



Key lessons and priority research and investments for Community Fish Refuge-Rice Field Fisheries



Introduction

Rice field ecosystems make up the majority of the agricultural land in the Lower Mekong region (Ingalls et al. 2018). In Cambodia, WorldFish research found that one hectare of a rice field ecosystem can provide enough wild fish and other aquatic animals to feed 2.6 people for a year (Freed et al. 2020; Hortle 2007). These rice field fisheries (RFFs) provide more than half of the fish that local people consume, and one-third of total inland fish catch nationwide (Freed et al. 2020; FiA 2017). The economic value of RFFs can approach or even exceed the value of a single wet season rice crop (Hortle et al. 2008). In addition, as RFFs are traditionally a common-pool resource during the flood season, they are particularly important for impoverished and landless households. Because of this, management through community fish refuges (CFRs) would ensure that 80 percent (MAFF 2017 and 2018) of Cambodia's rice field ecosystems continue to provide these benefits. This brief provides the key lessons and priority research and investments needed to sustain, adapt and scale CFR-RFFs based on WorldFish's 12 years of experience.

Key recommendations

- CFR-RFFs provide many benefits. Engaging policymakers, investors and implementers can sustain these benefits through such actions as increasing the capacity and awareness of legal frameworks, aligning with decentralization and securing land titles. These actions also include supporting multiple dimensions of CFR management, such as biophysical conditions, governance, financial sustainability, knowledge dissemination, and adaptation.
- Many investments are needed to adapt and scale CFR-RFFs further. These include making training more effective, strengthening capacity, engaging youths and making use of technology as part of CFR management, making periodic biophysical investments, using tools for economic costing and valuation, crafting practical guidelines, and doing research related to biodiversity and climate.

Long-term success

To make CFRs successful over the long term, policymakers, investors and implementers need to implement the following seven actions:

1. **Build awareness and capacity of legal frameworks.** Ensure that all levels of government understand the prakas and relevant fisheries regulations related to managing CFR-RFFs. This requires periodic training and raising awareness to keep up with changes in both the regulations and the staff involved.
2. **Facilitate alignment with decentralization.** Involve commune councils and fisheries cantonments. These actors need to have clear mandates and funding to help manage CFR-RFFs.
3. **Secure land titles.** Ensure that CFRs have a land title in order to avoid land encroachment. As they are considered commune land, completing the land titling process can secure CFR tenure.
4. **Provide balanced support for biophysical conditions and governance of CFRs.** Provide support for technical improvements as well as management capacity. Although the needs of each CFR will differ, attention to both the biophysical and governance components is necessary for long-term success.
5. **Clarify and expand financial sustainability options.** Community fundraising is currently the primary source of income for CFR management. Although fundraising efforts, such as placing a donation box at a local pagoda, have provided consistent sources of funding, the amounts are insufficient to cover expenses for community-level management. Income generation activities could ensure the financial sustainability of CFR management, but they require clear regulations. These include terms and conditions for implementing the activities, ensuring transparency and inclusiveness in generating and managing CFR funds, and guidance on conflict resolution mechanisms.
6. **Invest in adaptive management and knowledge sharing.** CFR committees, local authorities and other stakeholders involved in managing CFR-RFFs have a wealth of experience. Various projects have tapped into this experience to provide knowledge and training and through annual reflection workshops to reinvigorate management commitments and performance. The investment and government engagement required to ensure these activities take place are well worth their benefits.

7. **Monitor and reflect on the loss of CFRs and RFF livelihoods.** Because of infrastructure development and/or environmental change, some CFRs have become disconnected from rice fields and lost their function as perennial fish habitats, often with a reversion to fishing activity. In addition, there is an apparent shift away from RFFs as a secondary livelihood for rural households, with increased dependence on wage labor and other livelihood activities. Monitoring and researching these trends could provide a better understanding of the changing conditions, their effects on the socioeconomic status and resilience of rural households, how to address drivers of change, and adapting CFR-RFF systems in response to changing needs.

Adapting and scaling CFR-RFFs

As socioeconomic and environmental changes take place, CFR-RFFs need to adapt to remain effective and deliver benefits. Building on the current system approaches could also extend the reach of CFR-RFFs and scale them further. The research and investments necessary to do so are outlined below:

- **Provide effective training and strengthen capacity.** Ongoing investments are necessary to ensure both government and community committee members have adequate training and skills to manage CFRs. Some turnover should be expected, which is why continued investment is needed. To that end, it is important to develop and pilot a program as vocational training provided through the educational system and/or government induction training for government staff.
- **Engage youths and use technology to manage CFRs.** Adding digital and data components to the management approach would have multiple impacts through investment that both engages youths and improves CFR management. Piloting youth training and developing digital and data components may include monitoring rainfall, water levels, water quality, floods, drought, illegal activities, and early warning or advisories for periods of water scarcity and/or high water demand. Using vocational and/or school curricula could train youths on CFR management, functions and conservation.
- **Use the CFR improvement fund as a periodic investment mechanism.** Investments that improve the environment and biophysical conditions are important when establishing a CFR. They are also needed at regular intervals (every 3–5 years) to maintain activities beyond what the CFR committee has funds to achieve. The recently developed CFR improvement fund at the FiA could provide this periodic investment, if the fund is replenished.

- **Develop economic tools to guide CFR investment and valuation.** A tool to estimate investment costs, including both biophysical and governance investments, could support future site selection and investments. A versatile tool would allow for analysis of the changing costs based on different contexts or starting conditions. A tool and/or research is also needed to estimate long-term return on investment for CFR-RFF systems. Although several projects have monitored and evaluated specific aspects of CFR-RFF benefits, there is no systematic approach nor one that adequately values the benefits of climate resilience.
- **Develop and/or refresh practical guidelines.** Developing and disseminating practical guidelines, such as the [Manual of CFR-RFF Management](#), would support CFR-RFF management. As conditions change, this requires periodic investment to refresh and/or develop new guidelines. Currently, a general guideline for stocking CFRs is in development, and it can be updated in the future with recommendations for specific species. Expanding the recommendations for site selection and investment in the CFR-RFF manual is needed to include waterbody conditions that were not originally considered in candidate CFRs. A new guideline is also needed on developing nurseries and planting flood tolerant trees in CFRs, as these trees can stabilize fish habitats and banks. Guidelines on deepening CFRs are also needed, including on technical and operational guidance on bank slopes, bottom topography, placement of excavated soil, procurement, contracting transparency and working with an excavation company.
- **Key areas of foundational and discovery research.** Research is needed to better understand fish migration patterns and the distances fish travel from a CFR, the best practices for stocking and maintaining fishstock in different types of CFRs, and conservation activities targeting rare fish species. So far, no CFR oriented investments have been able to cover these fundamental areas of knowledge to ensure CFRs are conserving biodiversity as best they can. Changing practices and conditions in rice production could also benefit from research in order to understand their effects on the biodiversity and productivity of CFR-RFFs. These include controlling the invasive golden apple snail, preventing loss of local snail species, determining the presence of pesticides in water, soils and aquatic species, and examining the effects of rice planting techniques and soil conditions on aquatic species abundance and RFF productivity. Periodic research investments will be needed to identify changes in how CFRs influence fisheries production, biodiversity, nutrition and livelihoods. Finally, climate-related research will help CFR-RFFs adapt to and mitigate the effects of climate change.

Opinion piece

The Sustainable Aquaculture and Community Fish Refuge Management project, supported by GIZ, saw a huge leap in harnessing the power of digital technologies to sustainably manage CFRs in the province of Kampong Thom. A CCTV camera, connected to the internet and powered by solar energy, has been helping the patrol team observe the conditions of the ponds in real-time and avoid fishing within the CFRs' protected areas. The experience of using cameras from other committees to manage CFRs which supported by project, some other committee along with installing solar cameras to monitor the CFRs.



Photo credit: Sean Lynch/WorldFish

“ With our camera, the patrol team can save time for patrolling. By just clicking the app on a smartphone or tablet that connects to the camera, they can view the conditions around the pond in real-time. Community people are aware of this and told other people not to go fishing around the protected areas. ”

— Pheat Peakdey, Chief of the CFR committee in Boeng Doeumsmach Khaektoum

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