership fees were established, equaling 1,000 riel (~0.25 USD) per year for community fishery members, and entrance fees were established for non-members, equaling 20,000 riel (~5 USD) per boat to fish in the community fishing area during the fishing season. The Learning Institute also set up three community savings groups to help support the FCZs.

Building Capacity: To help build community capacity, The Learning Institute conducted a training needs assessment in the project communities, then reviewed their findings with community members to rank their top priority needs. The Learning Institute then provided trainings about developing community fisheries management plans, financial management, proposal and report writing, conflict resolution, and benefit sharing. These trainings helped teach fisheries management committees how to report their activities to the local commune, with the goal of motivating the communities to share their ideas with local authorities.

Patrolling and Enforcement: Patrolling teams were set up for each FCZ, with each community having two or three teams that patrol for one week on a rotating basis. The teams use a template to report on their activities to the community fisheries committee, including the date, time, and location of patrolling; the name of the team leader; any illegal fishing gears or activities encountered and actions taken; and any challenges. Occasionally, joint teams will patrol that include local Fisheries Administration staff, commune council members, community members, and local police. As a further form of enforcement, any community members who see illegal activities or disturbance in the FCZ can report back to the fisheries management committee.

Day and night patrolling activities in Doun Sdueng

When someone is apprehended for fishing illegally, the patrol team may first educate the fisher and make a written agreement to not fish illegally in the future, or they will be fined in the future. The communities are able to detain offenders and call the Fisheries Administration for further action. Or, if a commune council member is present on the team, they can arrest illegal fishers and refer them to the Fisheries Administration, where they may then be sent to court. This has happened in some instances for people who have been caught electrofishing.

The project supported patrolling twice per month. After the project ended, the communities continued to support their patrolling using membership and entrance fees for the community fishery. Sometimes the local Fisheries Administration helps supply gasoline for the patrols, while community members provide the use of their boats. The Learning Institute provided walkie talkies so the villages could communicate with each other about FCZ management.

Monitoring: To assess the effectiveness of the FCZ, The Learning Institute asked the community members about their observations, which included statements like, "Fish are literally jumping out of the water at this site." They also asked households to report their fishing catch and learned about household catches and fish sizes by talking to local middlemen. This monitoring indicated that fish catches and sizes tended to increase during the course of the project. The Learning Institute used phone calls and Facebook to stay in touch with the communities after the end of the project.

Challenges

- **Turnover:** Internal staff turnover at The Learning Institute created challenges of having to train new staff and familiarize them with the project.
- **Persistent Illegal Fishing:** Illegal fishing activities still happen because of food and livelihood needs in the community. Patrolling members must also continuously educate newcomers to the area about the FCZ regulations.
- **Institutional Capacity Building:** It took time for The Learning Institute to review and understand the concepts of collaboration approaches in community fisheries and their application in the Cambodian context, as well as build trust among many stakeholders.

Successes

- **Reduced Illegal Fishing:** The number of observed illegal fishing incidents decreased during the implementation of the project.
- **Fish Species Return:** Community members reported that previously absent fish species had returned to the area, and could be caught near the borders of the FCZs.
- **Increased Fish Abundance:** Based on bubbles in the water and fish coming to the surface, villagers reported to each other that the conservation areas have a lot of fish.
- **Community Contributions:** Community members were willing to contribute their own time and money to protect the FCZs.

> "I don't use the word "successful," I use the word manageable…There are still challenges, but it is still manageable."
>
> *— Srey Marona, The Learning Institute*

Lessons Learned

- **Literacy Barriers:** Literacy barriers are present in some communities, meaning that disseminating the regulations of the community fishery and FCZ requires verbal explanations to the community. Meetings should be announced both in writing and by word of mouth. Information related to community fisheries management and the FCZ should be integrated into regular village communication systems.

- **Diverse Information Sharing Channels:** Information sharing is very important both within and between communities, as well as with government officials. Information about the importance of FCZs can be shared through formal meetings, but fisheries committee members can also make it a topic of general discussion at temples, village activities, and social gatherings. It is key that information related to the daily management of community fisheries be integrated into the overall information dissemination system of village activities.
- **Time Commitment:** It takes time for communities to understand the concepts of community fisheries management and learn how to collaborate as well as build trust among community and government stakeholders at different levels.
- **Involving Local Authorities:** The Learning Institute involved local fisheries officials and the local commune from the beginning of the process, including the development of the project proposal, consultation meetings, and a project launch. As a result, these groups were actively engaged throughout the course of the project.

Discussion with community and local authorities on fish conservation area boundary demarcation

- **Importance of Facilitation:** Trainings like developing a fisheries management plan require good facilitation to ask the community many probing questions. When the community asks questions back, try to get other participants to answer the questions. More meetings with communities are valuable early in the process to introduce the idea of the project. The number of meetings needed depends on having a good facilitator, and how easily they can help bring people to consensus.
- **Community Ideas:** To help communities take ownership of the process, be honest about the goals of the project to establish FCZs, but try to shape the process based on ideas from the community.
- **Learn by Doing:** A "learning by doing" approach can be helpful for communities to adapt project activities based on their experiences. The Learning Institute helped communities develop action plans and prepare agendas for monthly meetings, but let the communities themselves facilitate the meetings, while Learning Institute staff observed and later provided feedback for improvement. This helped increase the confidence of communities to take ownership of the process.
- **Accommodate Villager Schedules:** Sometimes the project staff needed to be flexible to accommodate the other livelihood commitments of villagers. This sometimes meant scheduling meetings in the evening when people were more available.

Tonle Sap woman cleaning fish

- **Engage Disadvantaged Groups:** Disadvantaged groups like poor households, women, or youth can be encouraged and supported to participate in the process of natural resource management, which can lead to increased equity in rural communities.

> "We try to build up youth because they are very important for the next generation. Without giving capacity to them, they don't know what happens in their village. We try to involve them in discussions to analyze their community, to understand 'What happens in my village? What happens in the next 10 years if we don't have resources, if we don't have people to run this organization?'"
>
> *— Srey Marona, The Learning Institute*

Woman living on Tonle Sap Lake

A fisherman in Peam Bang Commune of the Tonle Sap Lake

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Case Study 4

Royal University of Phnom Penh

Country: Cambodia
FCZ Locations: Sekong and Sesan rivers, Stung Treng and Ratanakiri provinces
Number of FCZs: 5
Number of Communities Involved: 5

The Royal University of Phnom Penh (RUPP) has been working to study and conserve water birds in the Sekong-Sesan-Srepok (3S) Basin of Cambodia since 2010. Water birds depend on healthy fish populations for food, and their habitats may be found adjacent to important fish habitats. The desire to establish long-term conservation measures in the area motivated RUPP to explore the creation of community fisheries. Community fisheries were designated in the area by the government between 2010–2012, but subsequently become inactive, as they must re-register with the government every five years in order to remain active. With a grant from CEPF from 2014–2017, RUPP helped revive previously established community fisheries and associated FCZs in three communities, and established new community fisheries and FCZs in two communities. These communities included Hat Pok (population 136) and Koh Pong (population 227) in Ratanakiri Province, and Sdao (population 227), Talat Samaki Rung Roeung (population 4,137) and Samros Chan Taban (population 3,940) in Stung Treng Province.

Establishment Process: Community members were concerned about people coming from downstream areas such as Kratie and Stung Treng to fish in their local areas, including setting many nets in the deep pools and using illegal methods such as explosives, electrofishing, poisons, and fine-mesh nets. They also understand the importance of fish to their livelihoods. Thus, the communities were motivated to participate in project activities to receive legal recognition and authority to protect their natural resources. RUPP staff followed the guidelines of the Fisheries Administration to establish the community fisheries, including working with communities to develop fisheries management plans, which included mapping and demarcating FCZs. They also helped the communities organize community fishery elections.

> “We had several meetings, many meetings – each step has to have a meeting. Especially during the preparation process, we had many meetings.”
>
> *— Seak Sophat, Royal University of Phnom Penh*

Tour of sandbar habitat with community

Selecting FCZ Sites: RUPP drew on their previous experience working in the project area and carried out a needs assessment questionnaire with community members to identify important habitats to protect based on local knowledge. They also collected data on local fish catches. The FCZs established included deep pool refuges for fish, and also protected adjacent sandbars that provide critical breeding habitat for threatened water birds and softshell turtles. The FCZs ranged in size from 5–40 ha, with an average size of approximately 15 ha.

Patrolling and Enforcement: The project trained communities and provided incentives to protect nesting grounds for birds such as the River Tern (*Sterna aurantia*), River Lapwing (*Vanellus duvaucelii*), Great Thick-Knee (*Esacus recurvirostris*), Little Ringed Plover (*Charadrius dubius*), and Small Pratincole (*Glareola lactea*). The project supported community rangers to protect bird nests every day during the breeding season from February to May, and fisheries enforcement teams to patrol twice per week with local police. The patrol teams mostly helped raise awareness in the community about the rules of the FCZs, and sometimes issued a formal warning letter to people fishing illegally.

Awareness Raising: RUPP helped raise awareness in the communities by screening a film related to natural resource conservation, including water bird and fish conservation. More than 500 people attended these screenings, and the project also held a quiz where people could win small prizes by answering questions. They also developed posters and brochures about the importance of natural resource protection.

Alternative Livelihoods: Another project activity involved supporting the establishment of a community market for livelihood support at the request of one village. The project helped provide a billboard and fencing for a market area where community members could sell their products.

While the project was able to help the communities establish FCZs, it ended before engaging the communities in extensive implementation of FCZ management. The community fisheries are supported by an annual budget from the commune level, which is hoped can help the communities in continuing to carry out their activities.

Challenges

- **Lengthy Government Process:** Finalizing the official map of the community fishery and FCZ areas took longer than expected. This challenge included delays in getting approval from higher levels of government, and also due to some fisheries officials wanting to keep certain areas open for fishing interests rather than protecting them in FCZs.
- **Benefit Sharing:** It was challenging for the project to spread benefits to the entire community, beyond those who were receiving incentives to protect bird nests or patrol FCZs. While the project team had initially planned to establish community savings groups, they could not identify individuals in the communities who could successfully manage these funds.
- **Nighttime Illegal Activity:** While the communities were able to report illegal activities that they observed during the day, it was harder for them to report poachers who were active at night.
- **Lower Sesan 2 Dam:** The construction of Lower Sesan 2 hydropower dam, which became operational in 2017, is expected to decrease fish populations and is likely to have negative impacts on

project communities beyond the scope of what can be addressed by FCZs.

- **Logging and Deforestation:** The rapid rate of logging and deforestation in the region (both legal and illegal) has increased the use and disturbance of the river environment. At times, the project encountered difficulty in finding enough people to participate in the community conservation program because they could earn more money from illegal logging than conservation incentives.


Meeting at conservation area
© RUPP


Baby bird hatching
© RUPP

Successes

- **Increased Water Bird Nesting:** The number of water bird nests recorded by community nest protectors increased during each year of the project, which likely reflects both a positive impact on bird populations in the study area, as well as increased capacity of community members to locate and monitor bird nests.
- **Increased Nest Success of Water Birds:** Community nest protection led to fewer instances of egg and chick harvesting by local people and improved overall hatching success rates of water birds. This likely reflects the daily presence of community rangers, as well as increased conservation awareness of the communities.
- **Legal Recognition of Sandbar Islands:** After the community fisheries were officially formed, the sandbar islands in the project area received legal protected status under the framework of the community fisheries area. This legal recognition enabled community members to protect the islands from human disturbance without fear and intimidation.
- **Communication with Local Authorities:** After the project provided books of phone numbers to connect communities with local authorities, such as the commune chief, local police, and village head, community members were able to report and stop the threats of destructive wood cutting, settlements, and gold mining in critical sandbar habitats.
- **Community Awareness-raising and Capacity-building:** Communities gained awareness and knowledge of conservation concepts and issues, and gained technical skills in environmental monitoring, record keeping, and conservation methods.
- **Field School Laboratory Opportunity:** In addition to the conservation outcomes of the project, RUPP students and staff strengthened their technical capacity to conduct conservation activities and programs. The project provided opportunities for students to learn about community-based conservation and natural resource management on the ground based on real examples. RUPP used project knowledge, data, and outputs in teaching and research activities.

Lessons Learned

- **Community Enthusiasm:** Communities were eager to set up and formalize community protected areas to have increased legitimacy to enforce conservation actions.
- **Protections Beyond Fish:** Community fisheries can serve as a successful mechanism to protect other aquatic species, such as birds and turtles that depend on fish to eat, and that also use sandbar habitats located adjacent to deep pools. Activities for bird and turtle protection can happen in parallel with fisheries protection.
- **Participatory Approach:** The project benefitted from using a participatory community-based approach that was based on open, respectful communication and close cooperation with community leaders and project participants. Social surveys were conducted to help inform community negotiations and arrive at mutually acceptable agreements with the participating communities. Using a community-based participatory approach likely led to greater buy-in and support from communities than other projects that have utilized a more top-down approach, and likely led to improved effectiveness of this project to achieve goals and objectives.
- **History of Civil Society Involvement:** RUPP's long involvement in the community contributed to the project's success, as did the communities' involvement with a local NGO called MyVillage. Because of these interactions, the communities were already familiar with the concept and importance of natural resources management. Their strong understanding about the need for protection enabled them to actively take responsibility for fisheries management activities.
- **Local Leadership:** Strong local leadership was important in driving the process. One community was home to a strong community activist who loved nature and conservation. Project staff encouraged him to stand for commune chief, and he was elected in 2012, giving the project strong support from a local leader. Four other project communities had fisheries committee members that were also commune councilors. Community members are more likely to follow conservation regulations if conservation activities are supported by people in positions of power, such as commune councilors or the commune chief.

Contacts

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Case Study 5

WorldFish

Country: Cambodia
FCZ Locations: Stung Treng Ramsar Site, Stung Treng Province, Mekong River, Cambodia
Number of FCZs: 5
Number of Communities Involved: 14

The Stung Treng Ramsar Site is a 37-km stretch of the Mekong River near the border between Cambodia and Lao PDR designated as a "Wetland of International Importance." The area consists of flooded forests, deep river pools, rocky outcroppings, and sandy islands, which are thought to provide important fish habitat. Within the Ramsar site are 21 villages that are home to more than 12,000 residents. Many of the residents depend on subsistence fishing to supplement their livelihoods, but these activities are threatened by destructive practices, such as fishing with electricity, dynamite, and poison. Although each community had previously been assigned an FCZ designated by the government, they still reported that illegal fishing was happening often. From community interviews, WorldFish determined that a few members of each community probably engaged in illegal fishing activities outside of their own fishing area (that is, they used illegal methods in the fishing areas of other communities). Therefore, WorldFish decided to engage the communities in collectively managing shared protected areas.

Preah Sakhon FCZ at the Stung Treng Ramsar Site

Between 2011 and 2016, WorldFish worked to develop community fisheries with 14 villages in the Stung Treng Ramsar Site (population sizes ranging from 283 to 1,135 people) with support from two CEPF grants. After the first project worked to establish three FCZs, community members took the initiative to nominate three additional deep-pool areas to conserve. Two of these were agreed upon for designation as FCZs, bringing the total number in the area to five. The average size of the FCZs is 150 ha, their total area is 916 ha, and key habitats protected include deep pools and flooded forest. Each FCZ is collaboratively managed by a group of two to five communities.

Consultation Process: During consultation meetings, WorldFish posed the problem to the communities: illegal fishing is taking place everywhere, and different communities tend to blame each other for it, so there is a need for cooperation among them. Furthermore, sometimes illegal fishers come from outside the area, which can be difficult for any single community to address independently. After discussing various ideas, the communities agreed that they should work together to conserve FCZ areas as a team consisting of different communities. They discussed how some communities would have to travel farther than others to patrol the FCZ sites, and how WorldFish could help support the activities that were beyond the abilities of the communities. Communities then estimated monthly expenses and agreed on how much both the communities and WorldFish could cover.

Deciding on Management Strategies: During discussions of the FCZ regulations, the community recognized that creating the FCZ as a no-take zone would be the easiest type of regulation for them to enforce. If they were to regulate the types of gear that could be used in the FCZ, they feared this might create some bias, and it would be hard for them to determine which types of gear were environmentally detrimental.

> “There had been a long talk in the communities about the type of regulations. In the end, they said that if we don’t have a no-take management region, it’s difficult to enforce. They themselves don’t have the technical ability to identify whether this or that fishing practice is detrimental to which species that may be the target of protection. Or if they manage under that regime, they may end up with some bias, because they may allow some groups to go on fishing because they claim the gear is not detrimental to conservation objectives. It’s not easy to enforce. If they make it a no-take zone, it’s easier for them. If they see someone present in the conservation area, it is almost certain that the person is intending to do illegal fishing. So for practical reasons, they said to make it a no-take zone so that it’s easier for them to deal with.”
>
> ***— Mam Kosal, WorldFish***

Community planning at Koh Khordin

Selecting FCZ Sites: Through a participatory approach, community stakeholders helped identify locations for the FCZs during a series of consultation workshops. Informed by existing literature and past studies, and taking existing government-identified protected areas into account, WorldFish worked with communities to select new areas for piloting FCZs based on several criteria. Some criteria that were considered most important were given a higher weight in scoring (x2 or x3). Criteria included:

No.	Selection criteria from workshop in Koh Sneng	Selection criteria from workshop in Preah Rumkel
1	Presence of endangered species	Presence of endangered species (x2)
2	Presence of unique species	Abundance of biodiversity
3	Accessibility	Accessibility
4	Fish spawning ground (x2)	Fish spawning ground (x3)
5	Fish feeding ground	Abundance of fish important for fishery livelihoods (x2)
6	Habitat for fish refuge (x3)	Habitat for fish refuge (x3)
7	Presence of flooded forests	Presence of plant species for herbs and medicine
8	Synergy among other protected sites (x3)	Overall size of the area
9	Active Community Fishery presence (x2)	Active Community Fishery presence (x2)

Although the communities initially identified many areas that were important for fish biodiversity conservation, they ultimately gave precedence to the practicality of protecting those sites. WorldFish was clear from the outset that the project support would only be temporary, and afterwards communities would need to take over the process. This helped the communities focus on selecting sites that would be most feasible to patrol, such as those where community fisheries were already active.

Community site planning

Budgeting: When discussing costs and support of different management activities, WorldFish had the communities consider three types of activities:

1. Activities that the community could do on their own without any support from outsiders
2. Activities that the community could do with minimal support from outsiders
3. Activities that could only be done by outsiders.

Communities were asked to make a budget for activities that they needed support for.

Planning for Patrolling and Enforcement: The communities identified that patrolling was something they could mostly do by themselves. This included setting the schedule for patrolling, identifying who would participate, and whose boat would be used, since the project did not provide a boat. WorldFish had to negotiate with the commune authorities to give the communities the authority to patrol for extended periods (such as one month), rather than needing to request permission each time. The communities learned how to work together as part of joint patrolling, and how to station teams at different sites so that all teams did not have to patrol the entire area. Coordinating patrolling among multiple communities was a challenge that was aided by strong leadership.

> “It comes down to leadership. Initially, the communities raised so many issues, but at the end they agreed that things cannot be equal. Some of them need to work more, some may not need to work as hard as others. The point they understand is that they also have different social status or conditions in their areas. Some participants are poorer than the others, so they have to understand that not everyone can equally participate in the process. Also, not everyone would be able to provide boats for patrolling, for example, because not everyone has a boat that is suitable for patrolling. In the end, it’s about the team leader in the community providing further facilitation within the team so that they come to a mutual understanding that they have to make some compromise.”
>
> ***— Mam Kosal, WorldFish***

WorldFish provided between 50 and 150 USD per month to each community depending on the budgets they developed, the size of the patrol team, and the distance they had to cover for patrolling. The boundaries of the FCZs were marked with signs and flags that are replaced as needed. Five guard posts, one for each FCZ, were also constructed in a few strategic locations on a shared cost arrangement between the communities and the project.

Observing Social Safeguards: To observe social safeguards, the project avoided selecting areas for conservation that would cause significant impacts to community livelihoods, and if impacts were foreseen, alternative fishing grounds for the poor were identified, such as a buffer zone around the FCZs. There was some initial criticism about the project from those who lived next to the FCZ area and depended on fishing for their livelihood. Over the course of the project, WorldFish helped facilitate discussions with the communities so that exemptions could be provided for the poorest and most vulnerable households, such as those without alternative livelihoods, widow-headed households, those with many dependents, and those who could not access other fishing areas. Local authorities (commune chiefs) played a lead role in convening community meetings to renegotiate the rules of the FCZs, and both people who opposed and supported the FCZs could raise their points. A broad group of community members were engaged to arrive at a solution that most people could accept, such as making exceptions for vulnerable households to fish in specific locations inside the FCZ with gear restrictions. This conflict management strategy worked well because the communities felt they were bound by their commitment to implement the FCZ, which the whole community had agreed to.

“We found out that engaging local authorities in the first place was not only important for the initial designation of the site but also in addressing problems later. The commune chief in particular was instrumental in inviting all participants to the negotiation session.

In two instances where some community members reported adverse impacts on their access to fishing, consultation was made with the commune chiefs leading the effort. One of the cases was solved by readjustment to the boundary restriction while the other was confirmed by the community members as not being an impact on small-scale fishers, but rather on large-scale commercial fishers whose gears were illegal and thus should not be allowed in any fishing grounds in the first place.”

— Mam Kosal, WorldFish

Government partners included the Department of Environment, which supports rangers who are responsible for patrolling the Ramsar Site, and Fisheries Administration staff, who provided advice on FCZ design and participated in patrolling. Both agencies also provided training on legal aspects of developing fisheries management plans and patrolling procedures. WorldFish staff provided feedback and advice to communities during monthly meetings on how to improve performance of the activities.

Implementing Patrolling and Enforcement: Setting up joint patrolling of the shared FCZs required coordinating with local authorities to give communities permission to patrol areas beyond that of their own community. These communities have a history of making verbal agreements rather than putting things in writing. Therefore, WorldFish helped the communities prepare key written documents like the FCZ management plans, and made sure that any verbal commitments were widely known, particularly to local authorities. Community members are not able to arrest illegal fishers, issue fines, or confiscate gear – only certain government authorities are able to do that. However, just their presence during patrols can serve as a deterrent to illegal fishers.

“It’s not necessarily about confronting or challenging the offenders directly, it’s about making sure that everyone knows that the team is working on the ground, and the team would be able to receive support from other groups as necessary, including from local authorities or rangers. The team is not so big, but if they are physically present on the water, the offenders tend to be scared away.”

— Mam Kosal, WorldFish

This project effort helped establish three levels of networks. The first is a network of patrol members of the participating communities and Department of Environment rangers who collaborate with the communities to patrol the Ramsar site and meet monthly. The second is a network of 14 communities that are directly involved in FCZ management, who meet quarterly to discuss concerns and recommendations about local management in the area. Finally, a provincial-level network related to community fisheries was established to bring together communities beyond the Ramsar site, relevant NGOs, and government agencies twice a year to share lessons learned and discuss relevant issues.

Challenges

- **Recruiting Youth:** Fewer young people in the communities are fishing, and many are leaving for the cities to find work in the garment industry or other jobs. Therefore, it has been challenging to involve the younger generation in these activities to help sustain the community's engagement in FCZs after the project ended. WorldFish often needed to train and engage larger numbers of community members in patrolling activities, with the expectation that some would move away.
- **Loss of an Ally:** A local authority (commune councilor) who was very active in helping to facilitate community involvement with the FCZs passed away after the project ended, and it has been difficult to find someone as committed to continue this role.
- **Retaliation Against Enforcement:** In retaliation for confiscation of boats and illegal fishing gear, one patrol member had his boat sunk and his farmhouse set on fire. To encourage communities to continue in their patrol work in the face of such risks,

> "We raised awareness with them by pointing out that they would be the ones who bear most of the cost if resources are lost. Working with local authorities is also indispensable to ensure the offenders are identified and blacklisted. Having community leaders attend monthly meetings with the commune chief is another way to address such issues."
>
> *— Mam Kosal, WorldFish*

- **Coordinating Livelihood Support:** WorldFish tried to coordinate livelihood support activities with other local NGOs as part of this project, but faced challenges in terms of differing project timelines and criteria for participants. For example, WorldFish wanted to provide livelihood activities for the households most involved in conservation activities, while another NGO was required to work with the poorest households. WorldFish was able to provide some conservation incentives from their own projects, including small-scale cement tanks for aquaculture.
- **Evolving Illegal Activities:** Illegal fishing activities in the areas evolved such that illegal fishers started coming in large groups of about 10 boats at a time and were sometimes armed, which individual communities could not address alone. Having the ability to patrol an area jointly gave the communities the flexibility to better address this evolving threat. However, this reduced the frequency of patrols, as the number of patrol team members in each community and their availability remained the same.
- **Hydropower Development:** The Don Sahong hydropower dam in Lao PDR located just 1 km upstream from the Cambodian border is a concern for community members, who wonder if the FCZ efforts may be futile in the face of such a largescale change.
- **Fish Catch Monitoring:** WorldFish implemented participatory fish catch monitoring during the first phase of their project, in which fishers agreed to voluntarily record their fishing catch. However, it was difficult to encourage fishers to participate during the second phase of the project without the ability to pay, because the fishers learned that other communities were being paid for fish catch monitoring by other organizations. Inconsistent records from the fishers also made it difficult

to analyze the data in a meaningful way. The project therefore focused their FCZ assessment on community perceptions about changes due to the FCZ.

- **Engaging with Illegal Fishers:** A few households are known to engage in long-term illegal fishing, but they avoid coming to meetings or engaging with the project. When the commune chief tried to meet with these individuals, they would never be at home.
- **Political Will:** Commune and national elections take place every three to five years, and around election time government enforcement declines because authorities want to receive voting support; illegal fishing increases as a result.

Successes

- **Multi-FCZ Management Plan:** A common management plan was developed that integrated the individual management plans of the five FCZs. This combined management plan helped strengthen the management of the FCZs as a network, particularly by calling for community members to patrol the areas together in joint patrols.
- **Physical Deterrents:** In response to illegal fishing, community members initiated the placement of physical obstacles inside the FCZs, which consisted of large, spiky bamboo structures that would snag gill nets and other mobile gear, in order to deter fishing activity.
- **Perceived Benefits:** Community members perceive that fish biomass and diversity have either increased or remained the same inside the FCZs. However, it is still difficult to substantiate these observations with scientific data.
- **Savings Groups:** Seven community savings groups have entered into written agreements with community fisheries groups in seven villages, and community fisheries groups can request funds from savings groups to support their operations. The community savings groups, which are comprised mostly of women, have

Community members installing bamboo structure in river to deter illegal fishing

Community savings group meeting

demanded more transparency in how the funds were spent and what progress was made, regardless of how small the contributions were. This has improved the financial accountability of the Community Fisheries groups.

- **Joint Patrols:** Collaborating as part of joint patrols taught community members how to plan their patrol routes such that the various teams could provide backup for each other.
- **Repurposing Confiscated Boats:** One community, with help from Department of Environment, was able to receive permission to do patrolling with boats that had been confiscated by the government from illegal fishing activities.
- **World Wetlands Day:** The project participated in a World Wetlands Day event in 2016 in one of the project villages, during which about 50 university students came to learn about the resources and community management of the Stung Treng Ramsar Site.

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Awareness raising with students and communities at a World Wetlands day event

Lessons Learned

- **Community Ownership and Initiative:** Once communities developed a sense of ownership around the project, they were able to develop their own ideas and initiatives to improve FCZ management.
- **Facilitating Government Connections:** WorldFish played an important role by connecting the communities with local authorities and government groups, and by helping to lead discussions related to technical details of support that the communities would need from these groups.
- **Engage Authorities Early:** Involving local authorities, including village chiefs and commune councilors and chiefs, from the beginning of the project was instrumental in moving the project forward. Local authorities may have more resources and ability to help nearby communities than government officials from sectoral line agencies such as the Department of Environment or the Fisheries Administration. They can also help convene community members to settle conflicts or disputes related to the FCZ.

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Community reflection and networking session organized by the Fisheries Administration and other partners

- **Mandated Conservation Commitments:** Having mandated commitments to protect the aquatic environment from various levels of organizations, including communities, Ramsar site management, and local government, helped the groups reinforce each other's activities.
- **Savings Groups Improved Transparency:** Contributions from savings groups have provided a small source of funding for the FCZs, and have also helped raise community awareness and a sense of ownership around natural resources management. However, their amount of capital is too small

to contribute enough to cover the costs of all community fishery activities, and therefore more funding mechanisms are needed.

- **Community Engagement:** Many community members have various commitments related to their livelihoods that made it difficult for them to engage in the consultation process. Therefore, holding regular meetings at different levels and frequency throughout the project provided multiple opportunities for community members to participate in the process.

Constructing observation platform for FCZ enforcement

- **Encouraging Community Leadership:** In cases where the communities had knowledge and experience about resource management, WorldFish provided minimal facilitation and asked communities to come up with their own ideas and negotiate with each other.
- **Continued Patrolling:** During a few years without support from the project, communities were able to sustain a minimum level of their patrolling activities with support from the commune chief.
- **Addressing Large-Scale Illegal Activity:** Higher levels of government authority beyond community patrolling are needed to address large-scale, organized illegal activities. Limited or slow response by appropriate government authorities can discourage community members from conducting their own patrolling.
- **Patrol Information Leaks:** The communities learned that sometimes when their patrols were joined by members from other stakeholder groups, information would leak to illegal fishers, who would then avoid the patrols. To try to prevent information leaks, they instituted a rule that only one mobile phone for the patrol team could be switched on during the patrol, and all others should be switched off.
- **Benefits Despite Illegal Fishing:** Although the nature of illegal fishing has changed in the area (fewer incidents, but more fishers involved in larger incidents) and it is difficult to tell whether illegal fishing is declining, community members believe that illegal fishing has not gotten worse, and that without this project, fisheries resources in the area might have disappeared completely.
- **Community Recruited as Rangers:** Some community members who were active in FCZ conservation were recruited by the Department of Environment to become rangers for the Ramsar site. This had mixed results: while the community members became more empowered, government staff are spread thin, so these rangers were often called to patrol areas that were beyond the FCZ site, thereby reducing the ability to patrol the FCZ.

- **Clarifying Role of a Network:** WorldFish needed to clarify the difference between a network and the community fisheries group for the communities to explain that the two play different roles. The fisheries groups are responsible for managing resources, protecting FCZs, and generating funding, while the network is about facilitating the communities to work together to share lessons and information, and increase representation, coordination, and cooperation among them.


© WorldFish

Elected leaders of Stung Treng provincial community fisheries network

- **Create an Enabling Environment:** It is important to create an enabling environment for the communities to succeed. This can include harmonizing activities with existing projects in the region, working with authorities to provide support for the communities, providing consistent advice and facilitation, and informing communities about outside events or opportunities that they can join to learn from. It can also be beneficial to provide supporting funding consistently rather than in one big amount. It is helpful if livelihood development and conservation activities can be integrated into projects implemented by a single organization and involve the same community members in both components.

> "In many cases, the communities are very motivated, but if they find they don't have an enabling environment, their level of commitment can easily reduce."
>
> *— Mam Kosal, WorldFish*

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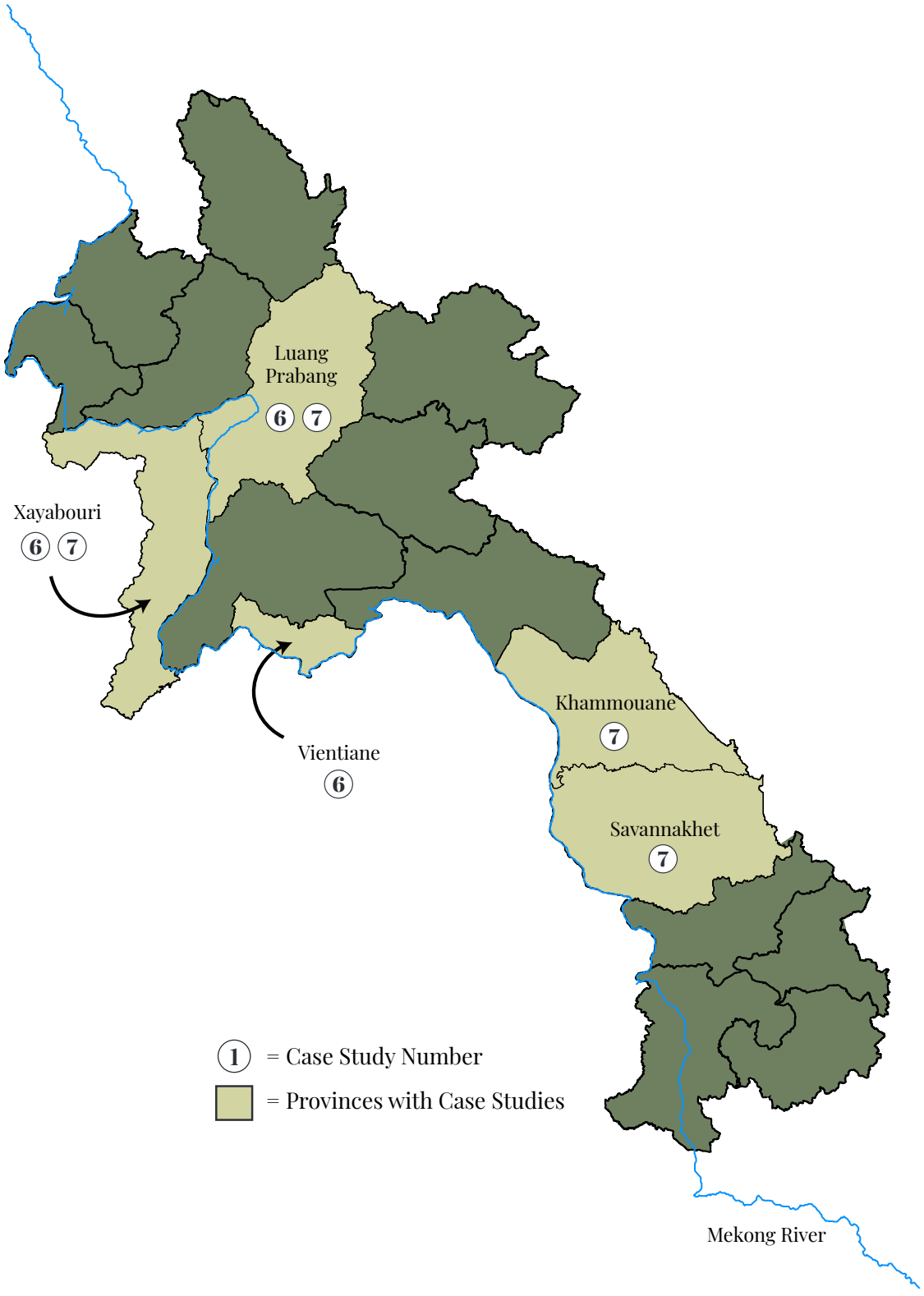
Case Studies

LAO PDR



Case Study 6

FISHBIO

Country: Lao PDR
FCZ Locations: Mekong River mainstem; Xayabouri Luang Prabang, and Vientiane provinces
Number of FCZs: 7
Number of Communities Involved: 9
Target Species: Jullien's Golden Carp (*Probarbus jullieni*), Thick-lipped Barb (*Probarbus labeamajor*)

Since 2014, FISHBIO has received four grants from CEPF to establish a network of seven FCZs with nine communities on the mainstem Mekong River in northern Lao PDR. The communities range in population from 155–1,115 residents. The FCZs are located in areas thought to be important spawning or refuge habitats for the critically endangered Jullien's golden carp (*Probarbus jullieni*) and endangered thick-lipped barb (*Probarbus labeamajor*). Some of the FCZ locations were first identified during a 2013 CEPF-funded biodiversity survey led by IUCN.

Identifying Target Species: Both species of *Probarbus* fishes are under serious, long-term decline, likely due to targeted, unsustainable harvest during the fishes' reproductive migrations and spawning periods. Because of the higher value of fish with eggs, fishers in northern Lao PDR target *Probarbus* spawning areas where the fish congregate during the December–February spawning season, using an abundance of large-mesh gill nets designed to catch the species. Unlike most Mekong River fish species that reproduce during the rainy season, *Probarbus* fishes spawn at the beginning of the dry season when water levels are low, making them particularly vulnerable to fishing.

Probarbus fish

Consultation Process: During the 2013 biodiversity surveys, FISHBIO partnered with IUCN to begin consultations with communities that expressed interest in aquatic resource management in order to lay the foundation for establishing FCZs. From this foundation, FISHBIO went on to facilitate the establishment of three FCZs in Xayabouri and Luang Prabang provinces managed by three villages, and one large 5-km long FCZ at Kengmai Rapids between Xayabouri and Vientiane provinces managed by four villages. FISHBIO also conducted a fish-catch monitoring project with two villages along the Mekong River in Vientiane Capital known to catch *Probarbus* fishes, and at the request of the villages sought funding from CEPF to help them establish three FCZs.

Primary livelihoods in the project villages include rice and vegetable farming and livestock raising, although many families also fish for subsistence. Community members were concerned about an increase in illegal fishing in their areas, particularly with electrofishing gear and dynamite, and saw FCZs as a way to ensure the sustainability of aquatic

resources for future generations. The Lao Fisheries Law allows for local communities to take an active role in the management of their fisheries resources at the village level through co-management with district-level government agencies. This is achieved through the formation of fisheries management committees that establish and enforce regulations, such as the establishment of FCZs.

Designating and Mapping FCZ Sites: To help the communities officially establish FCZs, FISHBIO followed guidelines written by the Lao Department of Livestock and Fisheries and WWF (DLF and WWF 2009), as well as a template for FCZ management plans provided by the government. After coordinating village consultation meetings to discuss the state of aquatic resources and threats, FISHBIO conducted participatory resource mapping with communities to have them identify key fishing habitats, areas that were important for *Probarbus* based on local knowledge (such as gravel bars for spawning or deep pools refuges), and which locations the community wanted to protect with FCZs. FISHBIO staff then conducted a technical survey along with villagers and government staff to verify and map locations of FCZ boundaries in the field. The FCZs range in size from 14–215 ha.

FISHBIO staff conducting a technical survey to map FCZ boundaries with community members

> “First we have to have the village consultation workshop. What is their goal of the FCZ that they want to establish, what kind of target species do they want to conserve or general aquatic species, and what is the objective of the FCZ that they establish? That is the key point that we have to identify clearly, the purpose of the FCZ. After that, we can support the legal process to help the community to establish officially. Not only the legal process, but also connecting to cultural beliefs if possible, to make everything sustainable when the project ends.”
>
> ***— Sinsamout Ounboundisane, FISHBIO***

Deciding on Management Strategies: When discussing the options for FCZ regulations, FISHBIO presented the communities with the option of only closing the FCZ to fishing during the *Probarbus* spawning season (i.e., establishing a seasonal FCZ). They discussed the benefits and challenges of both a seasonal FCZ and a no-take FCZ. Ultimately, the communities decided that year-round, no-take FCZs would be easiest to communicate to the community and enforce, and would also provide the most benefit to fishes in the long term. Communities in Lao PDR are able to decide on the fines and penalties associated with violating the rules of the FCZ, which are documented in the FCZ regulations. Once the community signs off on their regulations, they are sent to the District Agriculture and Forestry office to verify that all legal requirements have been met, then sent to the District Governor’s office for approval. The finalized regulations are then disseminated

to the community during a village workshop, and FISHBIO helped the communities install signboards to communicate the boundaries and regulations of the FCZ.

Patrolling and Enforcement: The communities decided that the best way to manage the FCZ areas was to share the responsibility among neighboring villages. FISHBIO trained enforcement teams from each community in protocols for patrolling, reporting violators, and rotating shared equipment such as a project boat among villages. Throughout the course of the projects, FISHBIO organized two study tours to bring together multiple villages to learn from each other's experiences. They have also worked to build relationships between the communities and local authorities.

FCZ patrol team with new patrol boat

Training workshop for enforcement team

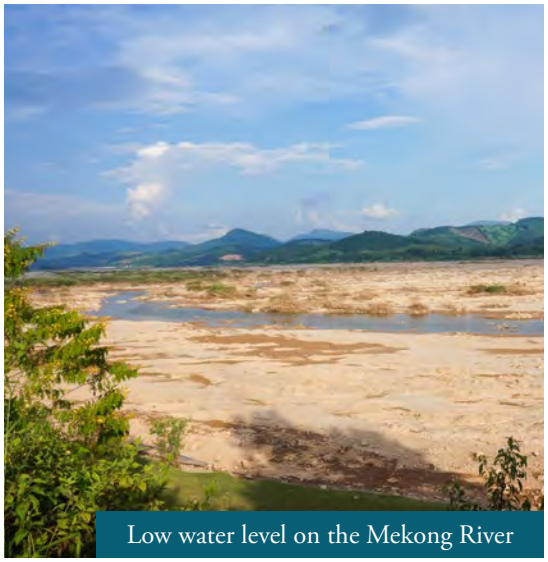
Study tour on the Mekong River

Challenges

- **Transboundary FCZs:** The transboundary nature of the Mekong River means that establishing FCZs on the river mainstem is often more complicated than in smaller rivers. FCZ establishment required extensive coordination between government officials in multiple provinces or multiple countries (Lao PDR and Thailand), especially given that these FCZs were the first of their kind in these provinces.
- **Enforcement Feasibility:** The large size of the 5-km-long Kengmai Rapids FCZ and its distance from the managing villages made it difficult for community members to patrol regularly. Although this habitat is considered important for *Probarbus* fishes and other fish species, protecting it can prove challenging.
- **Enforcement Conflicts:** Confronting and arresting illegal fishers is a difficult challenge for community members, even for village police or soldiers, despite the fact they have permission from the government to do so. A few conflicts emerged in some communities at the beginning of the FCZ establishment process, in which fishers retaliated against the patrol teams on two occasions

by sinking or cutting loose a boat belonging to an enforcement team member. This has discouraged enforcement teams from wanting to patrol. More recently, community members have been concerned about confronting illegal fishers for fear they might be involved in the illegal drug trade and could be carrying weapons.

- **Outsmarting Illegal Fishers:** Some illegal fishers have learned the patterns of the enforcement team to avoid fishing when patrols are happening. Additionally, dynamite fishing occurred in the Kengmai FCZ while the enforcement team was receiving a training from FISHBIO. Enforcement team members discussed how they needed to find a way to patrol more discretely, such as making a pretense about going to their farm fields when in fact they were going to patrol.
- **Need for Community Support:** During a project to strengthen the management of an FCZ at Kengmai Rapids, the village committee of one village wished to add a buffer zone to the FCZ to prevent fishers from setting nets just outside the FCZ boundary that could drift into the protected area. However, FISHBIO staff later learned that fishers in the same village opposed this idea because they felt the 5-km-long FCZ was sufficiently large. Without enough stakeholder support, FISHBIO decided not to pursue the buffer zone.
- **Changing Hydrology:** Several FCZs are threatened by both climate-change-related drought and the Lao government's planned dam construction on the Mekong River. The effects of existing hydropower on the Mekong River are already being felt. For example, the communities at Kengmai Rapids were interested in hosting a community fishing day fundraiser in an isolated pool of the FCZ once a year. However, changes to the hydrology of the Mekong River, likely a combination of upstream hydropower operation and drought, meant that this isolated pool no longer floods regularly. Therefore, this idea for a potential FCZ funding mechanism had to be abandoned.


Low water level on the Mekong River

Successes

- **Some Enforcement Successes:** While receiving support from the project, some enforcement teams had a few successes in apprehending and fining people who fished in the FCZs, including the confiscation of electrofishing gear in one instance. News of active enforcement teams and a single successful prosecution can serve as a warning to help deter illegal fishers from coming to the area.
- **Ambitious Scope:** These projects helped establish the first FCZs on the mainstem Mekong River in northern


Patrol member confiscating a gill net

Lao PDR. Despite their challenges, the FCZs are helping to relieve fishing pressure on fish species in a key migratory corridor.

- **Community Networking:** Nine villages learned about each other's experiences through two study tours, which allowed them to share successes and challenges with other communities facing similar situations. Community members were connected as part of a communication network through Facebook and WhatsApp.
- **Enforcement Resources:** The construction of guard houses at the request of the communities helped facilitate enforcement patrolling at FCZs that were far from the villages by providing a place for enforcement team members to stay overnight and be protected from rain.
- **Integrating Cultural Beliefs:** Buddhist blessing ceremonies by monks, the installation of spirit houses, and releasing fish at the FCZ sites have helped integrate FCZ management with local cultural practices and beliefs.
- **Education and Outreach:** The World Fish Migration Day celebrations in 2016 and 2018 provided opportunities to raise community awareness about migratory *Probarbus* fishes and the function of FCZs with local school children. This included creating *Probarbus* **paper puppets** and playing a **tag game** to illustrate the concept of FCZs. A few children were chosen to be "fishers" and the rest were "fish." The fish had to run from a "feeding area" to a "spawning area" without being tagged by the fishers. During the second round of the game, a few FCZs outlined with rope are introduced as "safe zones" in which the fish could not be tagged. The number of fish that survive from the feeding area to the spawning area is compared between rounds, and can be used to discuss the function and benefit of FCZs with the players.

> "What we are trying to do is bring our religions, especially Buddhist beliefs and the community beliefs, to be part of the process of FCZ conservation. That will help very much when the project ends and everyone in the community can feel ownership of the conservation program."
>
> ***— Sinsamout Ounboundisane, FISHBIO***

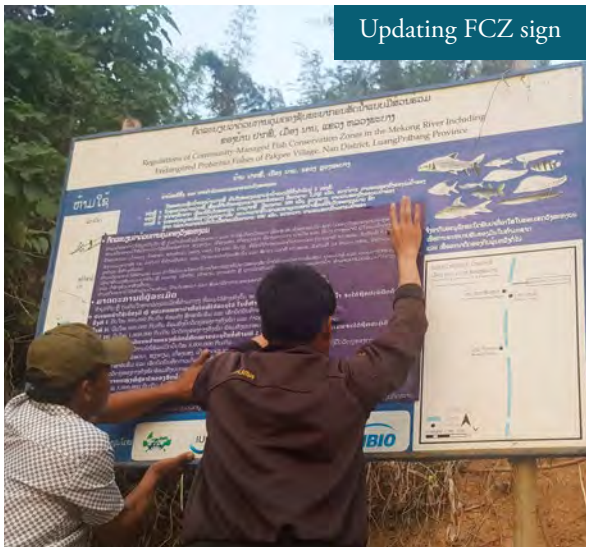
Sinsamout Ounboundisane receiving a monk blessing at the Ang Gnay FCZ

Lessons Learned

- **Tradeoffs Between Conservation and Community Needs:** There can be tradeoffs related to FCZ objectives in that the most ecologically valuable habitats may not be the easiest for communities to protect. Similarly, larger FCZs may provide more ecological benefit for fishes, but are more challenging for communities to patrol. It is important for organizations wishing to establish FCZs for species conservation to recognize these tradeoffs and ultimately respond to the desires of the

community, recognizing that they may need more support and encouragement to manage FCZs for biodiversity goals.

- **Coordinating Responsibility Among Villages:** Multiple villages can share responsibility and resources for patrolling large FCZs or networks of small FCZs, but this can make coordinating enforcement more complicated and challenging. Building relationships and good communication channels between communities is key. Communities that do not previously have a history of working together may take more time to develop relationships and trust to work collaboratively.
- **Challenges in Sustaining Enforcement:** FISHBIO supported enforcement teams to patrol regularly during the *Probarbus* spawning season (from December–February). The teams stopped regular patrolling once the funding ended, and instead only responded to reports of illegal fishing from the community. While community members are able to report activities that they observe during the day, enforcement activity is still most needed at night, when the majority of illegal fishing occurs.
- **Ongoing Maintenance:** Signs and guard house areas need to be regularly maintained, otherwise they can quickly get overgrown with vegetation. Faded or broken sign boards also need to be maintained or replaced every few years.



Updating FCZ sign

- **Issue of Fines as a Funding Mechanism:** Fines did not turn out to be a reliable source of funding for the FCZs. Very few violators were given more than a warning, and when a fine was issued, the communities needed to rely on the district government to distribute the fines. In one instance, the government authorities kept most of the fine and only reimbursed the patrol teams for the cost of their fuel. Other means are needed to ensure sustainable funding of FCZ activities.
- **Local Advocates:** Local advocates in the community play an important role in the success of the FCZ. One highly motivated village elder in Phalath Village is actively engaged in confiscating gill nets in the FCZ and educating other villages about the importance of conserving fish for future generations.
- **Facilitating Official Registration:** The process of getting an FCZ officially recognized by the government can take about one year and is a difficult process for communities to complete on their own. FISHBIO played an important facilitating role in helping communities navigate the process and get the needed paperwork approved, which can be more challenging for communities wishing to establish FCZs along the Mekong River mainstem.

> “Normally it takes about six months for the process of consultation in the village and the document support, and the process in the district level will take about three months up to five months, so in the project cycle to complete all FCZ requirements until dissemination is about one year.”
>
> ***— Sinsamout Ounboundisane, FISHBIO***

- **Managing Conflict:** In response to retaliation against enforcement teams, FISHIBO partnered with a conflict management consultant to work with project staff on techniques such as mapping sources of conflicts and identifying all of the relevant players, as well as channels for resolution. One suggestion from the consultant was following up with dissatisfied individuals in the community, because sometimes just being able to voice dissatisfaction and feel heard, even if just by project staff, can help appease that individual, even if there is not a readily apparent way to resolve the issue. When FISHBIO conducted conflict management training with community members, many identified that increased education and outreach was needed to help villagers understand the rules and purpose of the FCZs.
- **FCZs and Destructive Fishing:** Destructive Illegal fishing, such as by using electrofishing and dynamite, is a widespread, serious problem that cannot be addressed by FCZs and community enforcement teams alone, especially when it is carried out by people in positions of power who may be armed. Properly addressing this issue will ultimately require more political will, support, and action from government staff.
- **Imperfect can Still be Beneficial:** Even if occasional illegal fishing in the FCZs continues, the FCZs are not considered a failure. Community members report that the situation is better than before the FCZs existed – without the FCZs, they believe that illegal fishing would be even more widespread. Although compliance may not be 100%, some fish populations can still benefit from reduced fishing pressure.

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Video: "Freshwater Protected Areas in Lao PDR" **youtu.be/X_772uqCWGI**

Case Study 7

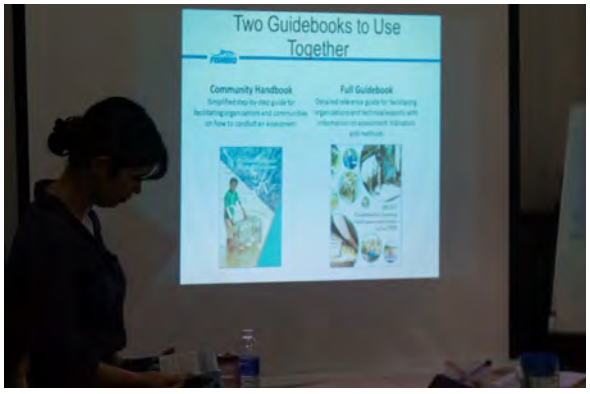
FISHBIO

Country: Lao PDR
FCZ Locations: 1) Mekong River, Xayabouri and Luang Prabang provinces (3 FCZs/communities); 2) Hinboun River, Khammouane Province; 3), Xenamnoy Stream, Savannakhet Province
Number of FCZs: 5 evaluated
Number of Communities Involved: 5

Monitoring is an integral part of ensuring that any conservation intervention is successfully achieving its goals; however, few resources exist for monitoring the effectiveness of FCZs. FISHBIO received a grant from CEPF to develop a tool for assessing the effectiveness of FCZs from 2015–2019. This took the form of a guidebook called ***Guidelines for Assessing Fish Conservation Zones in Lao PDR*** (Loury et al. 2019) and a companion ***Field Handbook for Assessing Fish Conservation Zones***. The guidebook consists of an overview of why and how to conduct an FCZ effectiveness assessment as part of the fisheries management cycle; descriptions of 21 indicators of governance, socioeconomic, and ecological effectiveness; and examples of methods for collecting and analyzing data on each indicator.

FISHBIO hosted a stakeholder workshop in 2016 to obtain feedback on indicators that would be useful for assessing FCZs in Lao PDR. They then pilot tested the guidebook at a network of FCZs FISHBIO helped establish with Houaykoualouang (population 488) and Korkfak (population 216) villages in Xayabouri Province and Pakpee Village (population 155) in Luang Prabang province in 2014. The FCZs managed jointly by the three villages are 30, 14, and 23.5 ha in size. The guidebook was also tested at two other FCZs established with support from WWF at Konglor Village in Khammouane Province in 2012 (population 1,337; FCZ size 1.5 ha) and with support from the Japan International Volunteer Center (JVC) at Kengmeaw Village in Savannakhet Province in 2008 (population 749; FCZ size

FCZ Assessment Guidebook training workshop



Introducing the field handbook to community members

Interviewing a community member

0.875 ha). These experiences helped inform case study examples included in the guidebook.

The pilot testing began with consultation meetings in each community to introduce the purpose and benefits of assessing FCZs. FISHBIO then held a meeting with each community to select indicators to measure that were relevant to the goals and objectives of each FCZ or the community's interest. Based on these indicators, FISHBIO and partners selected methods to measure a combination of governance, socioeconomic, and ecological indicators at each FCZ. An assessment survey was carried out at each FCZ, and the results were summarized and presented to the fisheries management committees in each village, along with recommendations for improving FCZ management.

In one example from Kengmeaw Village, the community wanted to know, among other things, whether the community was successfully following up on all violations against the FCZ regulations. Based on this objective, FISHBIO decided to measure the indicators G6, *Clear enforcement procedures and level of patrolling effort,* and G7, *Level of compliance with FCZ regulations* from the FCZ assessment guidebook. To measure these indicators, FISHBIO and JVC conducted a focus group interview with the Kengmeaw enforcement team.

The following information was documented about the village's enforcement procedures for indicator G6:

> *The whole community is involved with reporting illegal fishing in the FCZ. During the day time, the enforcement team follows up on reports of illegal fishing that they receive from members of the community. During the night time, the enforcement team conducts regular patrolling. There are four patrol teams in the village. One patrol team works every night, and a new team works the following night. Each team consists of five people: three village soldiers and two village police.*
>
> *Nighttime patrols last from 6 PM until 6 AM the next day. During each patrol, the team conducts four rounds of inspection, and each round lasts about 30 minutes. Due to the small size of the FCZ, the team does their patrolling on foot rather than by boat. The patrol team walks to the FCZ during each inspection, which is a distance of about 125 m from the village. There are two critical points where violators tend to fish in the FCZ: one in the upstream section and one in the downstream section. The patrol team uses flashlights during their inspection and cell phones to facilitate communication.*

Based on this report, enforcement team appeared to have clear procedures and regular enforcement effort, but these procedures were not documented in writing. The assessment team recommended that the enforcement team formalize their patrolling procedures in writing and keep a logbook of their patrols so they can document their enforcement effort and make notes about what they encounter during their patrols. This can provide information that is valuable for measuring indicator G7, *Level of compliance with FCZ regulations.*

To measure indicator G7, the assessment team asked the Kengmeaw enforcement team about the number of officially reported violations that resulted in fines. The answers were:

1. In 2010, 1 person from the village using a gill net was fined 500,000 LAK (~60 USD)
2. In 2011, 1 person from the village using a gill net was fined 500,000 LAK
3. In 2014, 1 person from the village using a cast net was fined 500,000 LAK
4. In 2017, 1 person from outside the village using hook and line was fined 500,000 LAK. He said he did not see the FCZ signboard.

Based on these results, it appeared that compliance with the regulations was generally high, and that the enforcement team had experience with apprehending and fining people who break the rules. Based on the most recent fine, FISHBIO recommended to the fisheries management committee to make sure the signs demarcating the FCZ were clearly visible and legible, and to conduct outreach about the FCZ with neighboring villages. During the final visit to the community, FISHBIO brought new signs to replace the village's old and faded FCZ signs.


Old faded FCZ sign


Updated FCZ sign

As part of this project, FISHBIO also helped compile a report on the status of Fish Conservation Zones in Lao PDR (Ounboundisane et al. 2019), the first ever official tally of government-recognized FCZs in the country (1,313 in total). This report included a sum of officially recognized FCZs located in each province in Lao PDR, as well as information about factors that can contribute to the success or challenges of FCZs. This resource helps identify where effort has been expended to establish FCZs, and can inform where effort could be focused to assess FCZ effectiveness moving forward. In can also serve as a template for other countries wishing to compile an overview of their FCZs.

Challenges

- **Resources and Will for Assessment:** Pilot testing the guidebook proved more challenging than anticipated because partner organizations did not have time or funding allocated to prioritize the assessments of their previous FCZ projects, and had moved on to other projects. Since the purpose of assessments is to evaluate the performance of an existing FCZ, this can prove challenging for organizations that are more focused on establishing new FCZs.
- **Ecological Sampling Challenges:** Sampling fishes in a standardized way to assess abundance and diversity inside and outside of FCZs presented many logistical challenges. Ideally, FCZs and unprotected reference sites should be sampled simultaneously; however, the resource-limited assessment

team needed to sample the sites sequentially. If fish moved from one location to the next, this would confound sampling results. Curious community members sometimes disturbed fish during the sampling events. While an assessment of the Kengmai Rapids FCZ did catch juvenile *Probarbus* fishes and confirmed the target species was using the habitat, the sensitive fishes died during the sampling process.

Community member transporting fish sampling equipment

Successes

- **Networking:** The project's stakeholder workshops proved to be a valuable opportunity for building connections and networking among organizations involved in FCZs, given the lack of other platforms focused specifically on FCZs. The Mekong Fish Network website (**www.mekongfishnetwork.org**) also provided a valuable resource for disseminating project information.
- **Filling a Resource Gap:** Prior to the publication of the FCZ assessment guidebook, few resources existed for evaluating freshwater protected areas. The methods in the guidebook are applicable to FCZs throughout Southeast Asia and beyond.

Lessons Learned

- **Sharing Resources:** Often, governance and socioeconomic indicators could be measured using similar methods (namely interviews or focus groups), and therefore data could be collected for these types of indicators simultaneously. Governance indicators are typically the most straightforward to measure and are a logical starting point for most groups wishing to assess an FCZ.
- **Level of Technicality:** The guidebook was designed with the intent of producing a technical resource for stakeholders with some level of expertise in fisheries or field studies. However, FISHBIO received extensive feedback that a simpler resource that could be implemented by communities directly would also be highly desirable in Lao PDR. Both technical capacity building and more basic resources are needed to ensure that assessment methods can be widely adopted.

FISHBIO staff weighing fish

- **Prioritizing Assessments:** Assessments require time, resources, and commitment in order to carry out. The importance of conducting needs to be prioritized by funders and facilitating organizations alike to ensure that projects incorporate appropriate resources for assessment and monitoring.

Community member assisting with FCZ fish sampling

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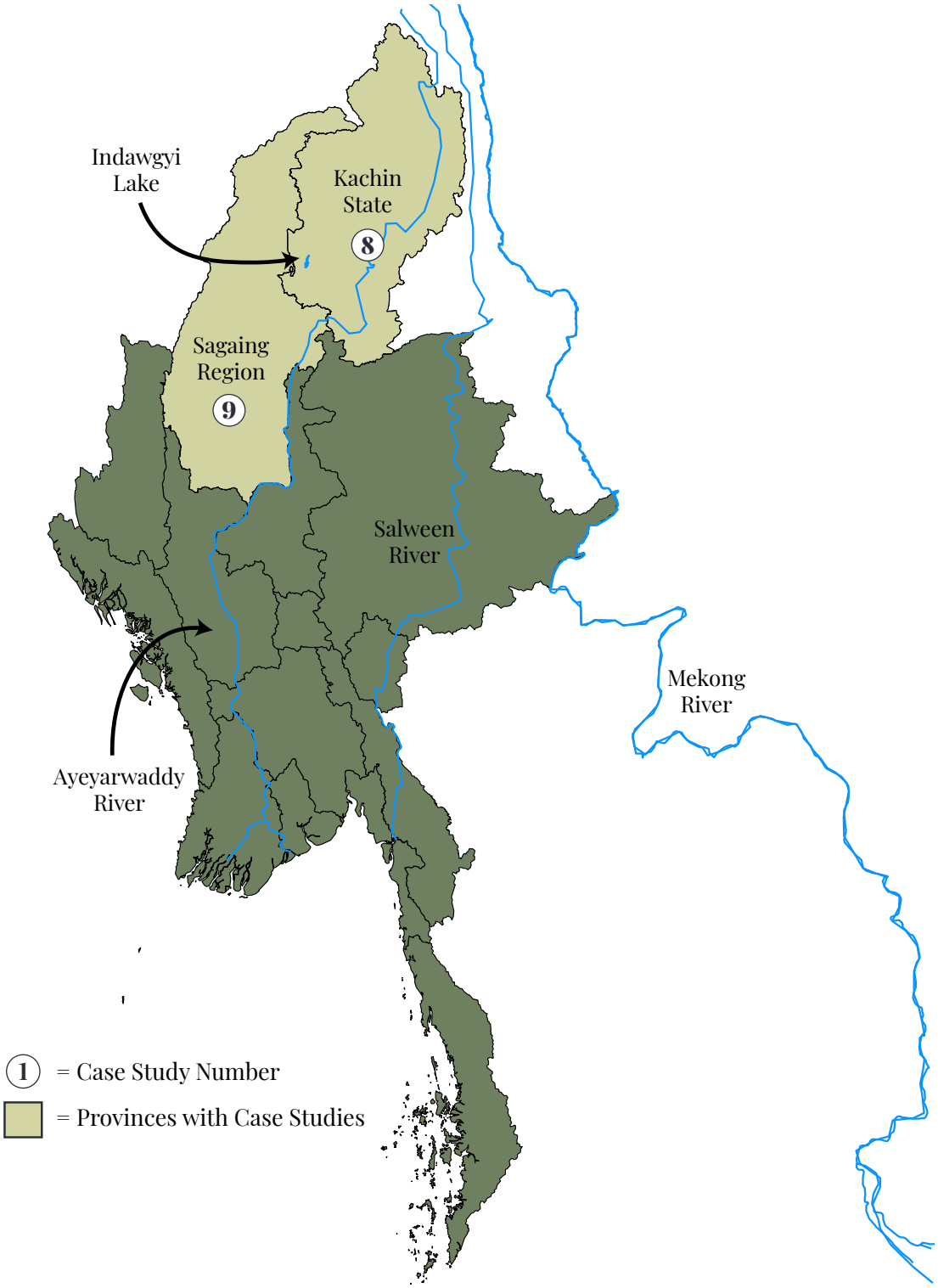
Case Studies

MYANMAR



Case Study 8

Fauna & Flora International

Country: Myanmar
FCZ Locations: Two locations in the Upper Ayeyarwaddy Watershed, Kachin State: 1) Indawgyi Lake and 2) Upper Mali Hka River in Hponganrazi Wildlife Sanctuary and N'Mai Hka River in Hkakaborazi National Park
Number of FCZs: 8 in Indawgyi Lake (4 Fishing Restricting Zones and 4 Fish Conservation Zones); 11 in Hponganrazi Wildlife Sanctuary, Mali Hka watershed; and 1 in Hkakaborazi National Park, N'Mai Hka watershed
Number of Communities Involved: 14 in Indawgyi Lake; 11 in Hponganrazi, Mali Hka watershed; and 1 in Hkakaborazi in N'Mai Hka watershed

Indawgyi Lake is the largest freshwater body in Myanmar, and its many conservation designations include Wildlife Sanctuary (1999), Ramsar Site (2016), and UNESCO Biosphere Reserve (2017). The lake has a complex and multi-layered history of fish conservation. A network of no-fishing areas was established by the colonial government in a top-down fashion in the early 20th century. However, in recent times the Department of Fisheries had not been enforcing these protected areas, and the rules were generally disregarded by local communities. A local NGO Friends of Wildlife tried to establish community-based FCZs on the lake from 2007–2014, but these were not recognized by the government. With a CEPF grant from 2014–2018, Fauna & Flora International worked to reinvigorate the FCZ process by bringing together communities and government officials.

Fisherman in Indawgyi Lake

As part of that project, FFI conducted ecological fish surveys to catalog biodiversity in the headwaters of the Ayeyarwady River, including in Hponganrazi Wildlife Sanctuary. With grants from CEPF in 2017–2018 and GEF-Satoyama in 2016–2018, FFI worked to introduce the concept of FCZs to communities living in Hponganrazi and Hkakaborazi parks. Many differences between the two project areas, including accessibility and familiarity with government processes, required FFI to use different approaches in Indawgyi compared to Hponganrazi and Hkakaborazi. Because FCZs are a relatively new concept in Myanmar, FFI consulted with FISHBIO, who joined consultation meetings with communities in both project areas to share examples of FCZ establishment in Lao PDR.

Establishing a Legal Framework: Early in their projects in 2016, FFI encountered a challenge in that the fisheries laws in Myanmar do not contain an explicit legal framework for community participation in fisheries management. Myanmar's 2008 constitution opened the fisheries sector to decentralize freshwater fisheries activities to the administration of the state and regional governments. Every state and region has to create its own suitable freshwater fisheries laws; however, these governments have been reluctant to propose practices like FCZs that would restrict access to resources, which they fear would be unpopular with communities.

FCZ meeting with Indawgyi Lake community

FFI organized a workshop with fisheries officials from Kachin State and the capital of Naypyitaw to share examples of community-based participation in marine conservation through Locally Managed Marine Areas elsewhere in Myanmar, and also shared examples from the Lao fisheries law. Legislation was drafted and submitted to the Kachin State Department of Fisheries to permit the establishment of FCZs in the state, but has not yet been approved. FFI is hopeful that FCZs will be included when the state's fisheries law is next revised. In the meantime, the government has approved the establishment of community managed FCZs on a case-by-case basis, such as in Indawgyi Lake. In Hponganrazi and Hkakaborazi, FCZs have been agreed to by the local communities, district-level Department of Fisheries, and concerned government departments, but to date have not yet been approved by the state-level Department of Fisheries.

Indawgyi Lake: Many communities around Indawgyi Lake were familiar with the FCZ concept because they had already been introduced to the process by Friends of Wildlife. A few had even continued to patrol the FCZs that Friends of Wildlife had helped them establish, but had difficulty enforcing regulations without government backing. Communities in Indawgyi were also

Previously established FCZ site on Indawgyi Lake

familiar with government management processes related to conservation and had frequent interactions with government officials, especially the Forest Department which is in charge of managing the Indawgyi Wildlife Sanctuary. Although the location of the lake is remote, it is still accessible by car, and FFI staff could readily arrange meetings to discuss FCZ establishment and develop fisheries management plans. Each community customized their management plans to restrict certain gear types and mesh sizes, as well as illegal fishing gear.

Many of the FCZs were established at the mouths of streams flowing into the lake, and areas known to be fish spawning sites. Some FCZs were also established to protect habitat that is important for rare or endemic species, such as one in Hepa Village established to protect a pipefish (*Microphis dunckeri*) that FFI identified during their fish surveys. The communities in this area did not support the idea of a no-take FCZ, so the regulations were written to permit fishing in that FCZ with types of gear that do not affect the pipefish. Although Department of Fisheries staff did not initially offer full support

for the idea of community involvement in fisheries management, they are now in agreement with the idea. FFI currently funds two government staff in Indawgyi to do regular patrolling with community members in the lake about 15 days per month. These patrol teams focus on and confiscate gear within the FCZs, but they also patrol the whole lake and confiscate gear such as small-mesh-size traps and electrofishing gear.


Confiscating illegal gill net

> “Whenever we went and surveyed, we stayed in their houses. In the night time, we have free time and we talk with them, we chat with them about many things and also we explain about our surveys, “We went there today and then we found these fish species.” To chat very closely and friendly with them, that is very important. We get some ideas of the situation from them, what was happening in former times.
>
> They said those were big fish species, now they are small and rare. In the meetings they said that all are very rare compared to former times, so they notice that. They know it is important to conserve these areas for the future.”
>
> ***— Zau Lunn, Fauna & Flora International***

Hponganrazi and Hkakaborazi: Hponganrazi is a very remote mountainous region that is only accessible by a few days of trekking. For this reason, communities there have few interactions with government agencies, and feel largely “forgotten” by development organizations. Building relationships was an important step in laying the ground-work for the FCZ process. When the FFI team first visited the area for fish surveys, they stayed in villagers’ homes, and at night would tell community members about the fish they found during their surveys. Through informal conversations with villagers, FFI learned about the fishery situation at present and in the past. They returned three times per year to this remote location for the fish surveys and built up trust with the communities.


Villagers mapping potential FCZ site(s) in Hponganrazi

The communities were concerned about people coming from outside areas to use destructive fishing practices like electrofishing. Once FFI introduced the concept of FCZs, communities were keen to take responsibility for the management of their natural resources. FFI worked with communities to draw maps of the areas where they wanted to manage fisheries resources, and encouraged them to select locations close to their villages that would be easier to enforce. These are managed fishing areas that prohibit the use of illegal fishing gear and limit fishing from outsiders; however community members can still fish in these areas with traditional gear in a sustainable way. No-take FCZs have yet to be established in this region. The primary goal of these fisheries management efforts is to support sustainable livelihoods, but additional conservation measures may be explored with the communities in the future.

Enforcement: To help build capacity for fisheries enforcement, FFI held a meeting with community members and the police department led by the Department of Fisheries. Because Hponganrazi is too remote for the government to regularly access, the communities were given permission to confiscate illegal gear, like electrofishing gear, and hold them in the village head's house until they could be given to the Department of Fisheries, who could pass the case on to the police department according to the government process. Having their activities recognized by the government helped empower communities and build a positive relationship with the government.

Alternative Livelihoods: As part of alternative livelihoods development in Hponganrazi, FFI provided seeds that communities requested for crop cultivation and home gardens. They also provided mini-tractors to each FCZ community, since plowing had previously been done primarily by hand. They trained the communities in how to maintain the tractors, and anyone who wants to use the tractor contributes money into a community fund that can be used for village development. FFI is also currently exploring the potential to develop fly-fishing tourism for mahseer in some communities as a new livelihood activity.

Challenges

- **Community Support:** Obtaining the support of communities can present an initial challenge and requires clear explanation about the concept and benefits of FCZs. To those only familiar with top-down management, their first reaction can be that a community-based approach is impossible. However, sharing examples of how this concept has worked in other areas can help convince them to try it.
- **Closed Season:** The Department of Fisheries in Myanmar has a national closed season for inland waters, which prohibits any fishing for 100 days between April and July. However, many fish-dependent families violate this regulation in order to catch food for their consumption and subsistence income. Imposing additional restrictions from FCZs could introduce extra hardship for such fishers.
- **Migrant Fishers:** Many migrant fishers have come to Indawgyi Lake to fish, and sometimes use illegal fishing methods. Special effort needs to be made to include migrant fishers in discussions about fisheries management to make sure they understand the rules of FCZs and to support the sustainability of fisheries dependent livelihoods.
- **Sustained Funding:** The FCZ projects still depend on receiving international funding to support them and have not found a way to be self-sustaining. Without external funding, fisheries officials would not have the capacity to support enforcement in established FCZs.

Successes

- **Creating Precedent:** As part of one of the first community-based freshwater conservation projects in Myanmar, FFI obtained government approval for community-managed FCZs in their projects, which did not have a precedent in the country. They are also laying the groundwork to help FCZs be legally recognized in the country more broadly.

- **Community Requests for FCZs:** FCZs were previously a new concept in the project area. But once communities in Hponganrazi heard about the project, some of them approached FFI and asked to establish FCZs in their villages, which expanded the scope of the project.
- **Awareness Raising**: FFI has set up many FCZ sign boards in the communities where they work and in the district capital. This has helped raise awareness about FCZs in the region, and local people are generally familiar with the concept now.
- **Effective Patrolling:** Joint government and community patrols in Indawgyi have been successful in confiscating fishing gear, including illegal electrofishing gear.
- **More Fish Observed:** FFI staff have anecdotally observed more fish in the deep pools near one of the communities in Hponganrazi Wildlife Sanctuary after implementing community fisheries management. This can encourage communities in their management efforts.

Lessons Learned

- **Provide Examples:** Community management of aquatic resources is a relatively new endeavor in Myanmar. FFI was able to draw from their experience of establishing Locally Managed Marine Areas (LMMAs) elsewhere in the country, and also partnered with FISHBIO to learn about approaches to FCZ establishment in Lao PDR. Providing examples to project villages about community-based activities that have been implemented elsewhere can help address community members' initial disbelief about how this process can work.
- **Build Relationships and Trust:** Regular communication is important for relationship and trust building with communities. These are a key part of project success, particularly in remote regions like Hponganrazi where communities do not have contact with many organizations. Clear explanation about project goals and concepts, as well as transparency around project activities, are an important part of communication.

> "Examples are very important for them. If they don't know these [community-based conservation approaches] are being used in other areas in the same country, sometimes they do not believe it is possible. So we explained very clearly with examples to the community."
>
> ***— Zau Lunn, Fauna & Flora International***

FISHBIO staff sharing FCZ experiences

Village in Hponganrazi Wildlife Sanctuary

“We have to keep in touch with the communities; that is very important. Formerly, the relationship between the communities and government departments were very weak in our country. There was a big gap in communication. Communication is very important for trust building. So we try to bring together communities and government staff in every meeting, to work together very closely. Communication between government staff and the community is very important to achieve the goal of the FCZ approach. ”

— Zau Lunn, Fauna & Flora International

- **Embrace Bottom-Up Management:** Many communities had negative experiences with the government imposing top-down conservation measures. They were eager to participate in approaches that gave them responsibility to manage their own resources.

FFI staff working with Indawgyi Lake communities to establish FCZs

- **Offer Flexible Management Options:** In areas like Hponganrazi where people depend heavily on natural resources and have less experience with conservation activities, implementing FCZs as “managed use areas” that allow some fishing instead of “no-take areas” that prohibit all fishing may be easier for communities to accept. This can still have benefits for fish populations.
- **Involve Government Partners:** Getting official designation from the government is important so that neighboring communities will recognize the authority of a community’s FCZ. Therefore, it is important to involve local government officials in the process from the beginning to build their support for community participation in management.

Contact

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Case Study 9

Turtle Survival Alliance

Country: Myanmar
FCZ Locations: Upper Chindwin River, Sagaing Region
Number of FCZs: 1
Number of Communities Involved: 15 consulted

The Turtle Survival Alliance (TSA) has a long partnership with the Wildlife Conservation Society (WCS) to conserve turtles in Myanmar, including conservation of the critically endangered Burmese roofed turtle (*Batagur trivittata*) along the upper Chindwin River in northern Myanmar. One of the current threats to this species is entanglement in large-mesh fishing nets. Fishing hooks also pose threats to three species of softshell turtles in the area. As part of a turtle nest protection and head-starting project funded by CEPF from 2017–2018, TSA and WCS also explored the establishment of community fisheries and FCZs to protect deep pools in the Chindwin River that can serve as refuges for both turtles and fish. However, the project team encountered several challenges, including a lack of community interest and support among the 15 communities they consulted, which prevented the FCZ process from moving forward except in Limpha Village (population of 129 adults in 34 households) where the main project activities are based.

Legal Framework: The Chindwin River basin is home to many ethnic groups that are primarily agriculturalists, but who also occasionally fish for subsistence. The Department of Fisheries sells fishing concessions in the river at a cost of about 150 USD per mile, which need to be renewed annually. People who want to fish in the river need to purchase a fishing license from the owner of the fishing concession near their village. TSA and WCS learned that this annual concession system poses a challenge to establishing FCZs in the region because the fishing concessions for the FCZ area would need to be purchased and renewed every year, a cost that is beyond the means of most communities.

Consultation Process: As TSA and WCS did not have freshwater fisheries staff and were unfamiliar with the FCZ process, they partnered with FISHBIO to learn about FCZ establishment in Lao PDR. FISHBIO staff provided training for TSA and WCS staff about FCZ establishment, and visited seven communities in the Chindwin River basin, where they presented about the benefits of FCZs and shared

FISHBIO staff with community members and TSA staff on the Chindwin River

experiences from Lao PDR. FISHBIO also helped map the locations of several potential FCZ areas at deep pools to lay the groundwork for future FCZ establishment. However, once the project tried to move beyond consultation into the development of community-based management plans, local communities did not support the idea of giving up access to fishing areas, despite recognizing long-term declines in fish populations. This was in part due to a lack of trust between neighboring communities, and between communities and the fisheries administration.

Creating Fisheries Management: Although they could not move forward with creating an FCZ network, TSA and WCS were able to purchase the fishing concession for a 6-km stretch of the Chindwin River near the village of Limpha, where the core of their project work is based and where the organizations have developed good relationships with the community after many years of work. Owning the fishing concession gives TSA and WCS the ability to set the fishing regulations in that region; however, they have proceeded cautiously to maintain the goodwill of the local community and have not moved forward with establishing any no-take FCZs that would limit fishing activities. The main regulation they have enforced has been to exclude fishing by people from outside the community in that area. TSA and WCS have also made an informal agreement with the community of Limpha to limit the use of large-mesh nets, to avoid fishing in two deep pools known to be used by turtles, and to not use baited hooks for fishing. In 2020, the Sagaing Regional Government designated the fishing concession as an official "Conservation Zone," which limits fishing in the area only to the villagers in Limpha. It remains to be seen what else this designation might entail.

Conservation zone at Limpha

© TSA

Electrofishing warning sign in community of Limpha

© WCS Myanmar

Challenges

- **Fishing Concession Challenges:** The need to pay for the rights to manage a section of river and renew that license every year made it challenging to propose long-term conservation initiatives such as FCZs and created an obstacle for obtaining community support.
- **Distrust:** Tensions between ethnic groups in the region led to distrust among neighboring communities. Community members did not want to give up fishing in an area because they were afraid their neighbors would not respect the rules.
- **Corruption:** Community members perceive government officials as corrupt, and this lack of trust made them not want to engage in a formal process of FCZ establishment with the fisheries administration.

Successes

- **Community Conservation Volunteers:** The project has built good relationships with community members regarding turtle conservation, including teams of Community Conservation Volunteers. These local people monitor nesting beaches, help collect and transport eggs to a secure incubation area, monitor incubating eggs, and care for turtle hatchlings. One of these volunteers was recently elected as headman of Limpha Village, where most of the project work is focused. This successful development of local conservation leaders could lay the groundwork for future community fisheries conservation.
- **Benefits for Multiple Species:** Efforts to protect sandbanks used by turtles for nesting has also benefited other aquatic species, including water birds such as River Tern (*Sterna aurantia*), River Lapwing (*Vanellus duvaucelii*), and Great Thick-knee (*Esacus recurvirostris*).
- **Turtle Rescues:** Fishers are willing to participate in a rescue program to remove any turtles captured in their gear and bring them to TSA and WCS staff for care and release.
- **Enforcement:** Community members in Limpha village are willing to enforce some amount of fisheries management, such as confiscating nets from people outside the community who fish in the TSA and WCS fishing concession. This included the headman seizing electrofishing gear from a neighboring village fisher, which prompted outreach in both villages to state that future cases would be prosecuted.

© TSA

Burmese roofed turtle

Lessons Learned

- **Need for Fisheries-Dedicated Staff:** Trying to establish FCZs can be a challenge for an organization without fisheries expertise or a dedicated fisheries team. Dedicated staff are required to build relationships with the communities and to get to know their fishing networks and local issues.
- **Community Support is Not Guaranteed:** Without community support, FCZ projects cannot move forward. Benefits of community fisheries and FCZs may not be readily apparent to communities, who

> “Often it comes down to the persons who are involved in the program and what relationship they build with the community. It’s a process that takes time that is not easy. But I think anything that they see as being imposed on them from outside is going to meet some resistance. I would have a dedicated fisheries team to carry this out and start small, talk to a few communities. Find out what they’re interested in, convince them of the need to conserve the resource, and ask them how they would solve the problem.”
>
> ***— Steven Platt, Wildlife Conservation Society***

may be skeptical of such an approach for fear that others will use the resources if they restrict their own use (i.e., "Tragedy of the Commons"). Introducing communities to the idea of local resource management will take time and relationship building. It may be easier to start in a village that already has some experience with community-based resource management, such as managing a community forest.

- **Value of Local Staff:** Local staff can play an important role in building relationships with a community and generating support for a project in ways that can be more challenging for foreign staff.
- **Start Small, then Scale Up:** Focusing on one or two villages as a pilot project may prove an effective way to produce results that doesn't spread an organization's resources too thin. If fish conservation efforts are successful in these communities, the results may spread to other villages by word of mouth and help generate more interest in future participation.
- **No Exit Strategy:** TSA and WCS have learned that with long-lived species like turtles, successful outcomes can only be realized after many years of sustained effort. The same is likely true for community fisheries. Conservation initiatives are a long-term investment that cannot be completed in the term of a single project cycle.

> "The best advice would be what Clint Eastwood said on Heartbreak Ridge: "Improvise, adapt, and overcome," where if you try something and it doesn't work out, try something else until you get it right. One solution in one village might not be what you try in another village."
>
> *— Steven Platt, Wildlife Conservation Society*

> "You can't go up there in one funding cycle and expect to set up all this stuff and then walk away and expect it's going to run smoothly from here on out. Once you commit to these projects, you're pretty much in this for the long haul."
>
> *— Steven Platt, Wildlife Conservation Society*

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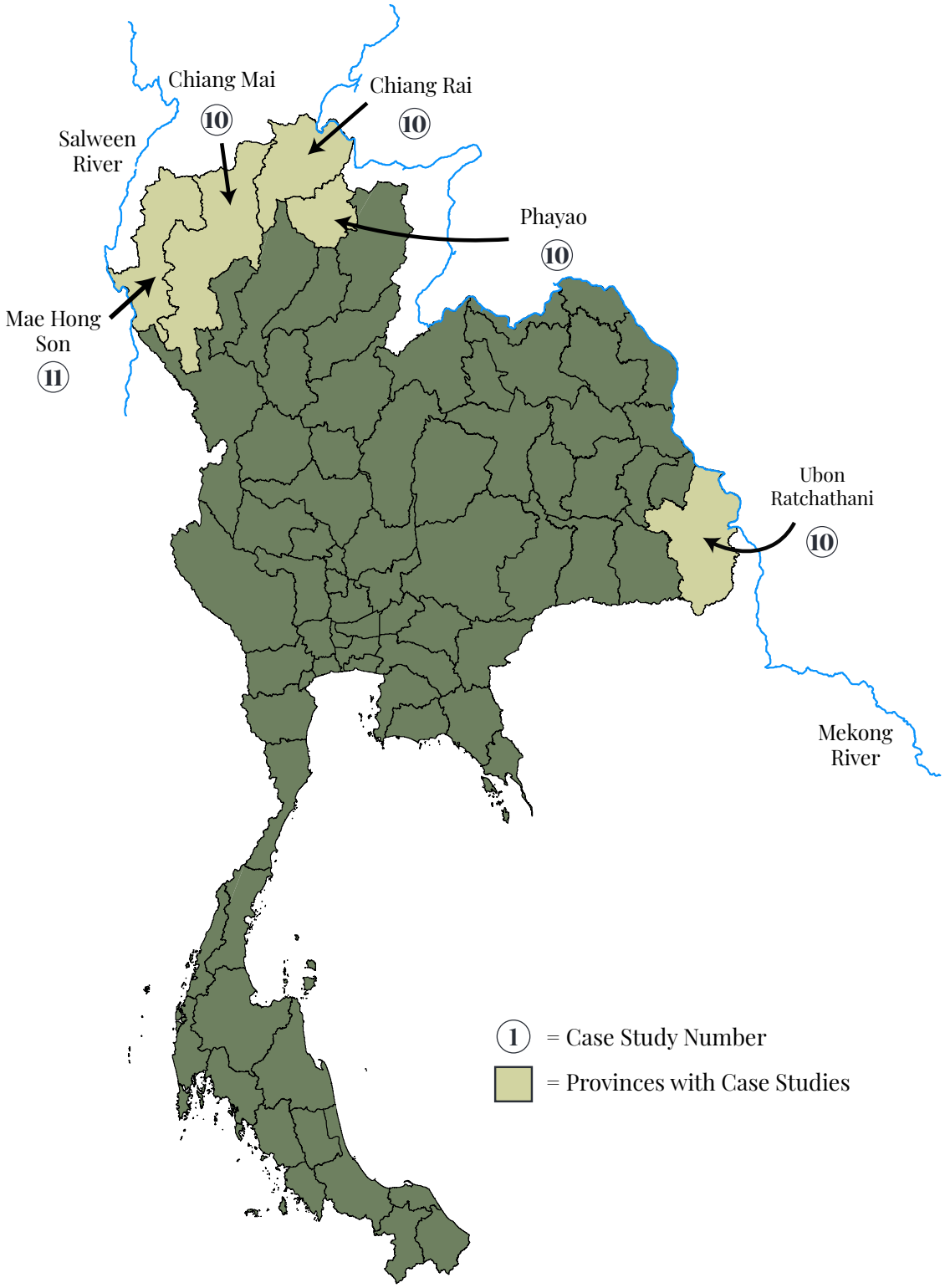
Case Studies

THAILAND



Case Study 10

Living River Association

Country: Thailand
FCZ Locations: Ing River, Chiang Rai and Phayao provinces; Upper Mae Chaem River, Chiang Mai Province; Mun River, Ubon Ratchathani Province
Number of FCZs: 37
Number of Communities Involved: 35 (21 in the Ing River basin, 6 in the Mae Chaem River basin, 8 in the Mun River basin)

Living River Association (LRA) has been working with communities along the Ing River, a tributary of the Mekong River, in northern Thailand for more than 20 years. In their early years of working together, LRA organized a field trip for communities to learn about the concept of FCZs in neighboring Nan Province. However, they were not able to pursue the topic further due to funding constraints and stopped their work with the communities. About 10 years later, LRA returned to the area and discovered that several communities had taken what they learned from the field trip to set up FCZs on their own.

After brainstorming about the problem of declining fish catch and its causes, the villages self-organized to establish FCZs. They selected the suitable locations, set up committees, and established FCZ rules and regulations. These cultural or traditional FCZs can be established without any approval from the government. With four grants from CEPF from 2012–2018, Living River Association has worked to support these communities and expanded their work to other river basins, ultimately working with 35 communities (average population of 490) across the Ing, Mae Chaem and Mun rivers to strengthen existing FCZs, establish new ones, and build community networks.

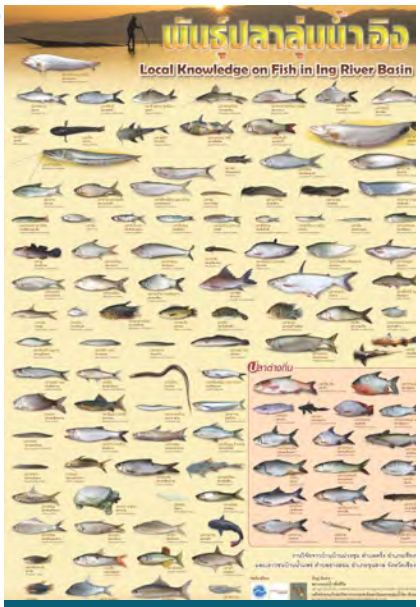
Incorporating Cultural Beliefs: Many of the FCZs in Thai communities incorporate Buddhist beliefs. Buddhist temples will have a "merit zone" in their vicinity in which killing of any kind (hunting or fishing) is not allowed. Temples next to rivers may therefore traditionally have a "no killing zone" that acts as an FCZ. Buddhist activities have been adapted for conservation over the past several decades as part of the Thai environmental movement. This includes the practice of tree ordination, a blessing ceremony in which monk robes are placed around a tree, and the tree is ordained the same way that people are ordained to become monks. Similarly, river ordinations can be performed at FCZs, in which a cable is strung across the river and hung with a monk's robes.


River ordination
© Living River Association

In addition to helping communities set up new FCZs, Living River Association helped strengthen the management of existing FCZs. This included organizing river ordinations in Buddhist communities and

other blessing ceremonies in Christian communities. Funding for the FCZs comes from the village fund. While the communities should conduct a river ordination at the FCZs every year, they may not always have the funds to do so and may request support from NGOs.

Selecting and Enforcing FCZ Sites: FCZs are often created around deep pools that serve as refuges in the dry season, and that also have some plants or large trees along the riverbank. If there is no vegetation in the area, villagers may place some large wood in the FCZ to provide shelter for fish. Villagers often choose to protect the area that is closest to their village so that everyone can participate in monitoring. If the zone is not next to the village, it is often near a road or bridge, so people can keep an eye on it. Women often play an important role in monitoring the FCZs while they harvest vegetables or fish nearby, and will report violators because they are concerned about the food security of their families. The village committee will fine people who violate the rules of the FCZ, and if people do not respect the community's authority, they will send the case to the local police. Illegal fishing has largely declined in the area, although it still happens occasionally. While the communities are able to largely manage the FCZs on their own, it is helpful to have the support of local governments in case they run into problems with violators that they cannot solve on their own.



Fish poster created by LRA

Villager Capacity Building: As part of their projects, LRA supported communities to conduct Thai Baan (or villager-led) research on topics such as fish and aquatic animal species, river ecosystems, local fishing gears, wetland forests, and local legislation on environmental conservation. Villagers selected the topics to study, and after receiving training and planning for data collection, they gathered information in their communities by documenting local knowledge. Thai Baan research is not only a tool to produce knowledge based on the integration of local and scientific knowledge, but also a tool to empower local communities by developing appreciation and understanding about their knowledge, capacity, and rights to manage their natural resources.

Based on the Thai Baan research, LRA identified at least 62 villages in the Ing River Basin that had set up FCZs, with an average size of 500 m by 50 m (2.5 ha). Living River Association produced multiple documentary films about the research, created fish posters for the **Mae Chaem** and **Ing rivers**, and published several **books** documenting the results of the surveys. They also conducted capacity building for community members on topics like social media communication for conservation, and how to produce videos using cell phones.

Community Networking: In 2013, LRA helped communities establish a local network called the People Council of Ing River Basin (PCIRB), in which communities can support and learn from each other's experiences in river management. In 2015, PCIRB organized a Green Walk, an event in which 23 organizations walked 25 km along the Ing River to raise awareness about Ing River conservation and PCIRB. LRA helped connect the network with the fisheries department and other local authorities, and created a chat group using the app Line so that communities could talk with each other. Not only do the communities discuss FCZ issues, they may invite each other to attend river ordination ceremonies or other cultural events,

and strengthen the relationships between villages. LRA also helped organize an Ing Forum in 2017 collaboratively with nine other organizations, including local community networks. This forum consisted of six workshops and was attended by 300 people to discuss sustainable river resource management. Additionally, in one district LRA worked with the local administration organization to conduct research about how the district could create local laws about environmental conservation.

Green Walk for Ing River

Challenges

- **Declining River Livelihoods:** Fishing used to make a larger contribution to villager livelihoods, but few people fish full time now because fish populations have declined. The connection between communities and the river is not as strong as it was in the past.
- **Complex Emerging Challenges:** While the communities have shown strong leadership in establishing FCZs, the challenges affecting the river are growing more complex, such as climate change, land grabbing, and pollution.
- **Distant Networks:** It can be challenging to connect community networks from different river basins on a regular basis because of the distance between them.

Successes

- **Initiative and Networking:** Communities have demonstrated a strong initiative and capacity to develop FCZs on their own. Additional support from LRA has enabled them to network with each other and form the PCIRB, which strengthens their collective voice in discussions with the government.
- **Community Acceptance:** Although there was some conflict between villagers when the FCZs were first set up because they thought the zones would limit access to fishing, after time passed they came to accept the FCZs.

> “In some cases it takes about five years to 10 years to get accepted by all villagers, to make other villagers see the results of the zones – that they can get more fish, and the FCZ benefits their fishing, not limiting their access.”
>
> *— Teerapong Pomun, Living River Association*

- **Documenting Knowledge while Building Capacity:** The process of Thai Baan research not only documented extensive local knowledge about the aquatic environment, but villagers also developed capacity during the process, such as research skills, leadership, teamwork and confidence.
- **Increasing Fish Catch:** Through participatory monitoring in Wiangtai Village on the Ing River villagers saw that their fish catches had increased since the FCZ was established, and the size and number of some fish species had increased.
- **Species Reappearing:** Some fish species that had not been seen in a long time began to reappear

in some villages. Villagers have also reported seeing more river otters, indicating that other aquatic species may benefit from increased fish abundance in the FCZs.

- **Female Leadership:** The FCZ in Wingtai Village was first set up after the community joined the initial study tour led by LRA. However it failed a few years later because villagers did not agree it. When a female village head was elected, she was able to reinstate the FCZ as a strong and well-respected leader who was able to build community support and good relationships with local authorities. The FCZ remains active to this day.

Female village head in Wingtai Village (third from right)

Lessons Learned

- **FCZs can Create Positive Interactions:** In places like the Mun River in Thailand, where a hydropower dam has created conflicts between communities and authorities, establishing FCZs and holding river ordinations are an opportunity for community members and local authorities to interact in a positive way.
- **A Tool for Networking:** FCZs can be a tool for networking and capacity building. If communities can use their knowledge and work together to manage FCZs, they may be better prepared to adapt and respond to other environmental issues.

> "An FCZ is an effective tool not only for fish habitat restoration and environmental conservation, but it also is a social tool. It's a tool for networking, for capacity building."
>
> *— Teerapong Pomun, Living River Association*

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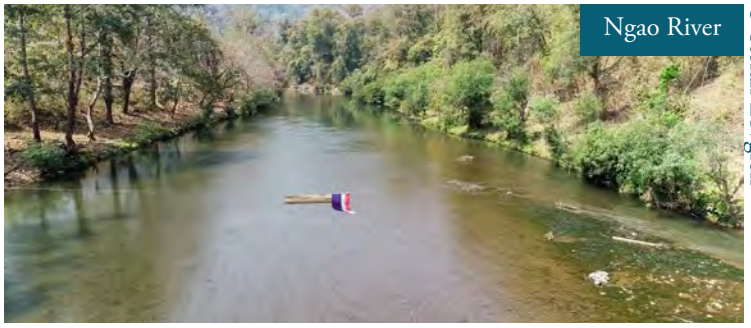
Case Study 11

Ngao River, Thailand

Country: Thailand
FCZ Locations: Ngao River, Salween River basin, Mae Hong Son Province
Number of FCZs: 53
Number of Communities Involved: 51
Note: This Case Study did not receive support from CEPF

Communities of Karen ethnic people living along Thailand's Ngao River, a tributary of the Salween River, have implemented FCZs for the past 27 years. Although the communities were introduced to the concept of FCZs by the local NGO Women and Children Development Foundation around 1992, the motivation to establish the FCZs has come entirely from the communities. They made the decision to implement FCZs in response to declining fish populations and the emergence of destructive fishing practices, such as fishing with dynamite or electricity. The communities have implemented and managed their FCZs without external support from government officials or NGOs. The first FCZ in the river was established by Mae Louie village around 1993. Another community adopted the model in 1996, followed by a third in 2003. As of 2020, there were at least 53 FCZs in the basin, managed by 51 different communities.


Ngao River
© Stefan Lovgren

The FCZs range in size from 0.2 to 2.5 hectares, and each community has developed regulations for its own FCZ largely independent of other communities. While most communities prohibit all fishing in their FCZs at any time, some communities treat the FCZ like a bank account which they may periodically draw upon. This could mean opening the FCZ to fishing for one day every three or five years, or treating the FCZ as an emergency supply of protein that the village can decide to access in a lean year if food availability is scarce. While such an approach provides flexibility to communities to meet their food and livelihood needs, a few days of very intensive fishing can essentially wipe out the fish population in an FCZ and reset the conservation benefits that had been gained.

Soybean farming has become a primary livelihood in this remote river valley, particularly as recent road construction has increased many communities' access to markets. Fish provide the primary source of protein for many families, though chickens and pigs are raised locally. Common fishing methods include gill nets, hook-and-line, bamboo traps, and spearfishing. Community members report catching and consuming nearly 40 different species, and important fish species include mahseer (*Neolissochilus* and *Tor* spp.), barbs (*Hypsibarbus salweenensis*) and catfish (*Hemibagrus* sp. and *Sperata acicularis*). Some of

the heaviest fishing occurs in the dry season between March and May, which coincides with the school break, freeing young boys to fish intensively using hand spears. Community fishing effort generally declines during the rainy season as water levels rise, flow rates become dangerous, and communities focus on agriculture, which gives the fish a chance to move beyond the reserve boundaries to spawn and provides some respite for fish populations.

Penalties: The penalties for FCZs in this region differ depending on the religion of the local community. In Buddhist and Baptist Christian communities, violating the rules of the FCZ is accompanied by a monetary fine that often increases with each subsequent offence, spanning a range of about 15–300 USD. In animist communities, violators must make an offering to the spirit of the river, such as several bottles of rice whiskey or sacrificing a pig or chicken. Animist communities will make annual offerings to appease the river spirit and ask it to curse anyone who violates the rules of the FCZ.

Marking FCZ Boundaries: One of the most effective ways of denoting the FCZ boundaries is stringing a cable across the river between two trees and hanging a flag from the cable. However, some of the FCZs are only indicated by a sign nailed to a tree, and some boundaries are not physically marked at all. In many communities, the FCZ is adjacent to the village and extends from the most upstream house to the most downstream house. This proximity to the village allows the whole community to keep an eye on the FCZ and participate in enforcement. Fishers can also help enforce the FCZ, because most of their fishing occurs right at the reserve boundaries to catch any fish that move out of the protected area. Each community has a conservation committee that is responsible for making decisions about how to issue warnings or fines in response to FCZ rule violations. While men hold most of the official positions, in some communities women are more outspoken than men, so play an important role in enforcing the norms of the FCZs.

Offerings made at a Ngao River FCZ

FCZ boundary marking with cable

Assesment: Researcher Dr. Aaron Koning has been studying this network of reserves since 2012. During the dry season between December 2017 and March 2018, he implemented a rigorous ecological monitoring effort to assess the effects of the FCZs on fish populations. During the study, he surveyed 23 of the Ngao River FCZs that were randomly selected, as well as an unprotected area located 100–250 m downstream of each FCZ. The Ngao River becomes clear in the dry season, which makes it possible to count fish by visual observation. Dr. Koning used a mask and snorkel to conduct a visual census of fish, which involved swimming transects through each study area, counting fish, and estimating their sizes. Results of his study are presented under “Successes.”

Challenges

- **High Fishing Pressure Can Limit Recovery:** Fishing pressure is so high outside of the FCZs that large fish (maximum length >20cm) are primarily only found inside FCZ boundaries. Communities report that fish populations have increased since the time that reserves were implemented, but say that more fish were present in the decades prior to reserve establishment, when human populations were smaller and fishing pressure was lower. FCZs can play a role in improving the condition of fish populations, but in the presence of continued high fishing pressure, it may not be possible to recover the same levels of abundance as an unfished state, even after multiple decades.
- **Reluctance to Enlarge FCZs:** Although Koning's research suggests that FCZs have the potential for greater benefits if they were made larger, communities have voiced concerns regarding FCZ expansion because they fear that people in their own or neighboring communities would object to further limiting the area available for fishing.
- **Lack of Legal Recourse:** Without official government backing for the FCZs, the communities do not have formal legal recourse if a powerful local or non-local actor decides to violate the rules of their FCZs and not obey warnings from the community. While this has not been a problem to date, it could become one in the future.
- **Uncertain Benefits for Migratory Species:** Individual FCZs may not be effective for protecting highly migratory species; however, a river-wide network of FCZs may help protect these fish along their migration routes, as well as the reduction in fishing effort and efficacy during the rainy season, when it is thought many Salween fish species migrate.

Successes

Key findings from Dr. Koning's research:

- **More Fish:** FCZs surveyed during the study had higher fish diversity, density, and biomass than nearby fished areas. The increase in biomass was more than 20 times higher on average, indicating that the reserves are benefiting all fishes, but particularly larger species (>20 cm maximum length).
- **Small Can be Effective:** Although larger FCZs demonstrated the greatest changes in fish biomass, FCZs as small as 0.3 ha were shown to have higher fish biomass compared to nearby unprotected areas.
- **Benefit of Proximity:** FCZs located close to villages had higher fish biomass than those located farther away, presumably because the proximity of the FCZs made them easier to enforce.
- **Benefit of Penalties:** FCZs with explicit penalties for violating regulations (whether a monetary fine or offering an animal sacrifice or libations) had higher densities of small fishes than those without penalties.
- **Spillover of Small Fish:** After a few years, as the number of large and predatory fishes inside the FCZs increases, smaller fishes (length ≤20 cm) may start to move outside of the reserves to avoid predation.

> “In general, when I discuss the findings of my study with community leaders, they are pretty interested. Their primary interest is in knowing how many species are found in the reserve. They already understand that the reserves work to increase fish biomass and density, because they can see that with their own eyes. I’ve tried to discuss how increasing the sizes of reserves could increase their benefits, but the initial response from leaders has largely been that expanding them isn’t really feasible given community considerations. This is something that would more easily be addressed at a meeting in which this could be discussed with multiple villages from within the basin.”
>
> ***— Aaron Koning, Cornell University***

- **Strong Ownership:** The communities feel a very strong sense of ownership for the FCZs because they have managed every step of the process on their own.
- **Decline of Destructive Fishing:** Since the establishment of the FCZs, destructive fishing methods have all but disappeared, and communities report that violations of the rules of the FCZ by fishing inside are rare.
- **Successful Spawning:** Resident fish have been observed spawning in some reserves every year in the same location.
- **Fishing Tourism Opportunities:** The recovery of species such as mahseer (T*or* spp. and *Neolissochilus stracheyi*) in the FCZs has made it possible for recreational fishing tourism to develop at some locations. Anglers hire local community guides who facilitate catch and release fishing in the FCZs, and these visitors pay a fee to the communities for this access, as well as purchasing food and paying for local guides and transportation.

Angler in Ngao River

© Aaron Koning

- **Adding Protections:** Some communities have intermarried over the generations, creating strong connections between them. In the last several years, a series of three communities located side by side along the river decided to adopt an additional ban on spear fishing in the unprotected areas between their village FCZs. They collected all the snorkeling masks in the village to prevent people from spearfishing. This created a 13-km corridor where no spearfishing is allowed. Anecdotally, people are now observing more large fish in these unprotected areas between FCZs.

Lessons Learned

FCZ Placement

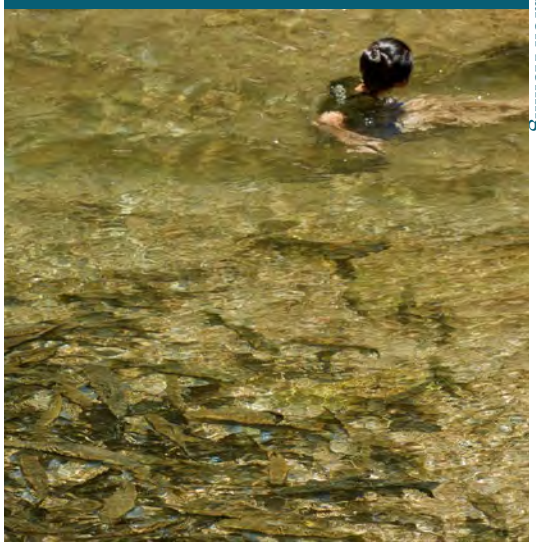
- In rivers it is important to try to **represent key habitats** within an FCZ, including deep pools, riffles, and runs.
- One rule of thumb to make sure representative habitat

> “Deep areas are good, but if you conserve deep areas to the exclusion of shallow water areas, you’re going to benefit some species and not others.”
>
> ***— Aaron Koning, Cornell University***

is captured within an FCZ is to make its dimensions **10 times as long as the river is wide**, providing that the community is able to enforce an area of that size.

- Establishing multiple FCZs along the same stretch of river can provide **connectivity** for fish populations.
- **Mouths of tributaries** are key habitats that can be valuable to protect.

Villager swimming with fish in Ngao River



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FCZ Implementation

- Establishing FCZs can be particularly effective in rivers where the **river runs clear** for at least part of the year (such as in the dry season). In these cases, the larger number of fish inside the reserves can be readily apparent to an observer, which can make a strong case to the community about the benefits of establishing FCZs and increase their willingness to participate in management and enforcement. Clear water also makes it easier to scientifically monitor FCZ effectiveness based on visual fish counts.
- It can be helpful if communities have a **regular forum for discussions**, such as meetings or religious services, where large numbers of community members can be kept informed about activities related to the FCZ.
- Community support and **willingness to enforce the FCZ** are likely the most important factors for FCZ success. Therefore, it may be less beneficial to try to protect a high-quality section of habitat that is located far away from the village and difficult to enforce. An FCZ located close to the village may yield more benefits if it is well enforced, even if the habitat is not as pristine. It may also provide the opportunity to expand FCZs or encourage additional FCZ creation once the benefits have been observed at one location.

> “There’s no point in protecting great habitat if the community is not going to protect it. So my primary concern would be finding a place the community will actually work to protect and empowering them to do so.”
>
> *— Aaron Koning, Cornell University*

- Good communication and **connection between communities** is an important aspect of FCZ success. If neighboring communities do not respect each other's fishing regulations, then more enforcement may be required.
- The fish seem to **know where the reserve boundaries are**, likely due to the high density of fixed fishing gears at reserve boundaries, and have been observed retreating back to the FCZs when disturbed outside the FCZ.

FCZ Monitoring

- Dr. Koning expects FCZs created in intensively fished rivers can begin to demonstrate appreciable results in **three to five years**, presuming fishing does not occur inside. In rivers where fish biodiversity is facing other additional stressors (such as pollution or heavy water diversion), FCZ benefits may accrue more slowly, and if other threats are severe enough, not at all.
- In murky water, **counting** the number air-breathing **fish coming to the surface** (per unit area or per unit time) to breathe or feed can serve as an indicator of relative fish abundance if compared to adjacent unprotected areas.
- If an environment is **highly productive** without heavy fishing pressure outside of the FCZs, it may take a **longer time to see the effects** of reserves (that is, to see a difference between the protected and unprotected area, since fish abundance in the unprotected area is already relatively high).

Ngao River fish

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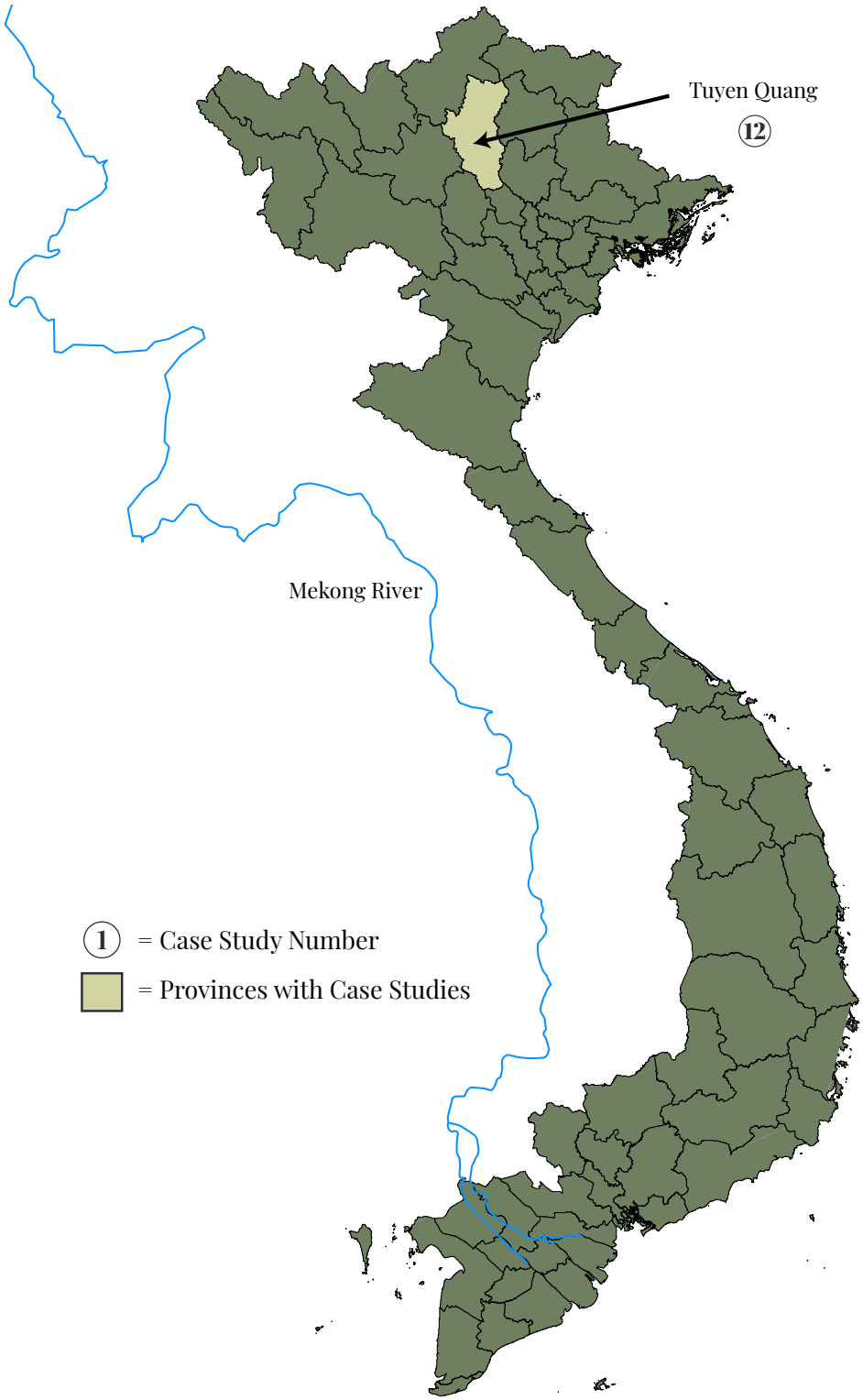
Case Studies

VIETNAM



Case Study 12

Center for Water Resources Conservation and Development (WARECOD)

Country: Vietnam
FCZ Locations: Na Hang Reservoir, Gâm River Basin, Tuyen Quang Province
Number of FCZs: 2
Number of Communities Involved: 2

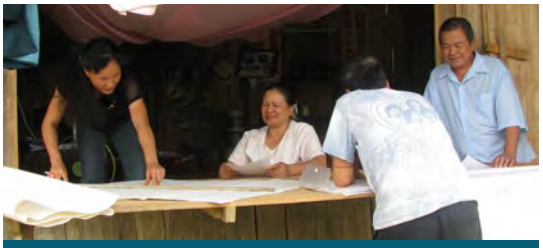

Shrimp holding pens in Na Hang Reservoir

The construction of Tuyen Quang Dam (Na Hang Dam) on the Gâm River in northern Vietnam created Na Hang Reservoir when it was completed in 2008. The dam is the most upstream in a cascade of three dams. The reservoir is bordered by Ba Be National Park and surrounded by karst limestone formations. The area is inhabited primarily by people belonging to Dao and Tay ethnic groups. While many types of fish were found in the river in the past, currently the main wild fish harvest in the reservoir is small shrimp. The shrimp are very productive, and the communities can harvest as much as one ton per day. With three grants from CEPF, the Center for Water Resources Conservation and Development (WARECOD) worked with communities in the region from 2009–2017. Their projects included achieving legal approval of two co-management groups for aquatic resources in the communities of Na Hang (population 6,784) and Son Phu (population 2,477). Prior to their efforts, there was no legal framework for community fisheries co-management in Vietnam.

Fishing Regulations: Na Hang Reservoir has several FCZs where fishing is not allowed. The locations of these FCZs were designated by the government in 2008, and usually encompass spawning areas near waterfalls or stream mouths. There is also a closed season from April to June, where no fishing is allowed anywhere in the reservoir. Community co-management groups can enforce the no-fishing areas designated by the government, and can also set restrictions on the types of gear that outsiders can use to fish in their community fishing areas. For example, in Son Phu, outsiders can fish with poles but not nets. Communities have the right to stop people from using destructive fishing gear in their areas, but cannot arrest or fine people or confiscate gear. A multi-sector government inspection team has the authority to fine, arrest, and confiscate, but they do not always patrol regularly.

Villager Research: The idea for co-management began with conducting Thai Baan (or villager-led) research. Acting as facilitators, WARECOD staff advised the communities to think about the past and present conditions of aquatic resources, and to see if they could identify any major turning point. Community members

Na Hang Reservoir



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Community members at a Thai Baan research implementation workshop

were organized into research teams and recorded the history of aquatic resource use before and after the construction of Tuyen Quang Dam. As a result of conducting research and presenting their findings, community members more fully realized the benefits they derived from natural resources, and also what they had lost – for example, fish populations had declined and some fish species had disappeared following dam construction. This motivated the communities to protect what they have left and raise local awareness about environmental conservation.

Addressing Illegal Fishing: Previously, the communities faced challenges with illegal destructive fishing in the reservoir, including people using electric fishing gear. From 2010–2012, WARECOD organized a gear buy-back program, in which families were compensated for handing over their electrical fishing tools. Families were compensated about 2 million VND, or approximately 86 USD, for each set of gear. The units were destroyed and the parts recycled, and families signed an official promise letter not to use this type of gear in the future. While the program bought back 36 gear units in total, which had some successes in decreasing the level of illegal fishing, there were not enough funds to buy back all of the illegal gear in the vicinity.

Management Roles: Community co-management groups (20 people in Na Hang and 15 people in Son Phu) played a role in educating people living around the reservoir to not use illegal fishing gear. While members traveled on the reservoir during their regular fishing or fish buying activities, they had face-to face discussions with people that they saw in the reservoir. Members of the co-management group in Na Hang also made an agreement not to buy fish from people who use illegal gear. To raise awareness in the community, WARECOD printed leaflets and gave the co-management groups megaphones and micro-phones to make announcements. WARECOD and the co-management groups also organized several types of community outreach events to raise awareness about aquatic resource conservation (see below).

Since the projects began, the use of illegal fishing gear has greatly declined in the reservoir, although this may also be in part because fish populations have also declined, and many people have changed their livelihoods to aquaculture. With less illegal fishing, the work of the co-management group has reduced. However, they still try to work together and support each other, and continue to educate community members about not catching fish during the closed season, and not dumping trash or polluting the reservoir. For example, they educated people about not repairing their boats in the reservoir, where the oil could leak into the water. The groups also organized community clean-up events at the harbor. One member wrote a song about the beauty of Na Hang Reservoir to encourage people to keep the lake clean. Women have played a key role in the co-management group in educating the communities, especially in Na Hang. For example, one woman who owns a shop in the harbor educates all of her customers about keeping the reservoir clean.

Examples of Awareness Raising: Throughout their projects, WARECOD has used games and events to raise community awareness about the importance of natural resources.

In 2011, WARECOD organized a cooking contest called "Na Hang Kitchen Queen," which consisted of five teams representing the five villages in Na Hang Town. Three women on each team had two hours to complete the cooking contest using local food from the river. The event was the first of its kind in the community, and attracted a lot of attention. It provided an opportunity to encourage people to give up destructive fishing practices, promote local cultural foods, and honor women's roles connected to aquatic resources.

In 2012, WARECOD organized a quiz event called "Fishermen Millionaire Contest" in villages where there were the most concerns about the use of destructive illegal fishing. This event required fishermen to answer quizzes and solve puzzles, which demonstrated their knowledge and understanding about aquatic resources. It served as an opportunity to remind communities about aquatic resource protection.

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Cooking contest in Na Hang Town

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Theater forum performed by community members

From 2015–2017, community members wrote various scenes based on shared concerns about aquatic resources conservation for a theater forum production. These scenarios included poor households still using illegal electric fishing gear, and shopkeepers with low environmental awareness not reminding customers to keep the reservoir clean. Each scene included protagonists and antagonists. During the play, the antagonists would give different arguments about not following the co-management regulations, while the protagonists would use different ways to persuade them. If the protagonist could not handle the conflict, other participants with better solutions would come to the stage and replace them. These plays helped remind community members about the aquatic co-management regulations.

Challenges

- **Convincing Government About Co-Management:** Because a precedent for community co-management of aquatic resources did not previously exist in Vietnam, WARECOD had to introduce the concept of co-management to government authorities. Some government officials did not support this idea because they believed that communities did not have the capacity to be involved in management. WARECOD needed many discussions to convince

> "Some governments do not think that people can play the role of management. They think management is a very big role. But indeed, it can be a very simple thing, being involved in sustainable use. We can talk about the role of community people in decision making as co-management."
>
> *— Nguyen Thi Ngoc Lan, WARECOD*

government officials to shift their perspective, and to understand that the scope of co-management could be as simple as communities making decisions to participate in sustainable use.

- **Ensuring Community Independence:** WARECOD had to discuss extensively with the government to ensure that the community co-management groups could function independently, and not be considered part of a government cooperative.
- **Making Local Government Connections:** The government structure is complex, and it is challenging for communities to know who is responsible for particular issues. Having good relationships and support from local government officials is important. When a key provincial fisheries official retired, the community lost an advocate in government, and have not found other staff who are as interested in supporting their issues.
- **Fisheries Decline:** Although illegal fishing has been greatly reduced in the reservoir, this is in part because the system has been so altered that there are fewer fish left to catch. Local people have shifted their activities from catching wild fish to rearing fish for aquaculture.
- **Slow Government Process:** Laying the groundwork for co-management was an extended process. By 2013, Tuyen Quang Province issued a decree to implement aquatic co-management as a result of WARECOD's work. However, no further progress was made on the ground. In 2015, WARECOD returned to investigate the situation, and found that there were challenges with authorizing budget to implement this concept. Further effort was needed to secure legal recognition of the co-management groups in Na Hang and Son Phu, which was finally achieved in 2016.

Successes

- **Creating a Legal Framework:** WARECOD was able to establish a legal framework for co-management for Na Hang and Son Phu that will ensure the sustainability of the model by obtaining support from local government officials. As one of the first cases of aquatic co-management in Vietnam not related to aquaculture, these two communities can serve as examples for the model to be replicated elsewhere.
- **National Support for Fisheries Co-Management:** Vietnam included co-management in the 2017 revision of the fishery law for the entire country. Discussions with ministry-level officials about WARECOD's activities during the law revision may have contributed to this inclusion.
- **Building Villager Skills and Teamwork Through Research:** Organizing villagers into research teams to conduct Thai Baan research gave them experience of working together and improved their organizational and management skills, which helped lay the groundwork for working together as a co-management group. Government officials who attended presentations of the Thai Baan research results were able to see how community capacity had improved, which helped convince them that community members could be responsible for co-management activities.
- **Sustainable Financing:** WARECOD purchased a boat for the Son Phu community to use for patrolling and outreach, since that community did not have as many fishing boats as Na Hang. Son Phu villagers developed a long-term funding mechanism for their co-management activities by agreeing to rent the boat to transport goods when it is not in use for co-management activities.

- **Government Cooperation:** In 2016, WARECOD organized a workshop that brought together four provinces in the Lo-Gâm River Basin. The four provinces signed an agreement to agree to long-term cooperation in aquatic resource conservation, including the use of co-management groups.

Lessons Learned

- **Regular Community Visits:** Although the project site is located a full day's travel from the WARECOD office, frequent (monthly) visits to the communities were important in the beginning to help them develop new behavior and habits related to aquatic conservation. Staying with the communities and building close relationships from the beginning of the project helped project staff understand the culture of ethnic minority groups. Project staff often had to work with community groups in the evening due to livelihood commitments of the communities.
- **Connect with Local Government Early:** Building relationships with government officials from the beginning of the project has been important to garner their support for co-management. This can help promote sustainability of co-management activities, because government offices may have resources to support such activities through their development plans.
- **Benefits and Challenges of Tourism:** Tourism can help support conservation, in that community members can take visitors on boat tours of the reservoir, and seeing fish swimming in the spawning sites and FCZs is often a highlight. However, tourists can also bring their own destructive fishing gear to the area, and community members need to educate and stop them.
- **Developing Conservation Awareness:** When the dam first closed the reservoir, there were so many fish trapped inside that community members said they did not think about the need for conservation. But once the fish populations declined, their discussions and Thai Baan research with WARECOD helped raise their awareness about why conservation was important.

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> "Through doing research, they deeply understand the situation."
>
> *— Nguyen Thi Ngoc Lan, WARECOD*

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