



Photo Credit: Sean Vetter/WorldFish

# Sustainable Aquaculture and Community Fish Refuge (SAFR) project: Final report 2024



អរម្ភដោយ: **giz** Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH



# Sustainable Aquaculture and Community Fish Refuge (SAFR) project: Final report 2024

---

## Authors

Phichong Ou, Vichet Sean, Vathanak Sun and Michael Akester.

## Citation

This publication should be cited as: Ou P, Sean V, Sun V and Akester M. 2024. Sustainable Aquaculture and Community Fish Refuge (SAFR) project: Final report 2024. Penang, Malaysia: WorldFish. Technical Report: 2024-14.

## Acknowledgments

This report was developed with support from the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the Sustainable Aquaculture and Community Fish Refuge Project (SAFR) in Cambodia.

## Contact

WorldFish Communications and Marketing Department, Jalan Batu Maung, Batu Maung, 11960 Bayan Lepas, Penang, Malaysia. Email: [worldfishcenter@cgiar.org](mailto:worldfishcenter@cgiar.org)

## Creative Commons License



Content in this publication is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0), which permits non-commercial use, including reproduction, adaptation and distribution of the publication provided the original work is properly cited.

© 2024 WorldFish.

## Photo credits

Front cover, pages 8, 20, Sean Vichet/WorldFish; pages 27, 41, LIM Sophorn.

# Table of contents

---

List of abbreviations	4
1. Executive summary	6
2. Introduction	8
3. Summary report	9
4. Final summary report	10
5. Partnership, coordination, networking and synergy	28
6. Monitoring and evaluation	30
7. Lessons	37
8. Best practices	40
9. Recommendations	41
10. Sustainability	44
11. Publication and communication	46
12. Challenges	47
13. Conclusion	48
14. Budget and financial status	49
List of figure	50
List of tables	50
Notes	50
Annex	51

# List of abbreviations

---

ABC	Alliance Bioersity International CIAT
AMD	Asian Mega-Deltas
ANKO	Akpivath Neary Khmer Organization
ATSAF	Academy for International Agricultural Research for Development
BiOM	Biological Monitoring
BMZ	German Federal Ministry for Economic Cooperation and Development
CCEM	Catch Consumption and Employment Monitoring
CFR	Community Fish Refuge
CI	Conservation International
CIP	Commune Investment Plan
DAD	Department of Aquaculture Development
EMMP	Environmental Mitigation and Monitoring Plan
FAO	Food and Agriculture Organization
FF	Fauna and Flora
FiA	Fisheries Administration
FiA-C	Fisheries Administration Cantonment
FIES	Food Insecurity Scale
FISH	CGIAR Research Program on Fish Agri-Food Systems
GFA	German Consulting Group
GIZ	German Corporation for International Cooperation
HURREDO	Human Resource and Rural Economic Development Organization
IIRR	International Institute of Rural Reconstruction
IUCN	International Union for Conservation of Nature
IUU-F	Illegal, Unreported and Unregulated-Fishing

IWMI	International Water Management Institute
M&E	Monitoring and Evaluation
MAFF	Ministry of Agriculture, Forestry and Fisheries
MUSEFO	Multisectoral Food and Nutrition Security
OAA	Other Aquatic Animals
PDAFF	Provincial Department of Agriculture Forestry and Fisheries
PLA	Participation Learning Action
RFF	Rice Field Fisheries
RFFII	Rice Field Fisheries 2
SAFR	Sustainable Aquaculture and Community Fish Refuge Management
SAFR-CFR	Sustainable Aquaculture and Community Fish Refuge Management-Community Fish Refuge
SIS	Small Indigenous Fish Species
SO	Strategic Objective
TA	Technical Assistance
USAID	United States Agency for International Development
VHSG	Village Health Support Group
WASH	Water, Sanitation and Hygiene
WCS	Wildlife Conservation Society
ZoI	Zone of Influence

# 1. Executive summary

---

The Sustainable Aquaculture and Community Fish Refuge (SAFR) project, which falls under the German Federal Ministry for Economic Cooperation and Development's (BMZ) Transformation of Agricultural and Food Systems initiative, aims to reduce poverty and hunger. Under the initiative, the BMZ launched its Global Programme Sustainable Fisheries and Aquaculture with the goal of improving the availability of fish products for food insecure people in Asia, Africa and Southeast Asia and increasing both employment and incomes. The program established projects in seven countries: Cambodia, India, Madagascar, Malawi, Mauritania, Uganda, and Zambia.

One of the projects is the Cambodia SAFR Intervention, which has three components: (1) sustainable aquaculture, (2) community fish refuges and (3) policy support for aquaculture and fisheries in the country. As part of its efforts, SAFR helped the country's Fisheries Administration (FiA) to achieve the establishment of 1200 CFRs. The aim was to increase fish production, create jobs and generate income from environmentally friendly rice fields for food insecure Cambodians. With more than EUR 1 million in funding from BMZ and the German Corporation for International Cooperation (GIZ), WorldFish implemented the CFR component of the project (SAFR-CFR component) to establish and improve 21 CFRs in the province of Kampong Thom.

WorldFish partnered with the local nongovernmental organization (NGO) Akpivath Neary Khmer Organization (ANKO). Together, they implemented the SAFR-CFR component of the project using three approaches: (1) improve the CFR and its environment, (2) scale out best practices for CFR management and nutrition, and (3) build the capacity and raise awareness of CFR management among communities and local authorities. The project began in December 2020 and was set to conclude in March 2024.

## 1.1. Main outcomes

**Goal:** Cambodia's food insecure population has improved access to more fish and fish products and has increased incomes from using resource friendly rice field fishery (RFF) systems.

**M1: The project increased the quantity of fish and other aquatic animals (OAAs) from sustainable rice field fishing that are available to food insecure Cambodians.**

**Baseline:** 1.48 million kg, **Target:** 2.055 million kg

The total amount of fish and other aquatic animals caught from rice fields was 2,094,695 kg increased 614,695 kg, equivalent of 42% from 1.48 million kg of the baseline.

CFR Zone of Influence (Zoi) provided fish and OAA around from 89 kg to 104 kg per hectares in the baseline of year 2021 and end line of year 2023, respectively.

**M2: The project increased the total annual incomes of men and women from sustainable rice field fish value chains.**

**Baseline:** KHR 21.653 billion, **Target:** KHR 24.077 billion

The total annual incomes of women and men working in these value chains reached KHR 3,045,384,662. (increased 14% from the baseline).

**M4: The proportion of regulated and reported the wild fish catch accounted for by artisan fishing from rice fields in Kampong Thom rose and was transparently regulated and reported.**

**Baseline:** 0 kg of the wild catch in 21 CFRs, **Target:** 3.6 million kg of the wild catch in 21 CFRs

A total of 3,748,480 kg of wild fish were caught in underregulated and reported fishing (104% of the target).

**Outcome 1: “More fish, more work”: Capacity development measures were implemented with the objective of boosting the availability of fish and OAA and increasing incomes.**

**A1: Twenty-one CFRs in Kampong Thom increased the amount of fish in surrounding rice fields.**

**Baseline:** 2,400,000 kg, **Target:** 3,677,446 kg

By the end of February 1,348,480 kg of fish had been caught in surrounding rice fields, which increased double (56%) to the baseline.

**A3: SAFR increased the number of jobs for women and men in the fish value chain.**

**Baseline:** 3,673, **Target:** 3,703

The project invested in capacity building and interventions to improve the physical environment of the CFRs, which is likely to increase the amount of fish in the CFR-RFF systems. This also increased jobs for 44 full time jobs for women and men along the value chain.

**A5: Communities in Kampong Thom applied the organizational and fisheries management practices that they developed or learned.**

**Baseline:** 0 communities (0 people), **Target:** 21 communities (220 people)

In 2023, 21 communities, with a total of 183 committees members, including 52 women, applied what they learned from the project. These committees applied on average 63% of CFR-RFF management practices, 71% of patrolling activities, 88% of CFR governance or organization rules, and 67% of CFR bylaws (Annex). All 21 CFR communities improved their diet and nutritional well-being by consuming more fish than before the project, reaching a total of 29,530 people against a baseline of 7,300.

**Outcome 2: “Sustainable fish”: SAFR improved the political framework and enabling environment for implementing sustainable and resource friendly aquaculture and RFF conservation in Cambodia and supported advisory and service providers to develop their services in a needs-oriented way.**

**B1: The experience of the project was fed into agreed-upon targets set by Cambodian government institutions for sustainable and resource friendly aquaculture and/or fisheries.**

**Baseline:** 0 guidelines, **Target:** 2 guidelines

Two guidelines—one on fish stocking and the other on fish patrolling—were endorsed by FiA.

**Outcome 3: “Fewer fish from IUU-F”: The incidence of illegal, unreported and unregulated-fishing (IUU-F) in the CFRs and nearby rice fields decreased through the establishment of an effective monitoring and supervision system for rice field fishing.**

**C1: SAFR increased the number of community inspections to supervise compliance with agreed-upon bylaws.**

By the end of January 2024, the patrol team had conducted 1 142 inspections, which represents almost double of the project’s target of 600 inspections.

**C2: Committees made decisions on regulating rice field fishing using a transparent procedure.**

The 21 committees made 21 decisions on their respective CFRs, reaching the project’s target. These decisions related to (i) development of community bylaw and internal regulation (ii) the development of a 3-year community action plan for each CFR, including types of activities brought to the action plan and when and where they were fundraised and (iii) patrolling, including solutions for illegal offenses, number of inspections and patrol times.

## 2. Introduction

RFF systems not only provide a diverse ecosystem of aquatic species that extends across flooded rice fields with the onset of rain during the rainy season—they are also a free source of nutritious food for many people. Nearly one third of inland fisheries production in Cambodia comes from RFFs, representing a total supply of about 158,700 metric tons (FiA 2017). However, this important natural resource is under threat from overfishing, drought from climate change, and environmental degradation, and it can only be sustained through proper management.

Cambodia's FiA is in the process of establishing 1200 CFRs throughout the country. The aim is to protect and enhance the productivity of RFFs. As of 2022, FiA had established 915 CFRs. The CFRs are natural or human-made ponds, designated in whole or part of a waterbody, where fishing is prohibited and where communities apply various management measures to improve fisheries production and enhance biodiversity. During the rainy season, fish and OAAs migrate from the CFRs into surrounding rice fields and associated habitats to breed, spawn and grow. RFF systems include CFR ponds, fish migration paths (natural or constructed channels) as well as rice fields and associated habitats (such as patches of swamp, small watercourses and ponds)—all of which are mainly seasonal places where people can harvest fish.

Between 2020 and 2024, with the financial support of BMZ through GIZ, WorldFish implemented the SAFR-CFR component of the project to improve the management of the 21 CFRs in Kampong Thom, one of the provinces in the Tonle Sap floodplain. The project was based on the 10 years of experience of the Rice Field Fisheries 2 (RFFII) project of the United States Agency for International Development (USAID). The SAFR-CFR component was designed for three purposes:

1. Build on the achievements and lessons learned during the RFFII project.
2. Scale out best practices in CFR management to improve food and nutrition security for the poor.
3. Increase community resilience to the impacts of climate change.

The SAFR-CFR component aimed to improve the accessibility of Cambodia's food insecure population to more fish and fish products and to increase their incomes using the resource friendly RFF system. It did so by improving the CFR-RFF environment, building the capacity of partners and communities, scaling up sustainable CFR management approaches to suitable RFF environments and supporting policy development.

The project had five main objectives:

1. Establish new CFR sites and improve existing ones.
2. Assess the CFRs and build the capacity of CFR committees to manage them.
3. Scale out a sustainable CFR management approach for suitable RFF environments.
4. Improve knowledge and awareness of CFR systems and other community-based fisheries management mechanisms.
5. Review regional rice-fish innovations and briefs on rice-fish investment and policy in Cambodia.



**Plate 1.** Harvesting snakeheads from a rice field pond in Kampong Thom.



### 3. Summary report

---

From November 2023 to March 2024, SAFR completed the following activities (these were not captured in the previous report, which ended in October 2023):

- Assess the capacity of the 21 CFR committees between December 2023 and January 2024. This was the endline assessment of the project and was intended to measure the capacity of the committees after they had received a year of support.
- Conduct refresher training on CFR management for 21 CFRs by the end of November 2023.
- Provide coaching to the 21 CFR committees on technical field activities to improve their CFR systems, build networks, improve practices for raising funds finding voluntary labor and acquiring materials and inputs from other stakeholders, and make key physical improvements to CFRs between December 2023 and March 2024.
- Provide refresher training to village health support groups (VHSGs) and caregivers on nutrition and water, sanitation and hygiene (WASH) practices in January and February 2024.
- Conduct the final biological monitoring (BiOM) and catch consumption and employment monitoring (CCEM) surveys in December 2023 and January 2024, respectively.
- Co-organize the project's provincial reflection workshop with the SAFR, GFA teams, ANKO and HURREDO partners. Which was held on 19-20 March 2024 in Kampong Thom province.
- Research and write papers related to the project, including CFR lessons learned, a policy brief, stocking guidelines, patrolling guidelines, a project information factsheet and the final report.
- Link producers of small fish powder to a group of local agriculture producers, relevant local authorities (at both the national and subnational levels) and caregiver groups of Multisectoral Food and Nutrition Security (MUSEFO) project and other nutrition projects through training, exhibitions, fairs and networking.
- Support remaining interventions for digging Boeng Meas CFR and provide patrolling materials.
- Host a field visit for the deputy director of the Department of Aquaculture Development (DAD) and their team to learn how to assess the capacity of CFR committees and to monitor interventions before the project closes.
- Coordinate with GIZ and the consultant team to evaluate the end of the project.
- Host a field visit for 38 CFR committees from 9 provinces across Cambodia, and FiA-DAD to learn the management and conservation of fisheries resources at four project CFRs.

## 4. Final summary report

**Goal:** Cambodia’s food insecure population has improved access to more fish and fish products and increased incomes from using resource friendly RFF systems.

### 4.1. Outcome 1

**“More fish, more work”: Capacity development measures were implemented with the objective of boosting the availability of fish and increasing incomes.**

**Indicator: A.1:** A total of 21 CFRs in Kampong Thom increased the availability of fish in surrounding rice fields.

**Target:** 3,677,446 kg/year

By the end of the project, annual fish production from the CFRs increased 1,348,480 kg, equivalent of 56% compared to baseline of 2,400,000 kg.

**Indicator: A3:** Jobs in the fish value chain were created for both men and women.

**Target:** 3703 full-time equivalent jobs

By end of the project, jobs were created for 44 women and men along the value chain, which increased from 3,673 jobs of the baseline to 3717 jobs.

**Indicator: A5:** Communities in Kampong Thom applied the organizational and fisheries management practices that they developed or learned.

**Target:** 220 people

By end of the project, 21 communities, with a total of 183 committees and members, including 52 women, applied what they learned from the project.

**Custom indicator:** Ten CFR communities in Kampong Thom improved their diet or nutritional well-being and were consuming more fish than before the project’s interventions.

**Target:** 7300 (45% males, 55% females)

Ten CFR communities improved their diet/nutritional well-being by consuming more fish than before the project, reaching a total of 29,530 people, more than four times the target.

Key outputs	Target	Result	Status
1.1a Increase the knowledge of the committees for 21 CFR communities to sustainably manage CFRs.	21	21	Achieved
1.2a Improve CFR management capacity scores.	20%	100%	Achieved
1.2b Increase the percentage of CFR committees that have implemented at least three high priority activities.	80%	100%	Achieved
1.3a Increase the number of people who attend awareness raising sessions.	4,500	4,964	Achieved
1.3b Increase the number of people trained as caregivers (potentially disaggregated by sex and age).	217	332	Achieved
1.3c Strengthen the business management capacities of 10 entrepreneurs who produce small fish powder.	10	10	Achieved
Establish 21 CFRs and register them officially with the provincial department of agriculture, forestry and fisheries (PDAFF).	21	21	Achieved
Provide training of trainers to 70 people, including 32 women, in CFR establishment and management.	42	70	Achieved
Train 718 CFR committees and local authorities, including 232 women, in CFR management.	470	718	Achieved
Develop action plans for 21 CFR communities.	21	21	Achieved
Provide coaching in field technical support to 1727 people, including 341 women.	1,422	1,727	Achieved
Train 10 producers of small fish powder.	10	10	Achieved
Develop separate guidelines for stocking and patrolling and have them endorsed by the director general fisheries administration to allow people to use them publicly.	2	2	Achieved
Select 21 CFR sites.	21	21	Achieved
Integrate 60 activities into 19 communities.	41	60	Achieved

**Table 1.** Key outputs of the project.

## 4.1.1. Output 1: Capacity building

### 4.1.1.1. Select sites

This was proposed by the PDAFF and Fisheries Administration Cantonment (FiA-C) at the provincial level as well as local authorities, such as the commune and/or village chief and villagers who were interested in establishing and strengthening CFRs. The project team (GiZ, FiA-C and FiA/DAD) visited 33 sites at the beginning of the project in 2021 and the extension phase in 2023. Of these 21 CFRs were selected, the main criteria for site selection is based on [CFR manual](#).

### 4.1.1.2. Collect data and map zones of influence

Primary data for the 21 CFRs was collected in a participatory manner with key local villagers and local authorities who have extensive experience in fisheries. The data was used (i) as a baseline to develop spatial CFRs by using GiS Arcmap and CFR maps and (ii) to develop project intervention plans to improve the fish habitat of the CFRs and build the capacity of committees and communities. Key data consisted of the number of households, number of fishers and fish value chain actors, number of villages, size of the rice field, way points of CFR ponds, location of the CFRs (latitude and longitude), the size and depth of each CFR during both the dry and rainy season, and the number of villages in the zone of influence (ZOI). Villages in the ZOI were identified according to how far the fish migrated, as indicated by fishers and/or villagers with extensive experience (Annex).

### 4.1.1.3. Conduct an inception workshop at the provincial level

Because of the COVID-19 pandemic, SAFR did not organize an inception workshop in 2021 in Kampong Thom, as planned. Instead, the project joined a virtual inception workshop that it organized in October 2021. The manager presented the objectives of the project, workplan and target areas, as well as progress made at the time of presentation. Many high level government counterparts participated in the workshop: the director general of FiA, the director of aquaculture development, the country director for GiZ, the vice governor of Kampong Thom, the chief of PDAFF and the chief of FiA-C, as well as other development partners, such as the Food and Agriculture Organization (FAO).

### 4.1.1.4. Conduct an inception meeting at the village level

For its extension phase, SAFR held a village inception workshop in 2023 with 11 CFRs. The purpose was to lay out its goal, objectives, donor support and main activities. Because of restrictions during the COVID-19 pandemic, SAFR was not able to organize workshops for the first 10 CFRs, so instead the project integrated its objectives and main activities into community training.

### 4.1.1.5. Build capacity

In February and October 2021, WorldFish's project team provided training to 70 participants, 28 of whom were women, representing FiA, DAD, FiA-C and ANKO. Training focused on five main topics: (1) CFR site selection, (2) steps for establishing CFR committees, (3) CFR capacity assessment, (4) development of a 3-year community plan and (5) training of trainer on CFR management. The last of these equipped staff of partner organizations to be able to provide training to CFR committees and local authorities at later stages of the project.

Results from tests administered before and after the training indicated that all trainees improved their knowledge significantly. Only four trainees scored over 50% on testing prior to the 3-day training, but all of them did so after it, with six achieving a score of "good" and five of "very good." (see table 2). The trainees' overall assessment suggested that they were satisfied with the efficiency and technical skills of the trainers, the content, the methodologies and the materials, though many did mention that the training room was small. In addition, the trainees appreciated the German government's support for covering the cost of training and providing them an opportunity to gain this unique knowledge.

### 4.1.1.6. Elect CFR committees and develop bylaws

To establish the 21 CFR committees, SAFR organized 39 meetings, with participation from 1,358 people, 625 of whom were women. In cooperation with the project team, FiA-C led the process for establishing the CFRs, including the development of bylaws and internal rules, as well as election of the CFR committee. Villagers and local authorities, including commune chiefs/councils and village chiefs, were both involved in the process. The first batch ran from September to November 2021, and the extension phase lasted from April until June 2023.

Score	Number of participants		Percentage	
	Before training	After training	Before training	After training
9–10 (very good)	0	5	0%	45%
7–8 (good)	0	6	0%	55%
5–6 (acceptable/average)	4	0	36%	0%
< 5 (fail)	7	0	64%	0%
Total participants	11	11	100%	100%

**Table 2.** Test results from training provided to FiA-C and ANKO staff in Kampong Thom.

#### 4.1.1.7. Recognize registered CFR committees

The 21 CFR committees were officially registered for a 5-year term by a series of hierarchically relevant local authorities, including the village chief, commune chief, district governor, chief of FiA-C and the chief of PDAFF. A total of 183 people, including 52 women, served on the committees on a voluntary basis, including roles as chief and vice chief of their committee, patrol members, awareness raising educators, accountants, cashiers communication members, and planners.

In keeping with the committees, SAFR officially registered 21 CFR bylaws. The project made four copies per CFR and shared them with FiA, DAD, PDAFF, the CFR committees, and ANKO/WorldFish.

#### 4.1.1.8. Assess the capacity of the CFR committees

Over the life of the project, SAFR conducted baseline and endline assessments with the 21 CFRs to measure the change in the committees' capacity to manage their CFR community before and after the intervention. The baseline was conducted in early 2021 and the endline in December 2023. Key people invited to participate in the assessments were classified into three groups: (1) a group of local authorities, (2) villagers and (3) the CFR committee. Up to 10 people were in each group.

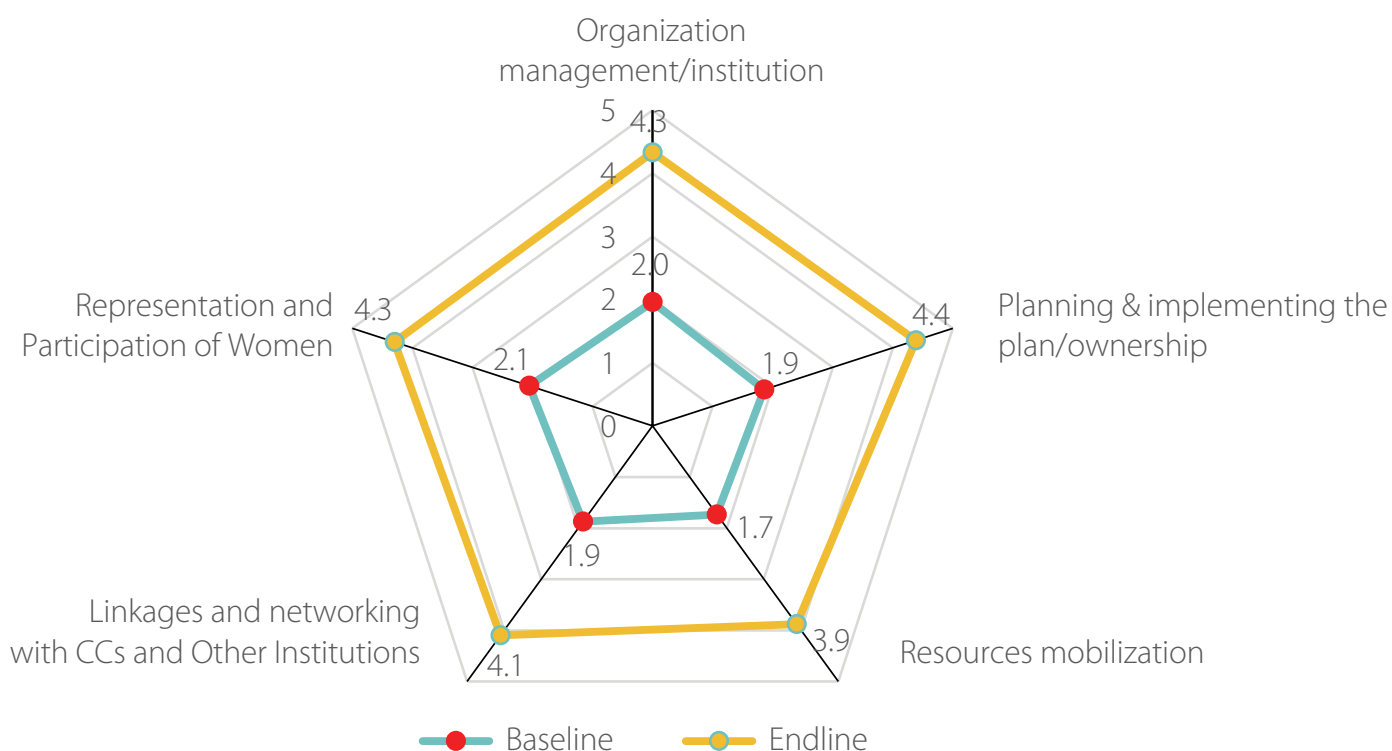
Thanks to the capacity building, intensive class training, hands-on training and technical field advice that SAFR provided, the endline result shows an enormous improvement of the committees to manage the CFRs. Overall, the committees scored 4.2 on their endline assessment—more than a twofold increase over the baseline of 1.90 (Figure 1.) A total of 757 people, including 272 women, participated in the assessments.

However, the first 10 CFRs scored 1.23 lower than the last 11 CFRs (2.46) according to the baseline, as the latter CFRs were more recently established. Based on the capacity assessment result, the project developed training plan to train all 21 CFR committees. A total of 718 people, including 232 women, received intensive training from SAFR. Participants consisted of local authorities, members of CFR committees, fishers and villages guards, and the topics focused on how to manage, patrol and stock fish in CFRs. After the training, participants had a better understanding of CFR management and what is involved in it, including how to measure water quality, how to raise funds, how to conduct effective patrolling and how to implement CFR bylaws. The project team used various training methods, such as field practice, videos and posters, which helped the participants understand and enjoy the training. As a result, trainees from the newest 11 CFRs scored 8.15 out of 10—more than three times higher than their pretraining score of 2.31 (Figure 2). A perfect score of 10 is considered excellent, while 1 is deemed very poor. The oldest 10 CFRs scored 2.78 before the training and 9.11 after it. Some participants from the newest 11 CFRs received low scores because some members were new and were just elected for the current mandate.

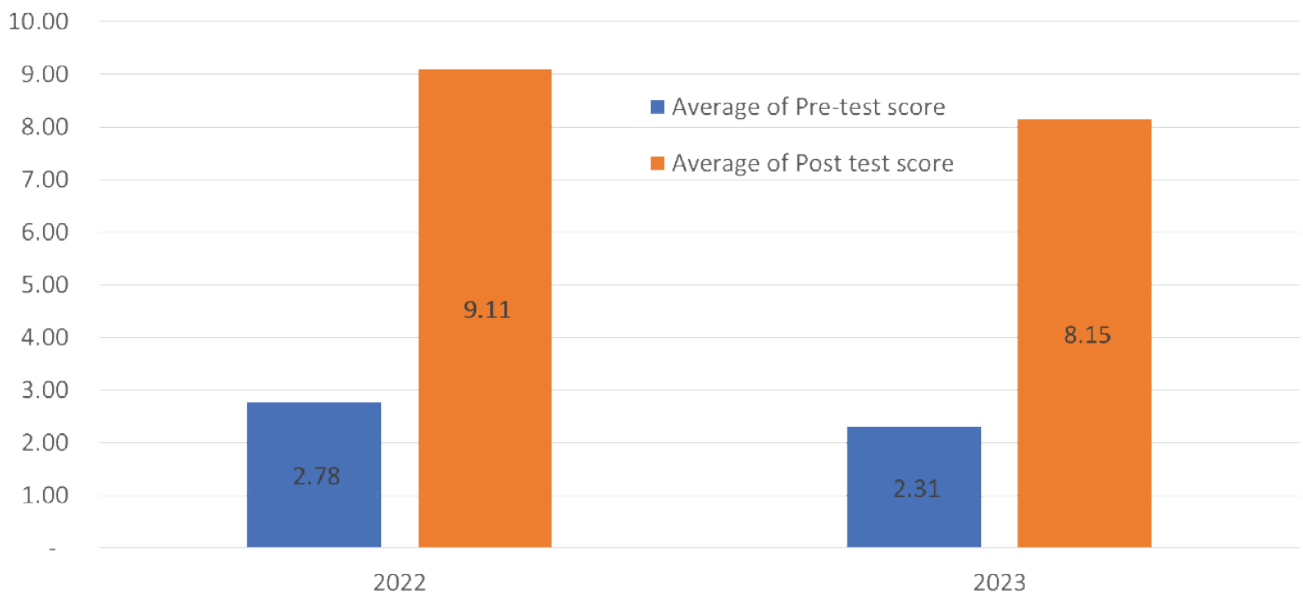
To retain local resources in the communities, 10 people selected from 10 CFR committees were provided comprehensive training in knowledge transfer on October 19, 2023. Using their training, they were able to raise awareness on CFR management within their community and hold other training events. Based on their capacity and practical experience with the project, they became potential trainers themselves, who can now provide training about CFR management to communities in the future. Four of the trainees acquired basic computer skills and were given computers. They also received intensive training on how to use them to, for example, type documents, organize files and folders and use email.

Criteria	Description
Organization and management/institution	<ul style="list-style-type: none"> <li>Number of meeting organized</li> <li>Facilitation of meetings</li> <li>Participatory nature of decision-making</li> <li>Role and responsibility of committees</li> </ul>
Planning and implementation/ownership	<ul style="list-style-type: none"> <li>Development of an action plan</li> <li>Implementation of the action plan</li> <li>Ability to solve problems</li> <li>Planning</li> <li>Implementation benefits to the poor</li> </ul>
Resource mobilization	<ul style="list-style-type: none"> <li>Application of fundraising methods</li> <li>Use of proper bookkeeping for funds raised</li> <li>Amount of funds raised</li> </ul>
Links and networks with other institutions	<ul style="list-style-type: none"> <li>Ability to network with stakeholders</li> <li>Integration of the action plan into the commune investment plan (CIP)</li> <li>Attended meetings with commune councils</li> </ul>
Representation and participation of women	<ul style="list-style-type: none"> <li>Proportion of women's participation and decision-making in CFR committees</li> <li>Level of respect among men's committees for the role of women's committees</li> </ul>
Score (1–5)	<ol style="list-style-type: none"> <li>very poor</li> <li>poor</li> <li>medium</li> <li>good</li> <li>excellent</li> </ol>

**Table 3.** Criteria for baseline and endline assessments of the CFRs.



**Figure 1.** Results of the CFR capacity assessments.



**Figure 2.** Test results for CFR-RFF management training of CFR committees.

In addition, all 21 CFRs committees received refresher training and coaching on a wide range of topics in two areas: (i) improving governance, which included fundraising, bookkeeping, community meetings, meeting minutes, the integration process and patrolling and (ii) making physical improvements to their CFRs, which included monitoring water quality (water temperature, dissolved oxygen levels, turbidity) and learning how to conduct an Environment Mitigation Monitoring Plan (EMMP) before, during and after project interventions.

A total of 21 CFR community action plans were developed for the 3-year periods of 2021–2023 and 2024–2026. The purpose was for them to serve as roadmaps for continued implementation. The following are the main activities proposed in the plans for each CFR:

- fundraising
- maintaining and renovating the guardhouse
- patrolling the CFR
- participating in monthly commune meetings
- repairing inlets and outlets
- deepening part of the CFR and canal
- installing a dead tree trunk or branch
- placing waste bins
- planting flood-resistant trees and aquatic plants
- installing solar lights and video cameras for patrolling

- installing signboards to raise awareness of cleaning and conservation of CFRs
- installing demarcation poles
- conducting a clean-up day campaign
- stocking fish
- strengthening the capacity of CFR committees
- removing excess aquatic plants
- repairing the road that connects the CFR to the villages.

#### 4.1.1.9. Conduct a status assessment

In 2007, the prime minister of Cambodia announced the intended establishment of CFRs in each commune. Since then, a total of 925 CFRs have been established through partnerships between development organizations and the Royal Government of Cambodia, led by FiA. However, no major assessments have been conducted since then. Upon request by FiA and DAD, under the EU's CapFish-Capture project in partnership with FAO, WorldFish received funding under the SAFR-CFR component to assess 578 CFRs covering 62% of all CFRs across Cambodia. The assessment commenced from January to April 2023 covered eight provinces: Kampong Speu, Prey Veng, Svay Rieng, Banteay Meanchey, Pursat, Battambang, Siem Reap and Kampong Thom. The last four are located in the Tonle Sap region and have received support from USAID for the past 10 years and GIZ for the past three years.

The objective of the assessment was to determine the current status of each CFR—from the physical CFR itself, to the resources, establishment, capacity building, bylaws, management committees, management plans and infrastructure development. The results were as follows:

- 1. General status:** Fishing remains the main activity for the target provinces, impacting the livelihoods of 1.3 million people in 1222 villages. Although the project potentially benefits 494,000 ha of rice fields, a proposal from FiA-C to cancel 182 CFRs is up for debate and could affect as many as 77,384 households in 374 villages. This proposal argues that these CFRs have become ineffective because of poor management, physical changes and overlap with community conservation sites. However, FiA will make a final decision.
- 2. Legal status:** Seventy-six percent of all CFRs were established using bylaws to guide their governance and operation. The highest proportion of bylaws were in Siem Reap and Kampong Thom, where USAID and GIZ fund projects, while the lowest were in Prey Veng and Kampong Speu, which received no project support. The assessment shows that without bylaws CFRs tend to be ineffective and ultimately lead to poor functioning. About half all CFRs were registered 10–15 years ago. The provinces where USAID and GIZ supported projects over the past 12 years contains the highest proportion of CFRs registered in the past 5 years, such as the 72% of CFRs in Kampong Thom.
- 3. Management of committees and capacity:** Seventy-four percent of the CFRs were established with management committees, the existence of which is correlated with formulating CFR bylaws. Provinces around the Tonle Sap region continue to have the highest proportion of CFRs with management committees, most of which were established 10–15 years ago. Kampong Thom has the highest ratio of management committees established in the past 5 years. The number of women on the committees varies from zero to nine, and on average women make up about 20% of total membership. In approximately 65% of these committees, women made up less than a quarter of all members.
- 4. Categories and size:** Most of the CFRs in the eight provinces are community ponds that are not prone to flooding, which accounts for about 56% of all CFRs. The average size of the CFRs is 5 ha during the dry season (April or May) and increases up to about 8 ha in the rainy season (October). During the dry season, the average depth of the CFRs is approximately 2.5 m, the deepest of which are in Kampong Thom. There are also CFRs that dry up during the dry season, especially in Banteay Meachey, Battambang and Kampong Speu. However, some of these CFRs still have the potential to resume their functions and are, therefore, classified as valid CFRs.
- 5. General resources:** Almost 70% of all the CFRs reported no support from any sources during the past 3 years, with the highest percentage in Svay Rieng, Kampong Speu and Prey Veng. These three provinces also reported a higher proportion of nonfunctioning management committees, suggesting that these two conditions are significantly crucial for the sustainability of CFRs. Over the past 3 years, 148 CFRs received external funding: about 75% came from development agencies, 17% from government and 14% from commune packages.
- 6. CFR management plans:** Preparation of a management plan for CFR operations was limited. Only 30% of all the CFRs reported having a proper management plan in place over the past 3 years, even though all of them have bylaws. However, there is still quite a number of CFRs that have not received support and have not made efforts to develop such important documents for management and governance. Meanwhile, only about 36% of CFRs with management plans have fully implemented them. The remaining 64% have either partially implemented them or not at all.
- 7. Fishstock status:** On average, 17% of all the CFRs in the eight provinces released breeding stock, while 18% released juvenile fish. On average, 64 kg of broodstock and 5570 fingerlings were released in each CFR that reported such activities.

## **8. Illegal activities and bylaw compliance:**

Thirty-five percent of all the CFRs reported public compliance with fisheries laws and CFR bylaws; only about 16% reported noncompliance. Among the eight provinces, Banteay Meanchey had the lowest proportion of CFRs reporting violations. Patrol efforts had increased in Banteay Meanchey since the establishment of its CFR, suggesting that patrol activities may be correlated with improved compliance with the bylaws and fisheries laws.

**9. Infrastructure development:** About 67% of all the CFRs reported that they did not have structures such as guardhouses or meeting rooms to support their operations. In contrast, about 75% had signboards, one third of which were reportedly in good condition.

**10. Rehabilitation:** Only 2% of the CFRs (9 out of 574) reported having enough support to rehabilitate their pond every year. This suggests that most CFRs likely need rehabilitation. Opportunities for such efforts were reported to benefit from other concurrent efforts and interest from various stakeholders, such as local authorities that had plans to revitalize the ponds to provide income-generating benefits to surrounding communities.

**11. Development benefits:** The most obvious benefits of the CFRs are seen in the improved fish catches by community members in the ZOI. CFRs around the Tonle Sap region contribute more to improving fish catch than provinces outside the region, such as Kampong Speu and Prey Veng. Some of the CFRs lack of support and cooperation between local authorities and communities when it comes to controlling illegal fishing.

**12. Sustainability:** Approximately 64%–70% of the CFRs had plans to improve their environment and management structures. The lack of external support made the CFRs less functional and led to demotivation and resignation among members of the management committees.

## **Discussion**

During the 2000s, the government campaigned to establish CFRs throughout Cambodia. In the

early stage, many of these CFRs had support from both community and external funding sources and efforts. However, they later faded and became disconnected from donor support. Changes in the socioeconomic context have also affected the existence of CFRs, as witnessed in those located in Kampong Speu. The lack of official guidelines and a legal framework for establishing CFRs and their operations, particularly the past 20 years, has had adverse effects on the sustainability of CFRs, especially the capacity to mobilize support.

Strengthening existing CFRs will require huge investments in capacity building to improve management and raise awareness among community members. In addition, funding is also needed to develop infrastructure and improve the biophysical conditions of these CFRs so that they can fulfill their function as refuge ponds and fishing grounds. The CFR enhancement process should also pay attention to active participation of all stakeholders so as to avoid possible conflicts of interest over the use of CFR resources.

## **Conclusion**

The results of the current CFR status assessment are critical to assess the progress made over the past 20 years and to establish a new baseline for existing CFRs that can be used to inform future efforts to strengthen these community-based institutions. There is significant activity and development of guiding documents such as bylaws, internal rules and even management plans, in addition to the necessary investments to rehabilitate ponds. The lists of CFRs proposed for retention and cancellation are not final and are subject to further review at the national level by DAD. Meanwhile, forward-looking strategies need to incorporate new social trends for environmental awareness and will play a crucial role in improving the effectiveness of CFRs.

### **4.1.1.10. Raise awareness on CFR-RFF management**

SAFR organized events to raise awareness among people in CFR villages and those residing in villages adjacent to them. A total of 51 villages, 17 communes and 23 schools were covered. Subjects covered included management, fisheries laws and bylaws, not only among people in CFR villages but also among those in adjacent CFRs in order to spread information over as many areas as possible. These efforts further expanded into areas with ZOI villages based on community reflection



and field observations by staff. The project also received verbal requests from local authorities and community committees to extend the villages into the ZOI based on field observations that most illegal fishers are not from the CFR villages. The awareness raising events, which were conducted in villages and schools, used a project 17.14 minutes video featuring CFRs.

At the end of these sessions, SAFR staff evaluated the knowledge of the participants. Students received a score of 9.6 and villagers 8.7. This means that students understood the content quickly.

Two main subjects were covered. The first was CFR or RFF management and fisheries laws, including an introduction to CFR-RFF systems, how and by whom these systems are managed, making physical improvements to the systems and raising sustainable forms of support. The second was nutrition and WASH practices, which included the types and functions of food groups, the advantage of eating micronutrient-rich small fish, how to process small fish powder, and basic hygiene and sanitation procedures. Participants were shown seven videos on CFR-RFF systems, nutrition, hygiene and banners over the 2.5 hours of each event. There was a total of 4964 participants, 3230 of whom were women, 56 percent of participants were youth (2800 youth, 1686 women included). They encompassed commune councillors, village leaders, CFR committee members, villagers and school students. Through general observations, questions and student drawings of CFRs, most of the participants were able to gain a better understanding of the advantages

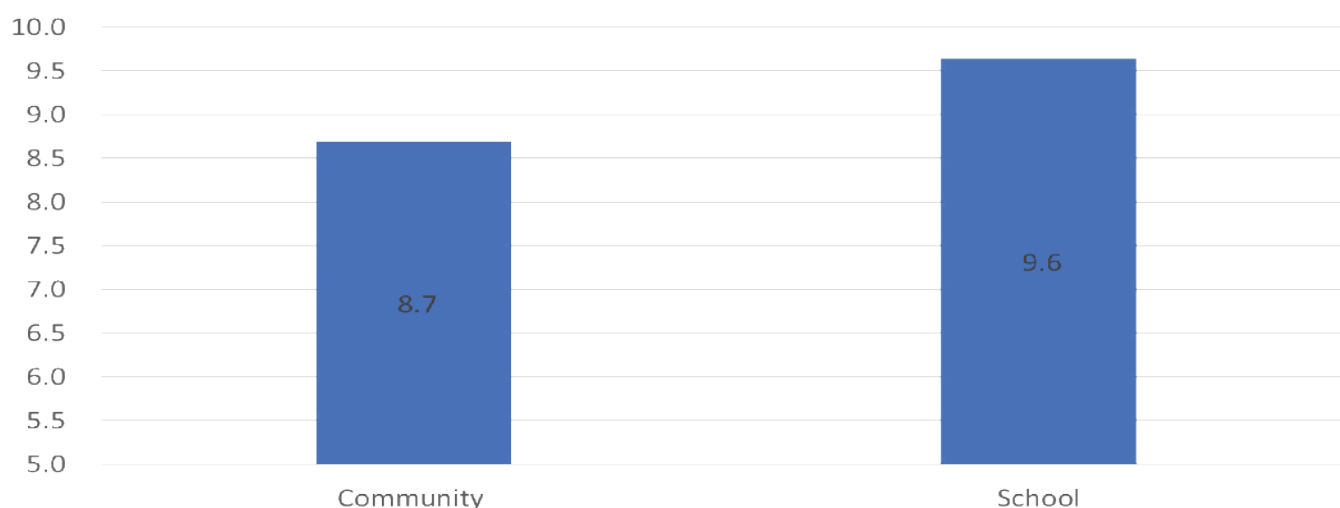
of CFR-RFF systems as well as nutrition and hygiene. At the end of the school event, the students promised to share this knowledge with their family members and others.

After these events, many more villagers began supporting CFR development plans by, for example, participating in cleaning up the CFRs, planting flood-resistant trees, promoting CFR bylaws and reducing fishing activities in prohibited zones of the CFRs. This made it easier to collect CFR memberships and raise funds to support community action plans.

#### 4.1.1.11. Provide ongoing technical field advice to CFR committees

In addition to intensive training in CFR management, SAFR also provided regular coaching sessions to CFR committees on how to implement a management plan. The committees received coaching either monthly or every 2 months, depending on how much time staff had available. Feedback and suggestions for improvement continued throughout the sessions. Thanks to a series of training, the 21 CFR committees were able to raise USD 20,672 organized 42 awareness events of CFR management (Annex).

The project trained the CFR committees in EMMPs and applied relevant EMMPs (Annex) to CFR intervention activities, and selected private companies complied with the plan. As a result, CFR committees achieved numerous community interventions: two guardhouses were renovated, CFRs were made 23,558 m<sup>3</sup> deeper, 67,630 m<sup>2</sup> of excess aquatic plants were removed.



**Figure 3.** CFR-RFF scores among villagers and students (2022–2023).

#### 4.1.1.12. Conduct nutrition and WASH training for partner staff and VHSGs

SAFR trained 16 VHSGs on nutrition and WASH practices. Figure 4 shows the average test scores for partner staff members who participated in a nutrition and WASH training program.

#### 4.1.1.13. Conduct training for caregiver groups

Over the course 64 events, a total of 332 caregivers, 99% of whom were women, received training from the project on house cleaning, nutrition, WASH and a household visioning map. Based on direct observations from the trainers, many caregivers improved their knowledge about nutrition and WASH significantly.

#### 4.1.1.14. Raise awareness of of nutrition and WASH among communities

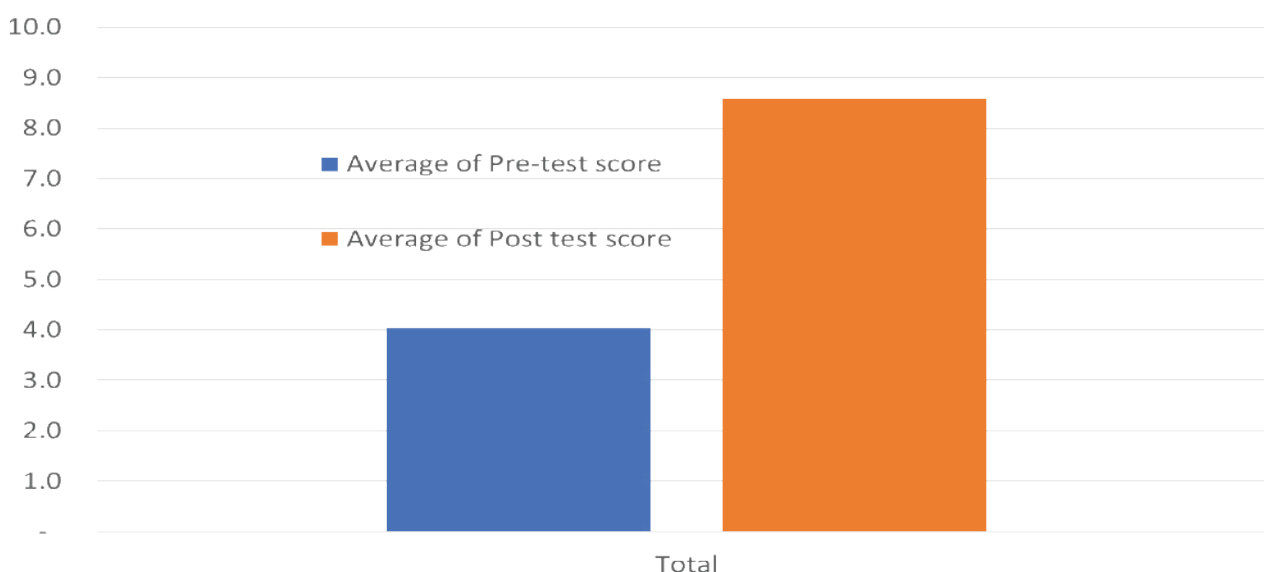
SAFR held events for 4,964 community members in local villages in order to raise awareness of nutrition and WASH. According to responses to questions during these events, 90% of the participants did not know the importance of small fish, as they usually remove the head and organ before cooking small fish even though the head (60%) and organs (39%) are the parts highest in micronutrients. As such, facilitators emphasized the advantages of eating small fish whole. These events could help the project spread and clarify key information and fix incorrect practices among villagers.

#### 4.1.1.15. Hold VHSG meetings

SAFR organized meetings with VHSGs every semester during 1-year extension phase. The goal was to follow up on the progress of caregiver groups regarding nutrition and WASH practices. The meetings were open to all participants to discuss their upcoming plan and receive technical advice from SAFR to strengthen their capacity and gradually take over the work of the project.

Meetings were held on May 23 and October 17, 2023, at the pagoda in Kampong Svay District and at ANKO's office in Kampong Thom. About 24 people, 16 of whom were women, received training at the beginning of the project, including 14 VHSGs and 10 small fish producers. The caregivers reported their progress in nutrition and WASH practices, while businesses relayed their progress and challenges in making small fish products.

According to the VHSGs, most caregivers consumed more fish and ate a diverse diet that included locally available resources, such as pumpkins, green vegetables and small fish. They also followed WASH practices. Some caregivers gave their children food from three different types of food groups and practiced active feeding. VHSGs are members of the commune responsible for promoting nutrition and WASH in their commune and villages. In 2022, the project supported 332 caregivers.



**Figure 4.** Test results on nutrition and WASH among partner staff and VHSGs.

#### 4.1.1.16. Train VHSG volunteers

In 2022 the project trained 16 VHSG volunteers, who continue to coach caregivers. Key topics included three types of food groups, hand-washing before and after feeding, active feeding, house cleaning and the advantage of eating small fish. As they had already been trained by many projects on similar nutrition and WASH topics, VHSG volunteers received additional training on the micronutrient content of small fish and how to consume and process them. They were also equipped with plenty of training materials.

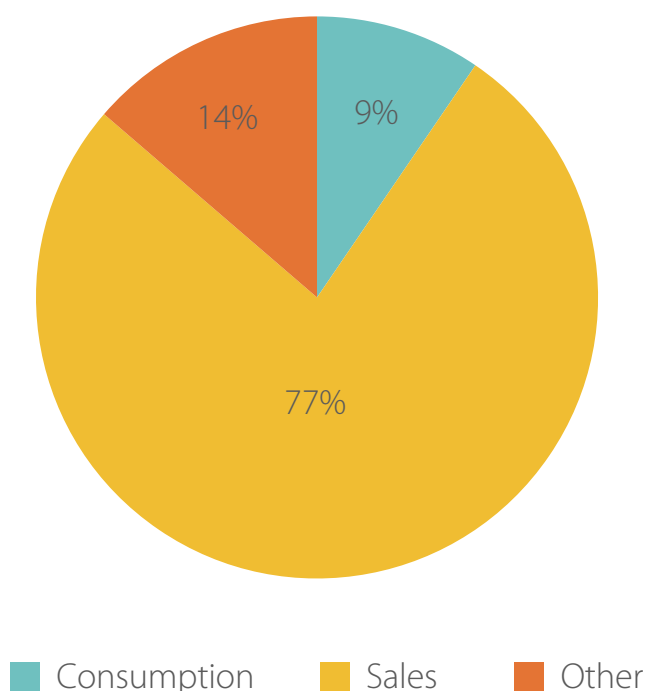
Mrs. Cha Channy is a VHSG at Boeng Ream CFR who is now responsible for training and following up on the progress of 15 caregivers. In reflecting on how to improve the future of the project, she recommended that SAFR include home vegetable garden activities for caregiver groups and promote small fish through a nationwide TV program to raise awareness among all mothers. By doing so, mothers would consume more nutritious vegetables and micronutrient-rich small fish and save money by not buying vegetables and wasting small fish.

#### 4.1.1.17. Processing small fish powders

After receiving training in July 2022, 10 producers of small fish powder processed a total of 745 jars of fish powder. Of these, they sold 572 jars, consumed or restocked 71 jars and donated 102

to their neighbors. These producers prepared a 6-month production plan and sales plan, as well as a marketing plan to promote their products through the VHSGs, telegrams, Facebook and word of mouth. Challenges they faced included a lack of promotional materials in the villages and insufficient fresh small fish during the dry season. To address these challenges, SAFR printed 20 A0 posters and 50 A4 leaflets for the producers. Messaging on the promotional material focused on the advantages of micronutrient-rich small fish, how to cook small fish and how to process fish powder. Project staff created two Facebook groups: one for the 10 small fish powder producers and the other for 44 caregivers.

Two small fish producers produced more than 60% of the total amount of powder, and they have ambitions to develop their products further by producing and selling more to people inside and outside of their provinces. Meanwhile, the rest of the producers continue to produce and sell powder in their villages and community and will supply powder to the two main producers whenever demand is high. In some areas, there was a lack of fresh small fish, specifically during the dry season. Others places had plenty of fresh small fish, but they had been stored improperly and were not processed in a timely fashion because the current traditional drying method takes a long time. As this product is still new to many people and mismatched with demand, sales remain low.



**Figure 5.** Percentage of use of fish powder produced (2022–2024).



**Plate 2.** Mrs. Chea Seng Han, a small fish producer, displays fish powder at a fair in Kampong Thom in October 2023.

To solve these issues, the producers are searching for a prototype of a drying machine. A pilot machine is expected to help producers to increase the quantity of products, improve the quality of their powder and save them time, especially when cheap fresh small fish are available in bulk during the rainy season, which is the peak season of the year. In addition, SAFR linked the producers to two events, where they were able to promote their homemade products: (1) a national workshop on CFRs and community fisheries organized by the Ministry of Agriculture, Forestry and Fisheries (MAFF) on June 19, 2023, in Phnom Penh, and (2) a provincial Food Day Fair organized by Action Aid on October 24, 2023, in Kampong Thom. During these events, the producers promoted their products and sold a total of 20 jars of fish powder, earning them KHR 200,000 in gross income. These events aim to promote local agriculture products made by villagers after the disruption of the COVID-19 pandemic over the past few years.

In addition, SAFR advised producers to refine their products and improve quality in order to diversify products made of small fish, such as processed powder, dried fish and different types of fermented fish (*mum, prahok, Trey prai*) and to bring these products to supermarkets.

As there are not enough fresh small fish available during the dry season, SAFR proposed piloting small fish species culture or aquaculture. In September 2023, two project staff went to WorldFish India to study successful culturing of small indigenous species (SIS) of fish, and the project is now planning to scale it out in Cambodia.

#### 4.1.1.18. Train producers on how to process small fish powder

To provide micronutrient-rich small fish to caregiver groups and help producers generate income, SAFR selected and trained 10 small fish producers from seven CFRs for a pilot. Key topics included (i) an introduction to small fish powder and its advantages, (ii) how to process it to maintain quality, (iii) developing a business plan, (iv) processing small fish powder, (v) basic quality and food safety measures, such as hygiene and storage, and (vi) sales and marketing. Before (4.13) and after (8.78) test results from the training showed that trainees had increased their knowledge. For the first 3 months, participants produced small fish powder and developed business. The plan consisted of having a business objective, starting date,

tasks, planning expectations, and resources needed to produce the powder, including the necessary capital and equipment.

#### 4.1.1.19. Create an exit strategy and sustainability plan

In 2022, SAFR developed an exit strategy to implement the project in a sustainable way and prepare to hand over its achievements to the communities and local authorities, including commune councils, district governors, FiA-C and FiA/DAD.

### 4.2. Outcome 2

“Sustainable fish”: Strengthen the political framework and enabling environment to implement sustainable and resource friendly aquaculture and RFF conservation in Cambodia

**Indicator B1:** The experience of the project is fed into agreed-upon targets set by Cambodian government institutions on sustainable and resource friendly aquaculture and/or fisheries. Target value: 2.

The project developed four documents based on previous experience of implementing CFRs:

1. stocking guidelines
2. patrolling guidelines
3. key lessons and priority research and investments for CFR-RFFs
4. rice-fish co-production pathways for sustainable development in Cambodia.

#### 4.2.1. Output 2: Improve knowledge and awareness of CFR systems and other community-based fisheries management mechanisms.

The aim of this output was to engage relevant organizations at the central and national level around strategic, legislative, policy and wider programmatic support for good management of CFR-RFF systems in Cambodia.

Nearly every year, Cambodia faces either flooding or drought. To reduce the risk that CFRs face, SAFR staff included capture fisheries and aquaculture in developing a digital climate service, using the Asian Mega Deltas (AMD) Work Package 3 from a strategy meeting held in Hanoi on June 5–7, 2023. The service

provides information on early warnings and weather forecasts embedded with mitigation plans to CFR communities and aquaculture farmers to help them reduce or avoid loss of fish and pond infrastructure.

In 2023, floods destroyed the bank of the Ou Krouch CFR where water and fish flow out of CFR pond, while other aquaculture farmers in the sustainable aquaculture component of the project lost thousands of fish washed away by the flooding. During such flood events, evasive fish species as tilapia often spread into the natural ponds, rivers and rice fields, compounding problems even further.

Since August 2023, project staff had also helped develop a *prakas* (proclamation) for the CFR. The *prakas* is a legal instrument instruct communities and relevant institutions to consistently establish and manage the CFRs in a formality, and to legally recognize CFR committees at their jurisdiction. The development of CFR *prakas* is underway and it is expected to come into effect in 2025.

#### 4.2.1.1. Include CFR management under commune priorities

Having seen the results of the SAFR project, local authorities gradually supported integrating community action plans into CIPs. In 2022 and 2023, the project integrated 60 activities in 19 CFR management plans into CIPs, and 31 of these activities were supported. For example, village chiefs and communes/councils held events to raise awareness of CFRs. They also coordinated with a private company to deepen part of the CFRs in exchange for excavated soil (Annex).

#### Coordination meetings and site visits

From the beginning of the project, SAFR organized coordination meetings and field exchange visits every 3 and 6 months.

Every three months, SAFR organized an online quarterly meeting with FiA and GIZ to update them on its progress and the next workplan as well as to raise challenges and issues faced during implementation. The latter required involving FiA and DAD in decision-making and in updating the status of laws and regulations related to fisheries. Discussions clarified procedures for endorsement guidelines, types of legal fishing gear for subsistence fishing and harvesting small fish and for working with unelected CFR committees. At

the beginning of the project, during the COVID-19 pandemic, elections for CFR committees were postponed. Instead, commune councils appointed temporary committees, with approval from both FiA-C and FiA. SAFR-CFR focal point, deputy director of aquaculture Mrs. Chhy Savry, two FiA/DAD officials, a SAFR staff member and three WorldFish project staff all attended the meetings.

In addition to these quarterly meetings, SAFR also held meetings at the provincial level with the PDAFF, FiA-C and relevant provincial departments every six months. The purpose of these meetings was to report the progress of the project, share lessons learned and experiences among all CFR committees and raise issues and challenges any faced.

As of 2021 three CFRs had obtained land titles (Trapeang Angkanh Veau, Boeng Ream and Trapeang Andeurk), and two were under process (Trapeang Kak and Trapeang Sala Visai). The Boeng Thloeng CFR is demarcated by the protected Sambor Prei Kuk archeological sites<sup>1</sup> in zone 3, which is far away from the temples.

The following four questions were raised during earlier meetings and then addressed and updated in later meetings:

1. How can local people help raise awareness of CFRs in the future?
2. How can the communities manage and raise funds more effectively?
3. How can communities calculate basic fish production and consumption levels and share the results with community members?
4. How can the communities carry out proper patrolling and stocking?

#### 4.2.1.2. Field visits

SAFR organized seven field visits inside and outside Kampong Thom.

**Field Visit for GIZ Global Program Manager on 20-21 March 2024:** A part from the annual provincial reflection workshop, WorldFish hosted the field visit for senior donor management team: Program Leader of the GIZ Global Project on Sustainable Aquaculture and Fisheries, Ms. Friederike Sorg, SAFR project team leader, Dr. Sean Austin, GFA, local NGO partners, ANKO, HURREDO. During this visit, the team had an opportunities to

verify the project achievements, challenges, and heard the voices from communities appreciating donors support, their improvement in fish catch and production at three CFRs-Boeng Phouk, Boeng Kaek Ngout, and Boeng Deurmsamch Khaektoum. The donors appreciated the result of the project, the commitment of communities and local authorities to continue the CFRs after the conclusion of the project.

#### **Study tour from 38 CFRs on 5-6 March 2024:**

The project team hosted a study tour for 110 people (19 women included) including CFR committees from 38 CFRs and local authorities from 9 provinces and FiA-DAD. The participants learnt practical experiences from the four project CFRs in Kampong Thom 1) procedure of management, governance structure, decision making; 2) different approaches of strengthening capacity of CFR committees through trainings, workshops, exchange field visit; 3) financing mechanism for sustainable CFRs and building networks for resource mobilization. In addition, the participants gained knowledge on nutrition and WASH and how to prepare small fish powders for home consumption and bought more than 10 small fish powder plastic jars from project support small fish powder producers during and after their study tour. The visitors shared their contact with the project CFR committees and small fish powder producers for future knowledge sharing and collaboration.

#### **Siem Reap**

On September 8–9, 2023, the project made a field visit to Siem Reap for the 21 CFR committees and key local authorities. The aim was to strengthen the capacity of the committees to manage future CFRs as well as to fulfill requests from the committees.

The visit had three main objectives:

1. Gain experience in CFR management and financial activities that the Trapeang Kuy CFR has practiced successfully.
2. Obtain additional knowledge relevant to healthy fish management and a suitable environment to support fish ecology.
3. Explore possibilities to sustain future CFR activities.

For 10 years, the Trapeang Kuy CFR received support to increase its capacity and to improve the condition of its CFR, first from an EU-funded FAO project and then from a USAID-funded WorldFish project. During that time, the CFR's committee maintained activities and helped the CFR reach its ecotourism goals. Key to the committee's success were solidarity, integrity and transparency. The committee had a strong

collaboration with many stakeholders, pagodas, tour guides, local authorities, local and international charities, NGOs and international organizations. In this regard, several activities generated income, including ecotourism, selling fish annually at other non-CFR community ponds and recreational activities as well as annual feasts like water festivals, Pchum Ben and Khmer New Year.

Question	Result
How can local people help raise awareness of CFRs in the future?	Ten key people from 10 CFR committees were selected in September 2023 and then trained as local trainers between October and early November.
How can the communities manage and raise funds more effectively?	On September 8–9, 2023 the 21 CFR committees did a strengths, weaknesses, opportunities and threats analysis during field visits to Siem Reap in order to identify potential activities that could generate income to support each CFR.
How can communities calculate basic fish production and consumption levels and share the results with community members?	All 21 CFR committees participated in the field visit to Siem Reap, where they received training on how to calculate the total amount of fish that villagers in each CFR consume annually.
How can the communities carry out proper patrolling and stocking?	During management training, the 11 newest CFRs learned about patrolling and stocking. These subjects were also added to the refresher training for the first 10 CFRs.

**Table 4.** Updated progress of quarterly meetings with 21 CFR committees.

In an ecological approach to fisheries management, there needs to be a balance among ecology, human well-being and good governance. Fish ecology requires good habitat and migration channels, controls on evasive species, available food and spawning grounds. To this end, all 21 CFR committees practiced exercises, such as identifying potential income generation activities, calculating household fish consumption in each CFR and prepare an annual budget plan against their workplans.

The CFRs would shared their action plan, along with what they had all learned, and continued to discuss it with committees, members and relevant stakeholders to explore the potential of more income generation activities to implement community action plans. For several events to raise awareness of the CFR, the project integrated the calculated fish consumption levels in order to spread information on the value of fish and how to manage a CFR properly.

A total of 53 people participated in the field visit to Siem Reap, including eight women. Most of the participants came from FiA, FiA-Cs in Kampong Thom and Siem Reap, communes and councils, CFR committees, GIZ, WorldFish, ANKO and Trailblazer of Cambodia. The overall evaluation of the field visit

found that the participants were happy with all of the subjects and activities, the skill of the facilitators, the homestay and food, and the outdoor location of the Tropeang Kuy CFR, where participants were able to enjoy fresh air and green rice fields.

#### **FiA-DAD field visit**

After a coordination meeting in August 2023, SAFR hosted a field visit on the afternoon of August 22 and the morning of August 24 for two officials: DAD deputy Mrs. Savry and DAD official Mrs. Mam Sovanary. The aim was to learn about the progress of six CFRs: Ou Ambaeng, Trapeang Kak, Beng Doeumsmach Khaektoum, Boeng Ream, Sbov Ambaeng and Tropeang Andeuk. DAD deputy director praised the valuable and generous supports of the donors which could be seen much more progress of the activities in the ground received directly by the communities.

#### **GIZ-DAD field visit**

On August 24, 2023, WorldFish and ANKO hosted a visit for GIZ and FiA-DAD to see two project sites: Ou Ambaeng and Boeng Phouk. In total, there were 15 participants, two of whom were women, including the SAFR team leader, director of DAD, deputy chief of the PDAFF, chief of the FiA-C, FiA-C officials, commune chiefs and

councils, and community representatives, as well as representatives from the GFA and Human Resource and Rural Economic Development Organization (HURREDO). The Director of DAD recognized good project progress made so far, encouraged the communities to keep doing such as good jobs of fisheries conservation as it is a source of providing fish and food to rural villagers, and finally suggested WorldFish to monitor trend of fish species.

#### **GIZ-SAFR field visit**

On July 20, 2023, WorldFish hosted a visit for the GIZ-SAFR team, as well as representatives from the GFA and HURREDO, to monitor the project at two CFRs: Ou Krouch and Boeng Doeumsmach Khaektoum. There were 20 participants, including four women. At the end of the trip, the visitor team recommended to the communities to absorb knowledge and gain more experiences from the project for the remaining short time before the project end to have enough capacity to manage their CFRs.

#### **German Embassy's field visit**

On 10th November 2021, the project hosted field visit for a delegation to understand the CFR concepts and the progress of the project. The key visitors were Mr. Jost Kadel (Deputy Mission Director and chief of Development and Cooperation of German Embassy to Cambodia), Excellency Sok Sylo (Secretary General of CARD), Excellency Preom Ratha (Deputy of Kampong Thom Provincial Governor), Mr. Farid Selmi (Team Leader of MUSEFO), Ms. Carinna Heineke (Team leader of Social Health Protection), Mr. Guenter Wessel (Team leader of improving Livelihoods and Food Security), Dr. Sean Austin (Team leader of SAFR), Ms. Sophie Harmann (Team leader of support to the identification of poor households program) and other key project staff.

#### **4.2.1.3. IUU-F patrols**

Over project period, 21 CFRs were inspected 2,491 times. 31 illegal cases were found at the CFRs, which were documented in 2022 and 2023. In 2021, the patrolling team were not fully formed yet, and 2024 is the project end covered only three months.

#### **4.2.1.4. Monitoring water quality**

During the dry season, water quality is usually a serious problem for CFRs. Early in the season, in December or January, after the rice has been harvested in the uplands, rice straw and stems become rotten, discolored and stagnant, which then flow into CFRs downstream in lowland areas. In April and July, high temperatures become a problem for CFRs, which are typically shallow and small. The poor water quality is harmful to the survival of fish and other aquatic animals. To maintain survival rates, CFR committees monitored and mitigated the water quality during these critical periods using training received from the project.

#### **4.2.2. Key lessons learned and influences on decisions**

The SAFR project developed two documents:

##### **1. Key lessons and priority research and investments for rice field fisheries: Community fish refuges**

The first document provides key lessons and priority research and investments that will ensure the sustainability, adaptability and scalability of CFR-RFFs based on 12 years of WorldFish experience. Among the findings in the document, CFR-RFFs provide many benefits that can be sustained through the engagement of policymakers, investors and implementers. Actions include improving legal frameworks, aligning with decentralization, securing land titles and supporting multiple dimensions of CFR management, such as biophysical conditions, governance, financial sustainability, knowledge dissemination, and adaptation. The document also outlined necessary investments to advance the adaptability and scalability of CFR-RFFs, which included conducting effective training and capacity strengthening, engaging youths and technology in CFR management, making periodic biophysical investments, using economic costing and valuation tools, creating practical guidelines, and doing biodiversity- and climate-related research.



## 2. Rice-fish co-production pathways for Cambodia's sustainable development

The second document describes the demonstrated benefits of CFR-RFFs, results from past investments and complementary innovations, and the potential benefits of additional such innovations. It found six complementary innovations with high potential: (1) climate smart dry season crops, (2) community-based aquaculture, (3) domestication of SIS, (4) homegrown school feeding programs, (5) integrated farming and (6) integrated water management. These innovations can develop technical, governance and/or value chain improvements through sequential or simultaneous integration into CFR-RFF systems. The innovations were drawn from experiences in Cambodia and elsewhere in South and Southeast Asia, with priority given to complementary benefits with the greatest potential for CFR-RFFs.

### 4.2.3. A regional review on rice-fish innovations

For this, the project reviewed and shared two documents:

1. Using experience from past and current WorldFish projects and programs, WorldFish scientists conducted a regional review on a collection of rice-fish innovations. This included practices and experiences, types of innovations and inclusion of farmers and fishers. Twenty innovations and 52 publications were included in the airtable, including best practices for CFRs. The review was not only used to prepare a program proposal for One CGIAR, as well as other regional proposals, but also to share it with other interested academic institutions, research institutes and universities. As part its legacy website, the CGIAR Research Program on Fish Agri-Food Systems is still waiting for the website to be created:  
<https://airtable.com/shrgS1tNLRyIDIWw5/tblbb4Zo87Gd0TPfD/viwpXADzC94kPBs60/rec0kZAEPNOOxgnFi?blocks=hide>
2. In collaboration with FAO, SAFR staff shared the innovation on the Technologies and Practices for Small Agricultural Producers (TECA) website. WorldFish has two rice-fish innovations published on the website: [Community Fish Refuges, Cambodia](#) and [nutrition sensitive fish production, Bangladesh](#) (Annex).

### 4.2.4. Provincial coordination and annual reflection meetings and workshops

During this reporting period, SAFR staff participated in two events:

1. On June 19, 2023, three staff and two women representatives from two CFR committees (Boeng Phouk and Trapeang Andeuk) participated in the National Community Fisheries/Community Fish Refuge conference organized by FiA. The Minister of MAFF presided over the event, which included 347 participants, including government officials, development partners, NGOs and community representatives across the country. Discussion mainly centered on how to strengthen communities and co-management to sustain fisheries resources and the livelihoods of current and future generations in Cambodia.

On June 23, 2023, Oxfam held a workshop in Sunway hotel featured 26 participants, three of whom were women, representing eight NGOs, international organizations and government institutions: Conservation International (CI), Oxfam, Fauna and Flora (FF), NGO forum, FiA, International Union for Conservation of Nature (IUCN), WorldFish and the Wildlife Conservation Society (WCS). SAFR's M&E officer presented the project's M&E tools for fish conservation. The purpose of the event was to (i) develop an M&E framework to manage a new 2-year project conservation led by Oxfam and implemented by its partners and (ii) discuss the creation of a common M&E tool for monitoring fisheries conservation projects in Cambodia.

### 4.2.5. End of project evaluation

GIZ organized the two evaluations: mid-term and end project evaluation. The mid-term assessed the project's goal, objectives, and progress against five dimensions: relevance, effectiveness, efficiency, impact, and sustainability. The result of the mid-term indicated that the project's progress was very positive and started providing an impact to the communities. The end project evaluation assessed the project achievements, impact, and outcome against the indicators. It was expected the GIZ would share the report afterward.

The project participated in and facilitated the mid-term evaluation in April and May 2022, and the end of the project evaluation in January and February 2024. In coordination with GIZ and the evaluation's consultant team, project staff shared the CFR locations and a contact list of CFR committees and local authorities. At the ground level, project staff informed local authorities and the 21 CFR committees and shared its schedule of interviews.

#### 4.2.6. Project closing workshop

In consultation with GIZ, the WorldFish SAFR-CFR component and GFA, ANKO and HURREDO partners co-organized the provincial reflection workshop on March 19–20, 2024 in Kampong Thom province. The workshop informed the relevant local authorities at provincial level the project achievement, challenges and lesson learned, best practices and the conclusion of project field activities and mission of partners.

The workshop was opened by Excellency Chea Van Chan (Deputy Provincial Governor and representative of Excellency provincial governor) highlighting fish was the main important food of Cambodia, especially Kampong Thom province was the potential location connecting two main rivers, Tonle Sap Great Lake and Stung Sen River where are the main sources of fish. The excellency highly appreciated the German Government and GIZ provided generous fund supported Kampong Thom people through the SAFR projects to improve the food security by increasing the fish production at household and communities. The Excellency strongly committed to continue these activities after the completion of the project and requested the donor to continue to support and would welcome new projects. Remarks given by distinguished key speakers summarized the background of the SAFR project, goal's and objectives, approaches, key achievements contributed to fisheries strategy of the Royal Government of Cambodia, and emphasis the importance role of fish played in environment of water and rice field. The key speakers were Dr. Hav Viseth, Deputy Director General of Fisheries Administration, Dr. Sean Austin, SAFR team leader, Ms. Friederike Sorg, a manager of the GIZ Global Programme on Sustainable Fisheries and Aquaculture, Mr. Mike Akester, WorldFish Regional Director of Southeast

Asia and Pacific, and representative of chief of PDAFF. A total of 170 participants shared their challenges, best practices and lesson learned and sustainability. Those were representatives of 21 CFRs, commune councils, district governors, FiA, FiAC, PDAFF, relevant projects and NGOs, aquaculture pond farmers, aquaculture pond school teachers and students. The Workshop was successfully completed as donors, local authorities, communities, and other beneficiaries were very happy with the results, recognized the project achievements since communities and farmers accessed more fish consume either fresh and processed, and sale. In the closing remarks, Mr. Deap Piseth, representative of chief of PDAFF, thanks to the German Government and GIZ who always supported his Kampong Thom people and look forward to collaboration with the German Government/GIZ.

In February 2024, the project's ANKO partner organized the closing meetings at commune levels to hand over the project achievements to commune councils and communities. Each event was discussed the continuation of implementation of community development plan and emphasized the support from the commune, sustainability, ownership. Seventeen events participated by 571 people including all 21 CFR committees, commune chiefs, FiAC, village chiefs. The fundamental support from the project either biophysical CFR, capacity building and community organization were very appreciated by the commune chief by signing on the handover letter to accept the project achievements and expressed the commitment to support CFR communities. The handover letter enclosed the CFR brochure described all activities and time-frame supported communities.

#### 4.3. Outcome 3

"Fewer fish from IUU-F: The incidence of IUU fishing in the CFRs and nearby rice fields decreased through the establishment of an effective monitoring and supervision system for rice field fishing.

**Indicator: C.1:** Communities increased the number of inspections to supervise compliance with agreed bylaws.

**Target:** 600

**Indicator: C.2:** Committees made decisions with regard to regulating rice field fishing in a transparent procedure.

**Target:** 21

**Output 3: Support patrolling to reduce illegal fishing**

SAFR developed a pair of guidelines: one on stocking and the other on patrolling. FiA’s general director endorsed the guidelines, and fish expert Mr. Rick Gregory commented on and edited stocking guidelines.

The project helped the CFR committees form patrolling teams and prepare workplans. Twenty-one patrol teams, one each per CFR, were formed and consisted of committee members, fishers, villager guards and village chiefs. As part of CFR management training and coaching sessions, the project provided training on how to conduct effective patrols. All 21 patrol teams also received equipment from the project, including walkie-talkies, flashlights, raincoats, boats and guardhouses (Annex).

Key inputs	Target	Result	Status
A total of 21 patrol teams and members were formed, with a timetable and workplan.	21	21	Achieved
A total of 21 were trained to improve patrolling.	21	21	Achieved
Patrol teams conducted 600 inspections.	21	21	Achieved
A total of 898 patrolling materials were distributed.	183	898	Achieved

**Table 5.** Support to CFR committee on patrolling in CFR system

## 5. Partnership, coordination, networking and synergy

SAFR collaborated with government counterparts, academic universities, other international research institutes and synergetic projects to produce major achievements.

### 5.1. FiA, DAD, FiAC, PDAFF, MAFF

SAFR collaborated with FiA, FiA-C and PDAFF in Kampong Thom and all provinces across the country to develop the guidelines on stocking and patrolling, while FiA and DAD coordinated with project staff to have FiA's general director endorse the guidelines. Meanwhile, FiA-C and PDAFF coordinated with the provincial governor and other provincial departments to proceed with work related to their authorities. This included permission to dig the CFR ponds, plant flood-resistant trees, and coordinate with the provincial department responsible for water resources methodology to allow the project to repair flood-damaged CFRs.

### 5.2. MUSEFO

At the beginning of the SAFR-CFR component, the project worked with MUSEFO in the same provinces and overlapped target areas in certain districts, communes and villages. The two projects shared training documents with each other on nutrition and WASH to match their subjects and identify any missing topics. They also shared their target villages to avoid overlapping the same beneficiaries with the same types of support and agreed to synergize their activities to maximize support for their beneficiaries. As a result of this partnership, SAFR trained producers of small fish powder and promoted the nutritional advantages of eating small fish to 87 MUSEFO beneficiaries at the end of 2023. The project used some of MUSEFO's materials during its training and awareness raising events on nutrition and WASH practices.

### 5.3. FAO

SAFR also collaborated with FAO under its CAPFish-Capture project to create questionnaires, co-train FiA and FiA-C staff and develop workplans to assess the status of 925 CFRs across the country. The project completed the status assessments for 578 CFRs and shared the report with FAO.

### 5.4. One CGIAR Initiatives

SAFR presented its CFR work and needs to various CGIAR Initiatives, including Alliance Bioversity International CIAT (ABC), International Institute of Rural Reconstruction (IIRR), International Water Management Institute (IWMI) and other WorldFish countries (Bangladesh and Myanmar) to find synergetic activities in the Tonle Sap region and to scale them out in the Lower Mekong region. The presentation included the project's CFR approach, as well as objectives addressing multithematic areas (food security and nutrition, biodiversity conservation, climate change mitigation and adaptation, community resilience) for One CGIAR Initiatives operating inside and outside Cambodia. As a result, AMD-WP 3 was included the CFRs as a digital risk application, while AMD-WP 2 was included in CFR plans to support food security and nutrition for farmers in provinces in the Lower Mekong, such as Prey Veng and Svay Rieng. AMD-WP4 worked with the Boeng Ream CFR to study the impact of water governance on the food system. Boeng Ream was selected to work under a joint ASEAN-One CGIAR Initiative for regenerative agriculture.

### 5.5. Mekong Fisheries project

One of WorldFish's projects in Cambodia supports CFRs and community fisheries as a learning hub in fish ecology. In October 2023, the project shared training materials on fish ecology and how to organize the learning hub with all project CFRs and conducted exchange visits to the Tropeang Kuy CFR, which is currently supported by the Mekong Fisheries project.

### 5.6. German universities

Since April 2021, WorldFish Cambodia has been hosting three students from German universities: one PhD student and two master students. The partnership is to strengthen collaboration between CGIAR centers and academic research institutes, the Sustainable Land Use in Developing Countries project of the Leibniz Center for Agriculture Landscape Research and ATSAF.

Together, the three of them conducted a research study on collective action in aquatic food systems at the CFR in Kampong Thom. Their objective was to define the respective roles and render the relationships with the ATSAF stipend holder to ensure high scientific quality and set a reasonable timeframe. The result of the research study will be used to reflect the project implementation and achievement, and future project design.

WorldFish and the IWMI support the conceptual framework and supervise the students' papers. Currently, we are in conversations with Cambodian students who could apply to the ATSAF for the Junior Scientist Tandem Program.



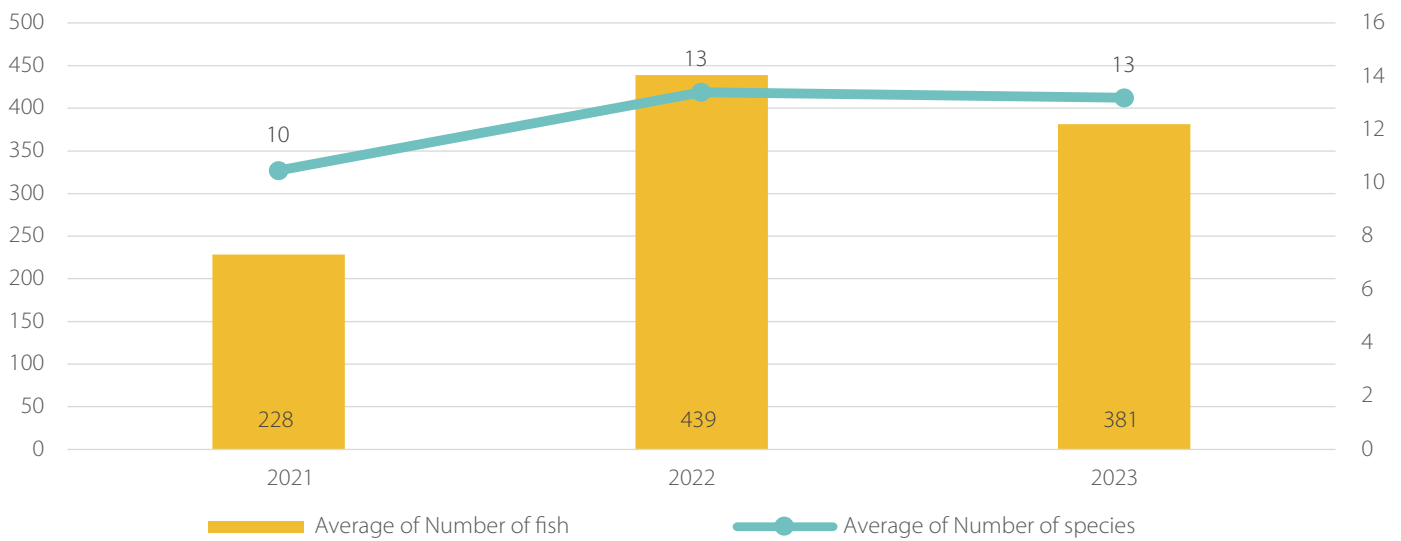
**Plate 3.** A fish vendor sells fish from the ricefield fisheries system at Boeng Phouk CFR in Kampong Thom.

## 6. Monitoring and evaluation

### 6.1. Biological monitoring survey

The BioM survey was conducted four times a year over 3 years (2021–2023) at five CFRs. The survey revealed trends and changes across three main biophysical characteristics: (1) water quality, (2) sampling of fish and other aquatic animals and (3) fish biodiversity. The average number of fish increased from 228 fish and 10 species to 439 and 13,

while the proportion of fish increased 92% in 2022 and 67% in 2023, and fish species also increased. These increases were the result of (i) SAFR’s technical interventions on the ground and (ii) the active participation of CFRs committees, local authorities and communities in CFR management and reducing illegal fishing in and around the CFRs (iii) regular rainy season and plenty of rainfall allowed water remained longer in the rice field system.

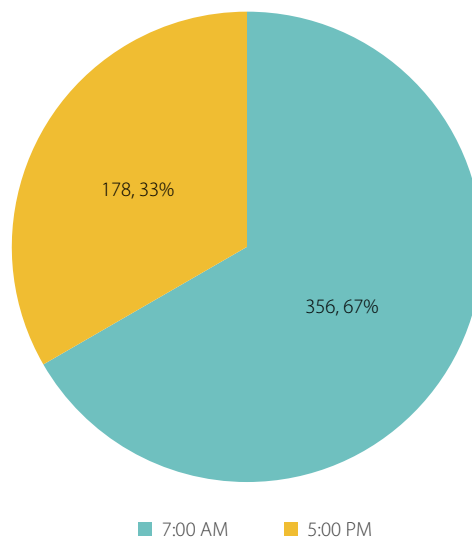


**Figure 6.** Number of fish and species at CFR.

### 6.2. Fish migration

Fish migration monitors fish passing through inlet and outlets. In June (or whenever the first water passage occurred), an underwater camera was set

up outside 14 inlet/outlets in both the control and treatment sites. As shown in Figure 7, the number of fish that migrated to the rice field in the morning was more than double than in the afternoon.



**Figure 7.** Proportion of fish migration.

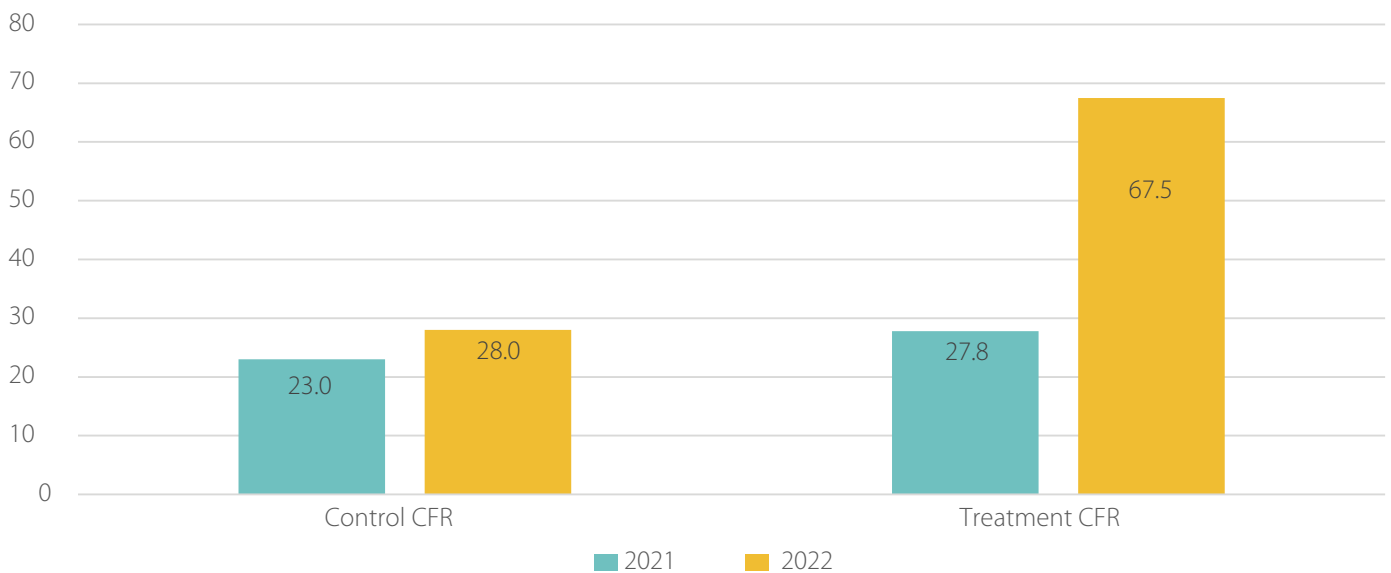
As shown in Figure 8, the number of fish that the cameras detected between 2021 and 2022 in the treatment sites was more than double those in the control sites. This is likely to be the effect of better physical conditions and management of the CFRs.

### 6.3. Fish nests

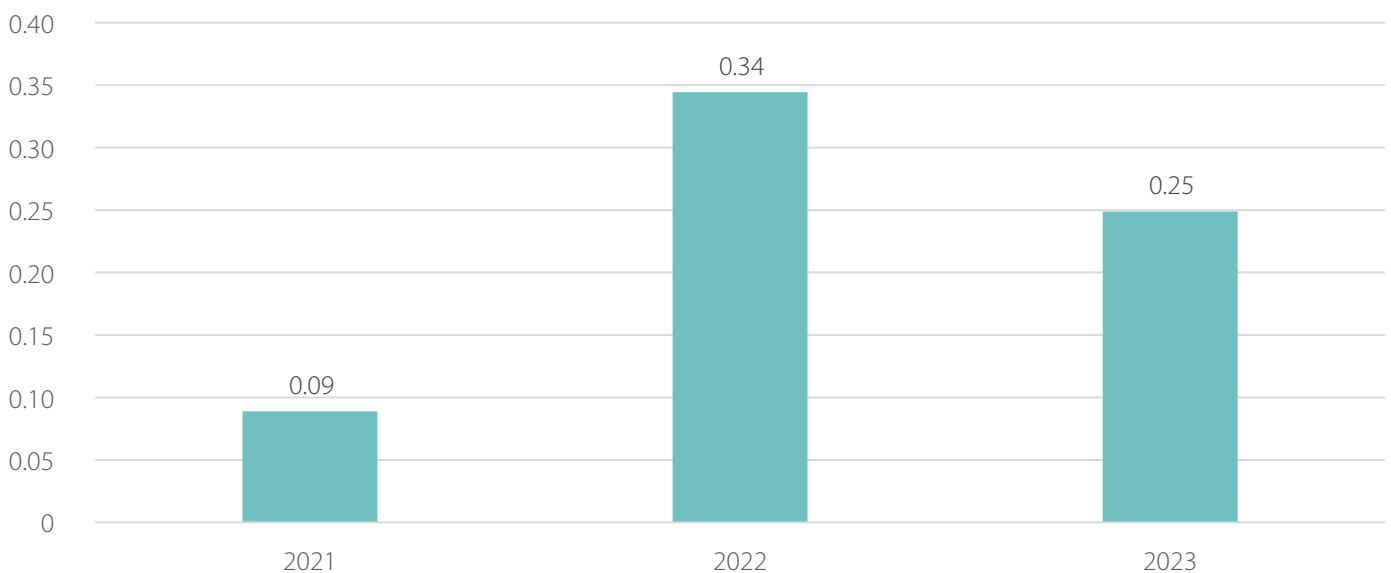
Monitoring fish nests is one of the indicators for detecting fish and determining the abundance and number of nests in order to document fish reproduction in RFF systems. Monitoring is done during the rainy season, from June until September, and examines the trend of fish nest habitats in both control and treatment sites. The study looked at five old CFRs and extended to five new CFRs that were selected during the extension. A total of 15

plots per site located in the RFF system—which includes the edge of the CFR, the channel and the rice field—were counted and monitored, the latter of which was done twice a year. A total of 525 plots were monitored over a 3-year period, covering 33% of the CFRs, 19% of the canals, 30% of the rice fields and 19% of the trap ponds.

Figure 9 shows the average number of fish nests found in intervention RFF nests per sampling plot from 2021 to 2023. According to the graph, the average number of fish nests found in intervention RFFs per plot increased from 0.09 in 2021 to 0.25 in 2023. It is possible that the intervention had a positive impact on the number of fish nests found in RFF systems.



**Figure 8.** Number of fish found by cameras per hour.



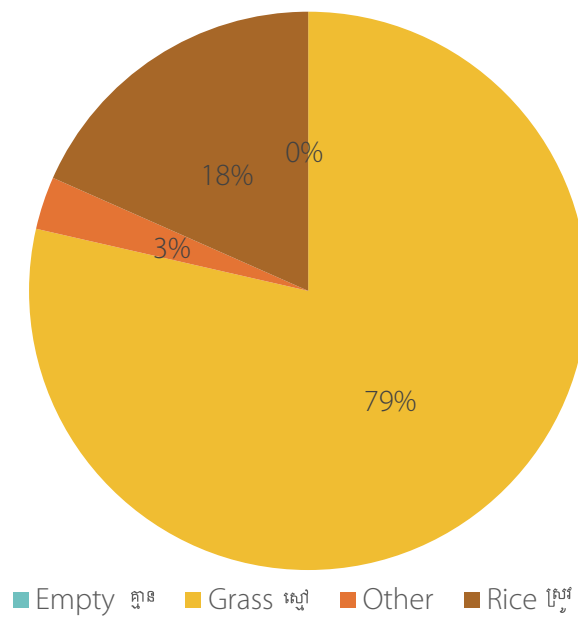
**Figure 9.** Average number of fish nests found during monitoring.

Figure 10 shows the proportion of fish nest habitats in CFR-RFF systems. Grass is the most common habitat followed by rice plants. No fish nests were found in plots without plants.

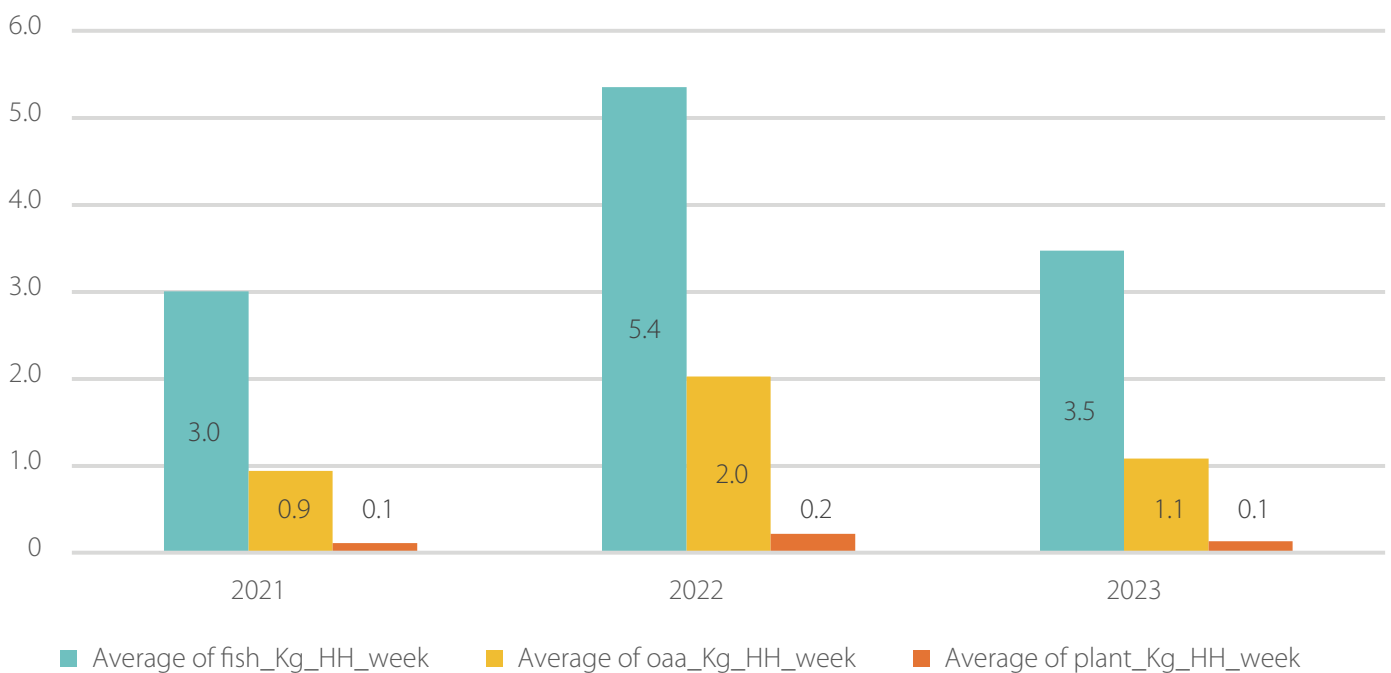
### 6.4. CCEM survey

The total of twelve CCEM surveys were carried out at 10 CFRs in the villages adjacent to the CFRs and ZOI. The results show that although the average weekly fish catch per household fisher in 2023 decreased slightly from 2022, the catch was still better than in 2021.

Figure 12 depicts the average weekly amount of fish and OAAs caught in kilograms per fisher household from 2021 to 2023. Compared to 2022, the average dropped from 5.4 kg for fish and 2 kg for OAAs down to 3.5 and 1.1 kg, respectively. In 2024, some areas of the rice fields, where the CFRs are located, such as Trapeang Andeurk and Trapeang Angkanh Veau, were not inundated because there was no flooding from Tonle Sap Lake and the rainy season was about 2 months late. Nevertheless, the catch in 2023 was still better than in 2021.



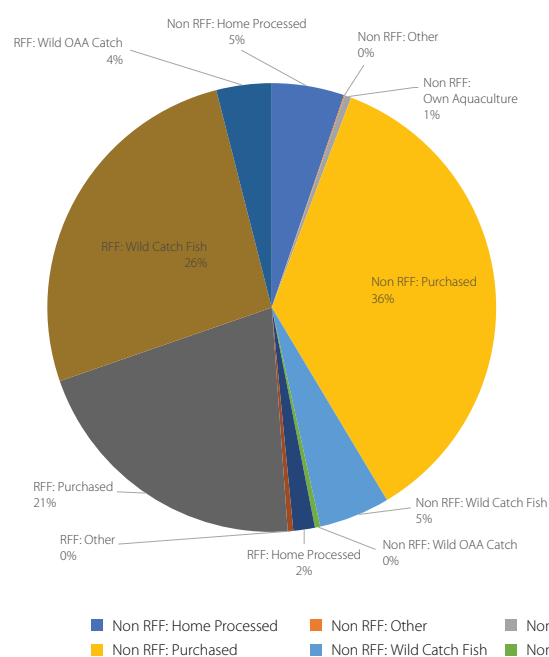
**Figure 10.** Fish nest habitats in RFF systems.



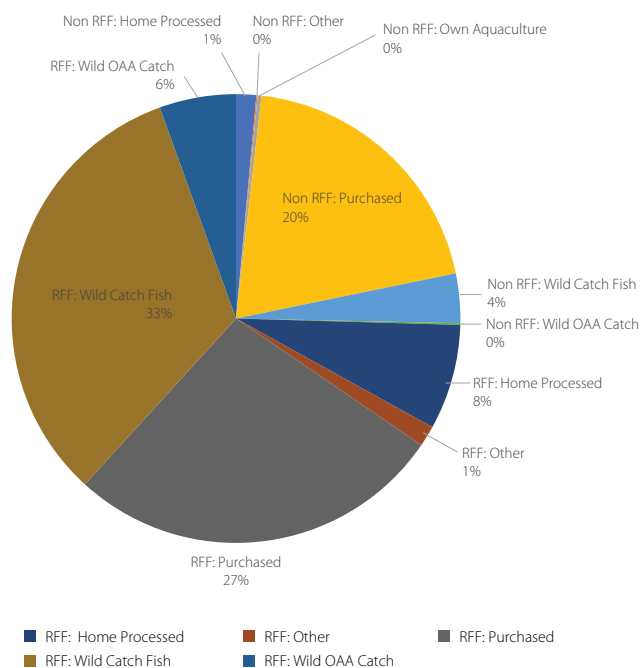
**Figure 11.** Average fish catch per fisher household.



**% FISH CONSUMPTION OF PEOPLE IN RFF SYSTEM 2021**



**% FISH CONSUMPTION OF PEOPLE IN RFF SYSTEM 2023**



**Figure 12.** Proportion of fish consumption in RFF systems in 2021 and 2023.

In Figure 12, the percentage of fish eaten from each source is represented by the pie slices. In 2021, RFFs accounted for 53% of all fish eaten. In 2023, this climbed to 75% which reflects to the reality of fish consumption by villagers accessed freely from the RFF thus the proportion of non-RFF fish sources in total yearly consumption dropped from 47% in 2021 to just 25% in 2023. These are the direct results of SAFR interventions over the 3 years of the project.

### 6.5. Food insecurity

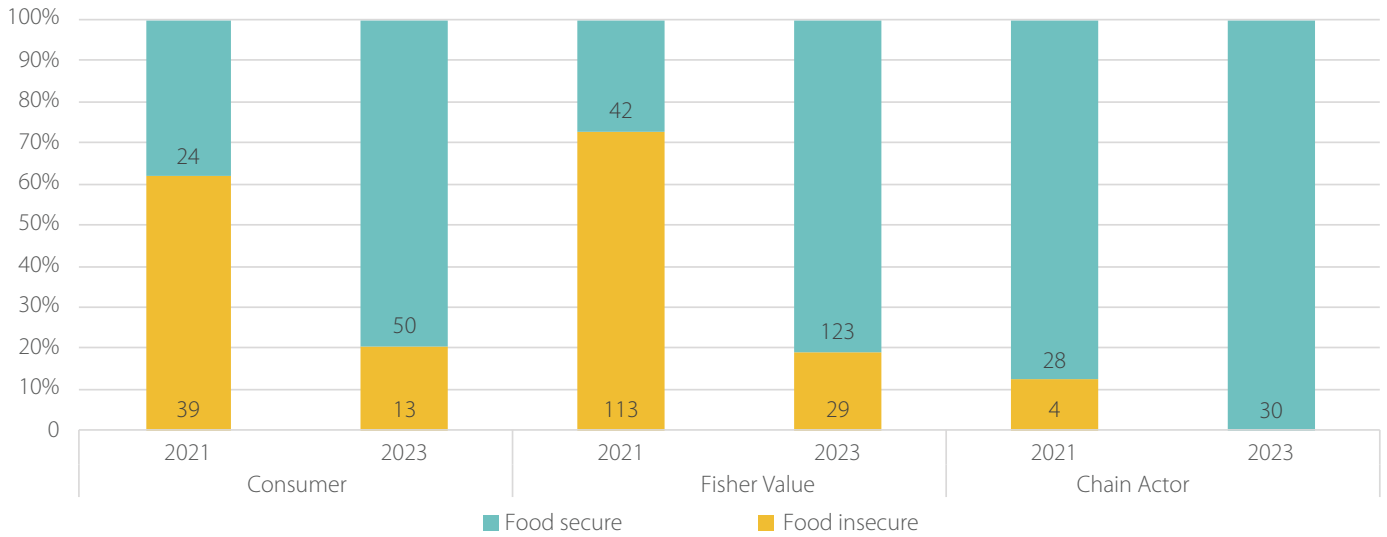
SAFR used the food insecurity experience scale (FIES) survey to monitor the level of food consumption of target beneficiaries, including consumers, fishers and value chain actors. The FIES was grouped into four levels: (1) food secure, (2) mildly food insecure, (3) moderately food insecure and (4) severely food insecure. The FIES survey was conducted together with the CCEM survey twice: once in 2021 for the baseline and then in 2024 for the endline. The sample size was 250 people.

The FIES survey is intended to be administered annually (Ballard et al. 2013). For SAFR, the purpose was, initially, to identify food insecure households for indicator M1 and then to monitor changes to food insecurity over the duration of the project. The sampling design matched the design of the CCEM survey and included a total sample of 250 households. The first joint CCEM and FIES survey was conducted in April 2021 with 250 households classified into 63 consumers, 155 fishers and 32 value chain actors, including input suppliers and processors/traders.

As shown in Table 6, the FIES baseline results reveal that most households were severely or moderately food insecure, while fewer were mildly food insecure or food secure. However, a higher proportion of VCA households were more food secure than fisher and consumer households. After project intervention, all food insecure households were dramatically improved in 2023, Figure 13.

FIES level	Consumer	Fisher	Value chain actor	Total
Food secure	19%	8%	72%	19%
Mildly food insecure	19%	19%	16%	18%
Moderately food insecure	33%	61%	9%	48%
Severely food insecure	29%	12%	3%	15%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

**Table 6.** Distribution of FIES levels (n=250).



**Figure 13.** Distribution of FIES levels in RFF systems in 2021 and 2023.

### 6.6. Catch diaries

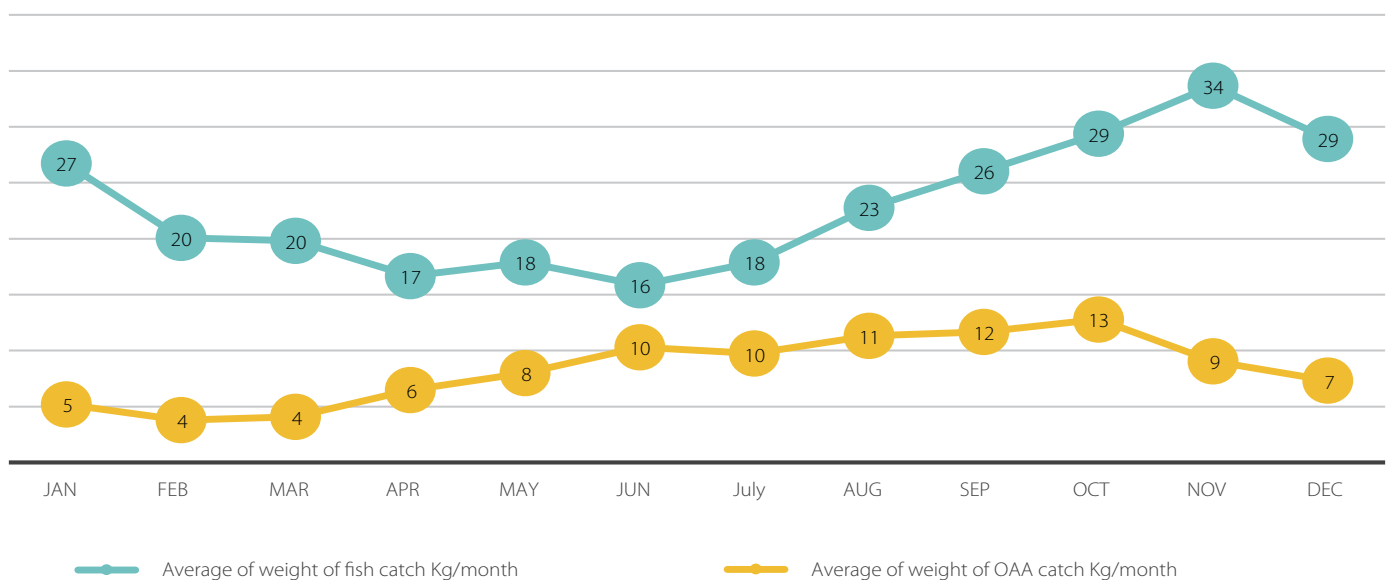
According to a logbook kept by 105 household fishers over a 2-year period, fishers were able to obtain a variety of nutrient-dense food sources, including 284 kg of fish and 103 kg of OAAs, as well as 35 kg of aquatic plants in average, for both personal consumption and excess sales.

Figure 14 illustrates the trends in fish and OAAs caught in a system by experienced fishers between 2022 and 2023, most likely based on their weight. Overall, when fish catches drop, both fisheries products are replaced, and OAAs captured increases. This demonstrates the significance of fish and OAAs for nearby fishers. However, the weight of fish captured nearly triples the amount of OAAs caught annually.

Fisheries caught by fishers> HH in RFF system	2021*	2022	2023	2024*	Average/year
Number of days fishing	8	119	138	13	130
Weight of fish catch Kg	23	272	289	30	284
Weight of OAA catch Kg	9	115	96	9	103
Weight of plant collected Kg	3	25	40	5	35

\* Only one month.

**Table 7.** Average amount of fish caught per household in RFF systems.



**Figure 14.** Trend of fish and OAAs caught by key fishers in RFF systems in 2022 and 2023.

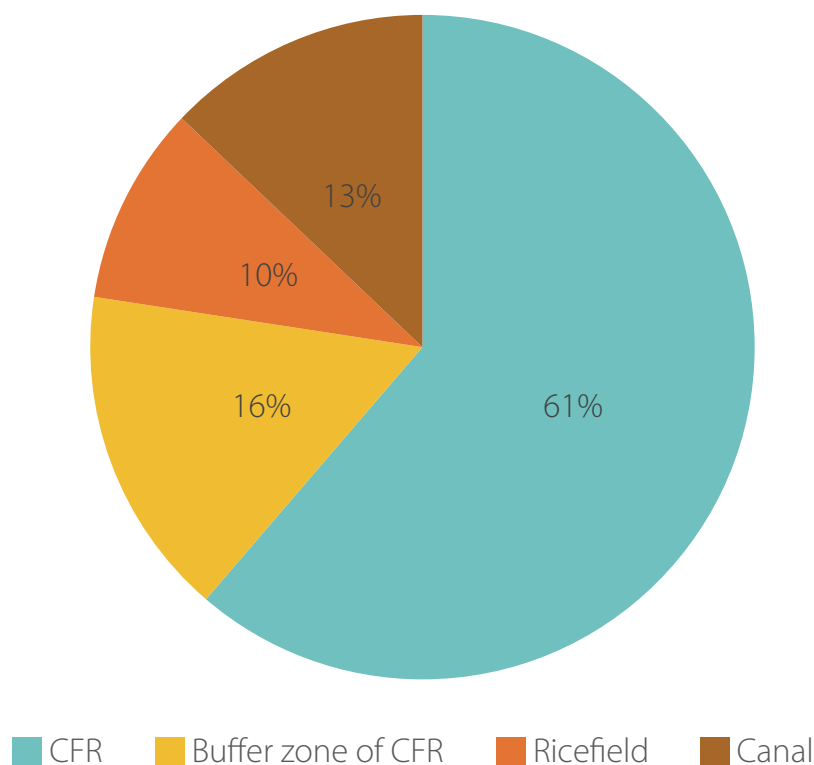
## 6.7. IUU-Fishing

The patrol team’s 2-year monitoring revealed that there were 15 cases of illegal fishing for every 1000 inspections in 2022. In 2023, that figure dropped to 13. In addition to enforcing CFR bylaws and fisheries laws, the team reported instances of illegal activities to FiA-C, commune chiefs and councils, and the local government.

Figure 15 shows the distribution of illegal fishing incidents found in CFR-RFF systems, categorized by the type of fishing gear used. The most common type of illegal fishing is in CFRs, followed by the buffer zones and then canals. Rice field fishing itself accounts for the smallest percentage of incidents.

Inspections	2022	2023
# CFR	10	21
Number of inspection	953	1,322
Total of accumulate people join inspection	2,825	4,138
Total of accumulate women join inspection	23	77
Number cases of illegal fishing	14	17
<b>Number illegal fishing found 1000 inspection</b>	<b>15</b>	<b>13</b>

**Table 8.** Key information from the logbook over a 2-year period.

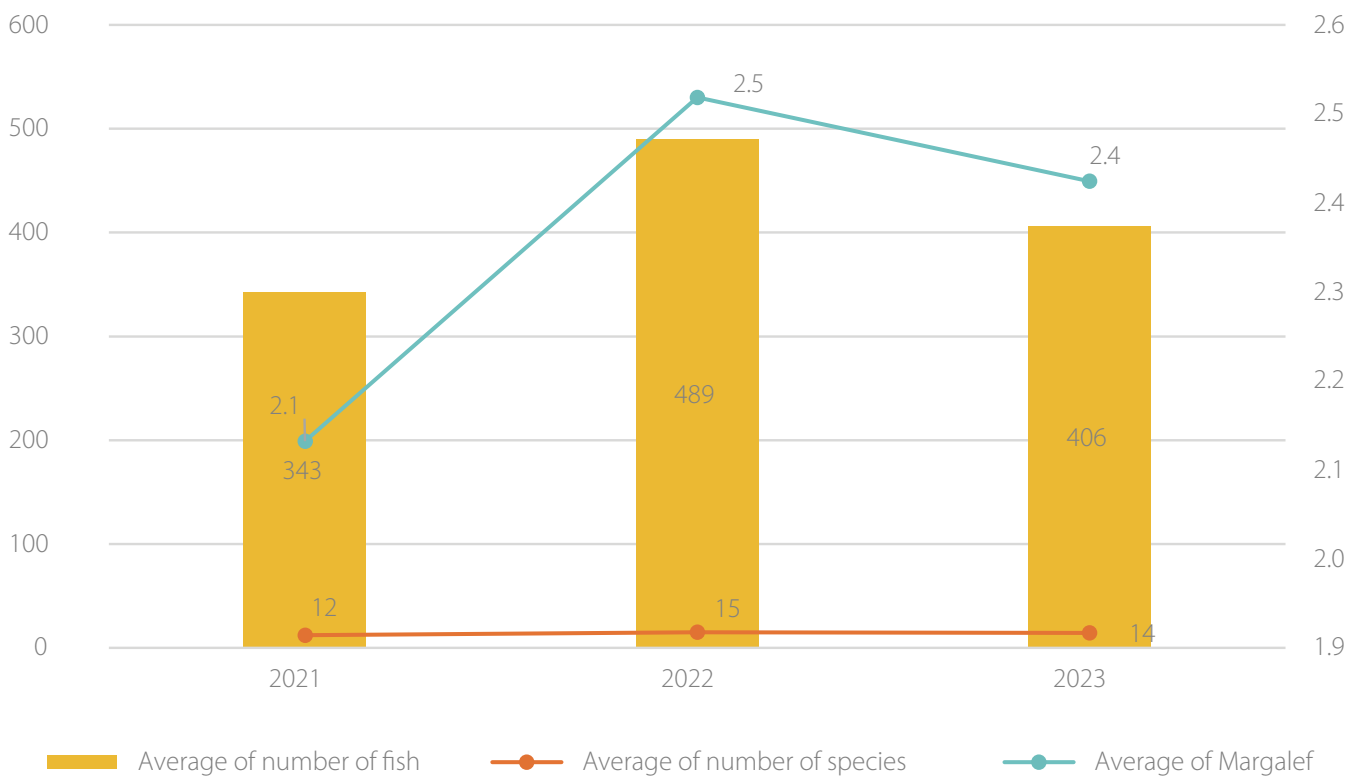


**Figure 15.** Illegal fishing in RFF systems in 2021 and 2023.

## 6.8. Margalef diversity index

The Margalef diversity index is a species richness index that is used to measure biodiversity in a simple way. This index depends heavily on sampling size and effort and standardizes the number of species encountered against the total number of individuals encountered. It is calculated through the following formula:  $(S-1)/\ln(N)$ , where  $S$  = total number of species and  $N$  = total number of individuals in the species sample.

As shown in Figure 16, from 2021 to 2023 the average number of fish and species richness in the CFRs increased slightly in both the species and the index average. This was likely the result of technical interventions SAFR made on the ground, as well as the active involvement of local authorities, communities and committees in managing CFRs and reducing illegal fishing within and around them. Other causes of species richness in CFRs that led to increase catches in 2022 were floods and regular and plenty of rainfall. The water level was lower in 2021 and 2023, which accounts for the lower number of fish species in CFRs.



**Figure 16.** The Margalef diversity index and abundance of fish in CFRs.

## 7. Lessons

---

The following are lessons learned throughout the course of the project:

- CFR systems have been in place in Cambodia for decades, even centuries. As such, improving and maintaining existing CFRs actually require less investment, have less impact on natural resources and the environment. Doing so would improve and continue to provide endless food security, nutrition and well-being for millions of Cambodians. The CFR is a aquatic food system accessible for all villagers nearby which can save their time and cost of traveling.
- A significant part of SAFR's success was due to the active involvement and shared responsibility among relevant government bodies (at all levels), partners and communities. Each partner shared its tasks and roles to achieve the goal and objectives of the project.
- Recognizing the reality of the situation is the first and most important step to proactively supporting the CFR system. Yearly observations have found that more and more CFRs are drying up. This is a significant problem, as CFRs are the only habitat in a rice field landscape that fish can take refuge in. Less habitat inevitably leads to lower fish production. Based on this reality, SAFR invested in pond dredging and other important interventions. It is also recognized that without rainfall and flooded plains, it is not possible to maintain high fish production. Likewise, without healthy habitat around CFR ponds, good climate and flooded plains, fish production will drop. These two main factors are inseparable from one another.
- Comprehensive capacity building for partners, committees and local authorities is fundamental to support CFR systems.
- In future, establishing CFR committees and bylaws needs to be quicker. If not, villagers will not be able to participate, as the time takes will affect their livelihoods.
- To maintain a proper RFF or CFR, the community should stick to its objectives and scope of CFR conservation and the best common interests of community. Otherwise, this will lead to internal conflict within CFR committees and, thus, damage the whole system.
- Identify ZOI in a participatory manner and base them on the practical experiences of fisheries observations, as water covers large areas during the rainy season and, thus, can cover the migration of fish species from the Tonle Sap region.
- Do not limit the design for improving CFRs pond habitats to accommodate only fish species that are suitable for a rice field ecosystem. Instead, accommodate many species, including wild fish and Tonle Sap and/or Mekong fish species.
- CFR committees and local authorities alone are not enough to protect CFRs. It is important to raise awareness among many villages to ensure the effectiveness of CFRs over the long run. According to the experience of the project, when people in CFR villages and ZOI understood the concept and advantages of CFRs, illegal fishing automatically dropped. Many more villagers contribute in-kind or in cash support. In some cases, most illegal fishers come from villages that are neither CFR villages nor ZOI.
- Local communities should make decisions; project staff should only justify or verify decisions based on technical knowledge and experience. For example, one community decided to stock silver barb, and the project used its survey data to verify if the decision was right or wrong. When some communities decided to stock tilapia, the project let them know that tilapia is an invasive and imported species that is not recommended by FiA, which led to the communities changing their minds.
- Develop guidelines for stocking and patrolling that address the necessity of the government and communities. Although these guidelines were developed from scratch, they were based on practical experience from the project. They were simple guides, which most people can easily understand and communities can use.

- Selecting the right site is important to the success of any CFR. It is important to apply technical criteria, especially the optimal size of a refuge pond and its connections to rice fields. The ponds have the capacity to hold water year-round, and deepening interventions are critical to ensure the rice field system functions well. Governance of CFR committees is important to continue maintaining the system.
- Maintaining CFRs after the project will not require a significant amount of funding if the committees can stick to the scope and objectives of maintaining and conserving CFRs only. With membership fees, fundraising boxes, fundraising events and in-kind contributions (such as labor), some committees can maintain their CFRs properly. Whenever they needed to implement an intervention in their CFRs, the committees for the Boeng Malich and Boeng Kaek Ngout CFRs were able to raise funds, both in-kind and in cash. The communities at these CFRs prefer to follow these methods so that they can keep their funds at home and not at the bank, as that would require significant travel and paperwork (some of them are illiterate). However, although this works for CFRs with strong solidarity, the drawback for some CFRs is a lack of money whenever there is an urgent need to repair a dam or bank.
- Future projects should identify potential income generation activities after the second year at the CFRs so that people can start these activities to generate regular seasonal or annual income to support the CFR. Activities include (i) using available non-CFR ponds to harvest fish, (ii) forming partnerships with the private sector to sell water to rice producers (at Boeng Malich and Kaek Ngout) and (iii) forming partnerships with water kiosk entrepreneurs to get payment from using water and space for operating kiosks.
- CFR committees whose members are composed of young people can drive CFR management plans quickly. Although young people have the potential to migrate to towns or neighboring countries for work, and are often targeted for work in villages and/or communes, it is important to encourage them to become candidates for election.
- It is also important to include women in CFR committees in order to develop community needs and to maintain trust when it comes to fundraising and managing of funds. Male committee members said that female members were more trusted in fundraising because many villagers believed they are more stable and honest than men and do not drink.
- Rehabilitating CFRs is a long-term investment and an entry point for solving many problems. It also provides long-term impacts for maintaining a sustainable aquatic system, food security and livelihoods. From previous experiences of the RFFII project, some rehabilitated CFRs were still functioning even though there had been a long gap without funding and the mandate of the CFR committee had expired.
- Irregularity in seasons, such as late rains, causes a delay in spawning and breeding, which in turn delays fish reproduction. In addition, poorly distributed rain and short rains in rice fields surrounded by CFRs and ZOI lower fish production in those environments because fish cannot migrate from the refuge pond to the rice fields for reproduction, as was the case in the Angkanch Veau and Tropeang Andeuk CFRs between April and August 2023.
- Recurrent seasonal flooding between September and October in both 2022 and 2023 in Kampong Thom adversely affected CFR banks, roads and household fishponds. It is important to be proactive after flash floods, repairing destroyed banks immediately in order to save water in the pond. Maintaining water in the CFR is important before the rainy season starts again. At the Ou Krouch CFR, water was maintained by repairing the dam to block the flow of water out of the CFR. This allowed fish and OAAs to take refuge in the CFR and allowed households to maintain rice production and water at the borewell of households living near the CFR.
- It is wise to understand the nature of many problems before starting to solve them all because doing so is costly, time consuming and requires more effort. In many cases, all problems can be solved by one solution at the same time. For example, making a CFR deeper can increase water, which in turn raises the

survival rates of fish, OAAs and other aquatic plants. It can also correct imbalances in the agroecosystem, loss of biodiversity and a lack of water for animals, such as cattle, buffaloes and birds. On top of all this, deepening a CFR pond increase water and/or reduce the cost of pumping water for rice, cash crop and vegetable production. It can also stop or reduce illegal fishing inside the CFR as well as stop or tone down conflicts between CFR committees and water user groups.

- As Cambodia is a fish consuming country, RFF system fresh fish and processed micronutrient-rich small fish need to be incorporated into nutrition and WASH programs.
- CFRs provide a platform for the collective learning process. This includes sharing CFR management through communities and spreading ecological knowledge on, for example, RFFs, fish ecology, aquatic diversity and fishing gear. This

facilitates collective action on, for example, developing a community action plan and implementing interventions to improve the physical conditions of CFRs through monthly meetings with committee members and local authorities.

- Improved RFFs are an inexpensive source of aquatic animals and plants. They provide a high yield of aquatic animals and plants at an affordable cost that many people can access freely from rice field environments. This way of living can, in turn, be passed on to many generations to secure food and nutrition.
- Improved CFR habitats, including the fish refuge pond, buffer zone, rice field and canals, are important for fish reproduction. Improvements should focus on planting flood-resistant trees, grass and other useful plants, and limiting or minimizing the application of agrochemical substances where aquatic species are favored to live.

## 8. Best practices

---

The following are best practices acquired throughout the course of the project:

- Through extensive and comprehensive training and sufficient time for real practice, ranging from community problem solving, community planning and engagement, and physical CFR improvement, CFR committees have solid capacity to solve internal and external problems, manage funds, uphold transparency and pinpoint the advantages of CFRs to communities and local authorities. It also allows committees to present results of CFR work to local authorities and projects and maintain good relationships with all relevant stakeholders.
- Working with the right partners makes a huge difference. The right partners have the same goal of supporting the best interest of the community, and share the same common value and code of ethic (integrity, team work, trust, growth) and result oriented background. Following clear role and responsibility, supporting each, partner involved actively in the project. This maximizes impact and fills in any gaps in work capacity, skills and knowledge. WorldFish and local partners ANKO, FiA-C and PDAFF in Kampong Thom have long and extensive experience in CFRs. This is the first step to producing quick results in both quality and quantity.
- The support of local authorities also plays an important role in coordinating works under their jurisdiction. For instance, FiA-C was responsible for leading the CFR bylaw and CFR committees election, explain the fisheries law and cases of legal and illegal fishing activities practiced in the ground in the training to the CFR committees and awareness raising to communities. In addition, commune councils is backstop of community who continue to strengthen and solve any issues out of the CFR committees responsibilities, e.g. the conflict of land and water use, conflict of interest within the communities.
- It is not necessary to provide the same support to all CFRs since they have different physical characteristic and community needs. The physical of CFR, the capacity of CFR committees, and community development plan will require different level of support. For instance, fifty percent of project CFRs did not require dredging ponds, they need capacity building, reorganize committees and update bylaw.
- The patrol is effective when patrolling team compose of member who stands for fisheries natural resources conservation, are well trained in conducting patrolling and fisheries law, equipped with patrolling equipment. Modern patrolling equipment such as solar video camera should be introduced to reduce heavy burden of patrol team.
- A proper functioning CFR committee should be composed of both young and old members. Committees in which young people have leadership roles are likely to learn fast and drive CFRs quicker than committees made up of old and illiterate leaders. However, older members still play an important role in CFR committees, as they mostly remain in their communities and are willing to support their CFR.
- Simple monitoring and evaluation embedded with the CFR committee coaching program is part of self-reflection and ongoing learning. After the project intervention, the CFR committees in Boeng Phouk and Boeng Doeumsmach Khaektoum observed fish species at their CFR increased from 3-5 species, the reduction of illegal fishing, and the increase in fish catch and consumption in their communities.
- It is noted that the project was implemented smoothly through regular reporting and direct communication and consultation with FiA, PDAFF, and commune councils, and collaboration with relevant stakeholders.



## 9. Recommendations

---

1. The government department FiA and FiAC that is responsible for overseeing CFRs should have continuous means and commitment to support established CFRs in many aspects of governance, including electing CFR committees for renewed mandates, updating or developing CFR bylaws, technical guidance on stocking, patrolling and fish ecology, and crafting new fisheries laws.
2. Communities should maintain the physical conditions of their CFR, as the cost of maintenance is less than the cost of a new CFR. The cost of removing excess aquatic plants is minimal if done every 3 or 6 months. In contrast, the cost increases four to seven times if they are removed every year or 2 years. This is similar to maintaining inlet and outlets and deepening ponds.
3. At the decentralized level, commune councils should allocate funds for regular CFR maintenance. This is more cost-effective than improving CFRs after a long time of abandonment or carelessness.
4. Communities and local authorities should clearly define the goal and scope of their CFR and ensure it is safeguarded by fisheries laws. Otherwise, implementation, which is in the best interest of all groups, will divert the goal and scope to something else. This will have unintended consequences. A poorly defined goal and scope would lead to a lack technical support or expertise in CFR pond management, lack of knowledge of invasive fish species ecology, demotivation and increased conflict among CFR committees. This would spoil the entire CFR system quickly.
5. Based on the experiences of CFRs, investment should cover three areas: (1) biophysical improvement, (2) capacity building and (3) ongoing technical support, policy and regulation. This is a long-term investment that will continue to provide long-term benefits to people in local communities.
6. From the perspective of social learning, collective action and seasonal activities, it is recommended to do a deeper contextual analysis to shape the project design, duration and investment. In this regards, the project duration should last up to or over 5 years allow sufficient times for communities and local authorities to learn and adapt all aspects of the CFR management and protection, and fisheries environment, and small fund request proposal, conflict resolution, and leadership.
7. Development partners should expand their support to CFRs in Lower Mekong provinces and coastal areas to revitalize CFRs that have had no external support for the past 20 years. This would maximize the benefits of food security to more poor people across the country.
8. Site selection is important to ensure the future success of CFR. The successful final site selection should look at 1) the strong committees and support from the communities and local authorities (village chief, commune council, PDAFF, FiAC), 2) technical aspects including physical, social, and economics 3) letter consent from most of villagers/communities/relevant stakeholders (Provincial department of water resources and meteorology, community forestry, water user group) and 4) policy and regulation related to CFRs including CFR prakas and fisheries law. On top of that, local authorities FiA, and villagers should be actively involved in the process and make a final decision. More importantly, to avoid making a wrong decision and wasting the project investment cost, people involved in the site selection should clearly understand the concept of CFR and have sufficient and successful experience working with CFR.

***“ Supporting CFRs is to support integrated thematics, such as livelihoods, national economy, culture, food security and nutrition, capture fisheries, climate change mitigation, biodiversity and food systems, as CFR/RFFs play many important roles in these thematics.”***

9. CFR committees' election should cover a proportion of women and youth dynamically in community work. In addition, the registration and CFR committees' recognition should not take time thus the CFR committees can fully function on time.
10. It is critical to strengthen CFR committees' capacity in bookkeeping, reporting, and community budget planning and managing the funds raised and incomes from other activities to implement the CFR community development plan effectively and efficiently within the scope of CFR. The committees should keep reporting the progress of community activities and finance to CFR committees and members and the commune council.
11. As part of major fundraising to sustain CFR, the communities should continue and improve the practice of identifying and implementing income generation activities such as economic ponds or so called-catch share (sister ponds of CFR) and other potential micro-entrepreneurs.
12. Long-term support for effectively developing and implementing community development plans in compliance with the Environmental Mitigation Monitoring Plan (EMMP), and capacity building is needed. The time will allow the CFR committees to understand, practice, and adapt.
13. Potential CFR committees should be equipped with digital technology including computers, tablets, and video cameras, and training to use all devices. These skills and equipment will advance CFR committees to work more efficiently, and productively in writing reports, request letters, workplans, detecting illegal fishing, receiving early warning of the weather forecast, and linking to government communication such as FiA, Resources, and Meteorology, and other institutions.
14. All communities should continue to raise awareness about CFR management and conservation annually, especially on fish day or other events related to fisheries. This will continue to remind the protection and participation to maintain sources of food in their community. This should be trained in how to organize the event.
15. An integrated fish nutrition and waste management with CFR management awareness raising at community and schools should be organized creatively and do the same to activities of stocking fish, planting flood resistant trees, and clean up campaigns. The activities and messages of fish nutrition, waste management, CFR management, and conservation should be related to each other.
16. Further capacity building for FiAC, local authorities, should include the topics of an update and/or new Fisheries Law, CFR prakas, patrolling and fish stocking guidelines, data collection, management and analysis, and reporting related to CFR such as fish catch and consumption, fish biological monitoring, fish nests and fish migration. This type of training should be classified into different levels of the participants.
17. CFR and buffer zones are good areas for the reproduction of aquatic food systems. Thus, regenerative agriculture with short-life crops such as mung bean, maize, and cover crops should be promoted and integrated.
18. CFR committees should receive comprehensive training both in theory and practice in collecting data type fish species, fish biology, fish ecology, fish diary catch and consumption, and fish nest monitoring. There should be simple analysis training, and presentation skills to communities and local authorities. This will provide ideas to CFR committees to develop further community plans.
19. It is recommended to continue to support a business of small fish powder processing providing small-household income and nutrition for children and pregnant women, whilst many challenges are seasonal captured fresh fish available only in the rainy season, new markets for this product, a mismatch between quantity and market needs, and quality of processing techniques.
20. To support further program and/or project development plans, the following specific research should be carried out:
  - Develop guidelines on pond rehabilitation, including dredging, water management and drought mitigation.

- Study fish migration routes to provide evidence for infrastructure development projects to facilitate these pathways.
- Development long-term mechanisms to support CFRs, such as integrating income generating activities into the community and integrating community development plans into government funds, such as commune investments or district or provincial funds.
- Integrate CFR land registration into the provincial department of land management to maintain the original size of CFRs and stop CFR land encroachment.
- Study agrochemical substances and toxic fish.
- Study the reproductive habitat of wild fish to understand the conditions to be improved and get policy support.
- Study mechanisms to establish CFR networks, which are a platform for sharing experiences and learning.
- Study fish species and OAAs that are disappearing from refuge ponds in order to understand the factors that influence this change.
- Study specific fish stocking in CFRs to enhance fish production.
- Use development tools to analyze the impact of project interventions and potential good seasons, including regular rainy seasons that provide enough water.

# 10. Sustainability

After developing its sustainability plan in October 2022, SAFR implemented the plan and achieved the following outputs:

- The project built capacity for government counterparts, partner staff, CFR committees and local authorities on important subjects of CFR management, conservation and governance. Training ranged from in-class and on-the-job training to regular field coaching and refresher training. Various indicators, including pre- and post-training tests and applied techniques and training topics, were set to measure the quality and quantity of the capacity building. Having seen the potential of CFR committees, the project provided training on how to transfer knowledge to 10 local trainers, who would be retained as local resource people for CFR work. Four of them received basic computer training and a computer to manage CFRs effectively. These trainers are now regarded as CFR knowledge banks in their communities, and they are likely to take on more responsibility for commune and/or village work.
- The project worked with the government to fill any gap of the CFRs. When the mechanism of a CFR is in place, it is administered by elected CFR committees, is supported by communes and districts, expertise is supervised by FiA-C, and policy development is supported by FiA. The project used a participatory approach to involve government counterparts and engage all stakeholders at every stage of the project.
- SAFR adapted the flexibility and reality to develop and implement the plan to cope with any changes.
- As each CFR covers many villages, and in contribution to managing each CFR, the project raised awareness on CFR management and protection to villagers, including school students, at many villages in the CFR and ZOI.
- The project continued to work with VHSGs, which are existing members of communes. VHSGs are responsible for training and monitoring the progress of caregiver groups in nutrition and WASH and linking them to

***“After the project supported internet fees in 2022, the committee continues to pay the monthly costs (USD 5) to operate the video cameras run by solar energy. With the cameras, the patrol team saved a lot of time in patrolling. Residents surrounding CFR were aware of the camera, especially fishers, who were afraid for camera’s capture. Without a camera, committees would not have enough time to oversee their CFR, especially illegal fishing activities.”***

***– Mr. Peng Toeu,  
CFR committee at Boeng Phouk CFR.***

caregivers in the SAFR-CFR component and the MUSEFO project. Small fish producers are also mostly VHSGs who network with existing projects, provincial departments and local buyers in and outside Kampong Thom through participation in exhibitions, Facebook and Telegram groups.

- The CFR sustainable financial mechanism were adapted by CFR committees. The mechanism contains many types of fund sources including the integration of CFR community development plan into commune investment plan (CIP) and/or district plan, charity, private sectors, festivals, membership. By January 2024, 21 communities raised USD 20,672 which has not included the enormous in kind contribution (labour, equipments). This amount of fund raised, if managed well in the scope of CFR conservatism, is able to annually support for maintenance for each CFR.
- To learn how to effectively manage and sustain CFRs, the project organized exchange field visits to successful CFRs in Pursat and Siem Reap for all CFR committees in and outside the target provinces. The visit to Pursat came in November 2022 and to Siem Reap in September 2023. Besides, the exchange field visits were also organized in target Kampong Thom province during the annual provincial reflection workshop at Kampong Thom.

- In coordination with FiA-C, commune councils and CFR committees, SAFR renewed the mandate of CFR committees whose mandate had expired. It also updated community action plans within the scope of the CFRs and redirected committees to manage their finances focusing on affordable maintenance measures, using fundraising methodologies learned through training by the project. In addition, SAFR integrated community action plans into commune investment funds and government support.
- The project's approach supported the improvement of 21 CFRs, which is right in line with the results of the CFR status assessments. These assessment reports indicated that only about 2% of all 574 CFRs received support for rehabilitation of CFR, and approximately 64%–70% of all CFRs had plans to improve the environment and management structures of their CFRs to ensure sustainability. However, an extensive lack of external support has negatively impacted the functioning of these CFRs, leading to demotivation and resignation of members of the management committees.
- Sometimes, communities and others unintentionally use wrong practices that can deteriorate wild fish species and other natural aquatic species and can lead to failure in managing the CFR. To avoid this, SAFR developed guidelines for both fish stocking and patrolling. The stocking guidelines are intended as an instrument to guide communities and projects to stock fish correctly and safely and not deteriorate local species. The patrolling guideline prepares patrol teams to conduct proper inspections in compliance with fisheries laws and CFR bylaws, and to act timely, safely and peacefully. The endorsed guidelines were disseminated to all CFRs across the country as well as to FiA, FiA-C and relevant organizations that are implementing stocking and patrolling measures.
- SAFR also developed M&E tools to regularly measure the project's progress and results. Research was conducted as part of fact finding and used for planning and decision-making. The results of the BiOM and CCEM surveys provided evidence to decide which activities should fill in any gaps and which guides to develop necessary missing rules and guidelines.



**Plate 3.** Villager harvesting aquatic plants from the CFR pond for sale.

# 11. Publication and communication

The following publications were developed during the grant period and can be accessed via the link in Annex.

1. The project provided input into developing a 7-minute video featuring the importance of CFRs in the Aquatic Food Production for Life. The video described the impact of climate change on aquatic food production. It also outlined how CFRs are an innovative approach to address climate change and how they contribute to many dimensions, such as food security, nutrition, climate change mitigation and adaptation of food production. The video was used at community training and awareness raising events and was shared with local and international audiences through various channels. It has since reached 2460 views: 591 through WorldFish's YouTube channel, 50 during the workshops and meetings, 46 via VHSG Facebook groups, 138 by group telegrams (WorldFish, SAFR-FiA-C, commune council, CFR committee) and 1,685 through the awareness raising events. The video can be accessed via <https://youtu.be/kuKltJz0jPw?si=hwZqUIEGGggrUicf>
2. Guidelines for stocking and patrolling fish were developed in both English and Khmer: 2000 copies (1000 each) were given to FiA to distribute to communities, FiA-C, universities and other development partners.

CFR Patrolling Guideline English  
<https://hdl.handle.net/20.500.12348/5890>

CFR Patrolling Guideline Khmer  
<https://hdl.handle.net/20.500.12348/5843>

CFR Stocking Guideline English  
<https://hdl.handle.net/20.500.12348/5889>

CFR Stocking Guideline Khmer  
<https://hdl.handle.net/20.500.12348/5842>

3. WorldFish developed two documents:
  - Key lessons and priority research and investments for community fish refuges: Rice field fisheries.  
<https://hdl.handle.net/20.500.12348/5841>
  - Rice-fish co-production pathways for Cambodia's sustainable development.  
<https://hdl.handle.net/20.500.12348/5840>

These two publications and other project documents were uploaded into its Dspace.

4. Through interaction between the Global Program and GIZ-SAFR, a GIZ communication specialist based in Germany interviewed the project manager to develop a new podcast series called Food4Transformation. The interview explored CFRs as an innovative way of contributing to the transformation of food and agriculture systems. The first episode focused on the resilience of agriculture and food systems in times of multiple crises and delved into (i) a community-based approach for rice paddy fisheries, (ii) the advantage of such an approach, (iii) the contribution of CFRs to making a community more resilient, (iv) the possibility of applying the community model outside Cambodia and (v) the importance of scientific data for fisheries. The episode is 25 minutes long and is available at either <https://www.foodfortransformation.org/podcast-en.html> or <https://x.com/food4transform/status/1709908640252002788?s=20>

# 12. Challenges

---

## 12.1. COVID-19 pandemic

The outbreak of COVID-19 pandemic in March 2020 was seriously prolonged till mid 2022. To reduce spread of virus, the Cambodian government imposed travel restriction, restricted gathering, temporary closed borders. In this time, most of project staff and local authorities were affected by the virus and quarantined from two to three weeks. This forced SAFR to delay elections for CFR committees 2 months.

Because of the frequent delays in CFR elections and bylaws, further activities were also delayed. IUU-F patrols have not begun widely because there is no clear role and guideline to adhere to. In addition, CFR sizes and boundaries have not been identified, which led to postponing the installation of demarcation poles. On top of all this, the official name of the CFRs was not agreed to in the delayed bylaw discussion, causing signboards to be put up late.

In response, project staff continued to implement activities in the field with a small group of people such as six month coordination meeting, CFR bylaw preparation, CFR management training of trainer, comply with COVID-19 precautions and obtain permission from local authorities. Quarantined staff at home documented 3-year community development plans for 10 CFRs, CFR bylaws and elections and reviewed training session plans and materials for training of trainers on CFR management to FiA-C and partner staff. They also conducted online training of trainers and continued virtual meetings for planning and reporting.

## 12.2. Flash flooding

Prolonged heavy rains and an extreme flood event in October 2022 and 2023 came as a big surprise, causing widespread damage to roads, households and farmlands upstream of the Stueng Sen River. It affected the Boeng Malech, Boeng Kaek Ngout and Ou Kruch CFRs and damaged access roads, guardhouses and signboards. The project team faced flooding when most of the target areas were affected by seasonal and flash floods. One of them was the Ou Krouch CFR, where the embankment and road connecting to the CFR were both damaged. Unable to access some flooded CFRs, project staff continued working at CFRs and offices that were not affected by the floods.

## 12.3. High prices and lower exchange rates

Since February 2022, when the Ukraine–Russia war began, the price of gasoline and diesel has soared. As a consequence, the cost of goods and services also increased. Meanwhile, the exchange rate from EUR to USD has been lower than in previous years. This crisis slightly affected grant agreement budget for the project implementation, although it was manageable.

# 13. Conclusion

---

CFRs are a successful way to maintain RFFs for nearby villages, providing a wholesome source of fish for villagers' consumption and a source of household income for Kampong Thom. Furthermore, as a source of water during the dry season and for various household uses, CFRs provide many benefits for the local way of life. When other local water sources, like little creeks and ponds that have dried up during severe drought years, having a well-managed CFR in a rural is especially helpful. If CFR management guidelines were expanded to other provinces where CFR development is appropriate, and perhaps improved for other regions of Cambodia, the livelihoods of rural communities would improve, as would their resistance to adverse effects of climate change.

The SAFR project successfully exceeded its goals of improving fish availability, income and community engagement in Kampong Thom in several areas:

- Fish production surpassed the target by 104%, with CFRs producing 3,748,480 kg of fish annually.
- Both men and women working in the fish value chain increased annually income by USD 761,346 and 44 full time jobs compared to baseline.

- A total of 183 CFR committees adopted sustainable management practices learned through the project, exceeding the target by 83%.
- A total value of USD 20,672 fund raised by 21 CFRs committees had been using to maintain and manage CFRs.
- A total of 29,530 people (four times the target) reported consuming more fish, leading to improved diets and well-being.
- CFR communities significantly improved their knowledge and capacity for sustainable management.
- Over 4,900 people participated in awareness campaigns and training programs.
- 27,814 hectares of rice fields and CFR conservation areas were improved by the project intervention including sufficient water remained in the community refuge ponds, grass and flooded resistant trees, etc. This was addressed to the drought climate change.
- Two year of fish habitat improvement along with a good season, fish species increased 30% and fish nests reached 34%.

Overall, the project made a significant and positive impact on the lives and livelihoods of the people in Kampong Thom. By increasing fish availability, income and community engagement, the project has contributed to food security and improved nutrition, adapted to the climate change, improved biodiversity, and has empowered local communities.



## 14. Budget and financial status

WorldFish received a grant amounting 1,108,716 EUR for implementing a 40-month project commencing from December 2020 to March 2024. The budget was fully spent timely and effectively in accordance with the project workplan and achieved the project goal, objectives, outcomes and deliverables, which is represented below.

Budget and Expenditure for December 2020 to March 2024

Budget Description	Budget (EUR)	Actual expense (EUR)	Estimated Expense (EUR)	Balance (EUR)	% Spent as end of November 2023
	December 2020-March 2024	December 2020-February 2024	March-2024		
1. Staff (Job title)	367,498	342,018	14,342.51	11,137.81	97%
2. Transportation/Travel costs	40,793	31,306	1,852.31	7,635.34	81%
3. Publication cost	1,665	1,267	436.57	(38.67)	0%
4. Training costs	18,269	20,466	1,142.81	(3,339.91)	118%
5. Project operating cost	279,402	293,293	3,443.46	(17,334.69)	106%
6. External experts	64,826	60,838	2,086.42	1,900.74	97%
7. Procurement of goods	670	631	-	39.38	94%
8. Supporting/Administration costs-OH	157,408	152,663	4,744.72	(0.00)	100%
9. Forwarding of funds	178,185	160,373	17,811.65	-	100%
<b>Total (EUR)</b>	<b>1,108,716.08</b>	<b>1,062,855.63</b>	<b>45,860.45</b>	<b>0.00</b>	<b>100%</b>

Expenditure compared with Approved Budget

Approved Budget (EUR)	Actual Expenses (EUR) (December 2020-February 2024)	Estimated Expense (EUR) (March 2024)	Balance (EUR)	% Spent as end of March 2024
1,108,716	1,062,856	45,860	(0)	100%

# Notes

---

- <sup>1</sup> Sub degree No.39 designates 438 hectares as the Sambor Prei Kuk Protected Landscape in Prasat Sambour district, Kampong Thom province for environmental protection, ecosystem conservation, sustainable use of natural resources and community-based culture protection.

## List of figure

---

<b>Figure 1.</b> Results of the CFR capacity assessments.	13
<b>Figure 2.</b> Test results for CFR-RFF management training of CFR committees.	14
<b>Figure 3.</b> CFR-RFF scores among villagers and students (2022–2023).	17
<b>Figure 4.</b> Test results on nutrition and WASH among partner staff and VHSGs.	18
<b>Figure 5.</b> Percentage of use of fish powder produced (2022–2024).	19
<b>Figure 6.</b> Number of fish and species at CFR.	28
<b>Figure 7.</b> Proportion of fish migration.	28
<b>Figure 8.</b> Number of fish found by cameras per hour.	29
<b>Figure 9.</b> Average number of fish nests found during monitoring.	29
<b>Figure 10.</b> Fish nest habitats in RFF systems.	30
<b>Figure 11.</b> Average fish catch per fisher household.	30
<b>Figure 12.</b> Proportion of fish consumption in RFF systems in 2021 and 2023.	31
<b>Figure 13.</b> Distribution of FIES levels in RFF systems in 2021 and 2023.	32
<b>Figure 14.</b> Trend of fish and OAAs caught by key fishers in RFF systems in 2022 and 2023.	32
<b>Figure 15.</b> Illegal fishing in RFF systems in 2021 and 2023.	33
<b>Figure 16.</b> The Margalef diversity index and abundance of fish in CFRs.	34

## List of tables

---

<b>Table 1.</b> Key outputs of the project.	10
<b>Table 2.</b> Test results from training provided to FiA-C and ANKO staff in Kampong Thom.	12
<b>Table 3.</b> Criteria for baseline and endline assessments of the CFRs.	13
<b>Table 4.</b> Updated progress of quarterly meetings with 10 CFR committees.	22
<b>Table 5.</b> Support to CFR committee on patrolling in CFR system	25
<b>Table 6.</b> Distribution of FIES levels (n=250).	31
<b>Table 7.</b> Average amount of fish caught per household in RFF systems.	32
<b>Table 8.</b> Key information from the logbook over a 2-year period.	33

# Annex

---

1. Implemented CFR physical intervention
2. CFR data inventory
3. Updated Logical Framework
4. CFR apply fisheries management practice
5. List of Publication
6. List of CFR Committee
7. Types of fish nests in rice field systems



## **About WorldFish**

WorldFish is a leading international research organization working to transform aquatic food systems to reduce hunger, malnutrition, and poverty. It collaborates with international, regional, and national partners to co-develop and deliver scientific innovations, evidence for policy, and knowledge to enable equitable and inclusive impact for millions who depend on fish for their livelihoods. As a member of CGIAR, WorldFish contributes to building a food- and nutrition-secure future and restoring natural resources. Headquartered in Penang, Malaysia, with country offices across Africa, Asia, and the Pacific, WorldFish strives to create resilient and inclusive food systems for shared prosperity.

For more information, please visit [www.worldfishcenter.org](http://www.worldfishcenter.org)