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Knowledge Policy Brief

Rethinking Learning in Community Fish Refuge Management: Insights from Cambodia

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Inland fisheries are central to rural livelihoods in Cambodia, providing both subsistence and seasonal income. However, these fisheries are increasingly threatened by environmental degradation, including overfishing, hydropower development, habitat loss, pollution, mining, sedimentation, and climate change. Furthermore, as intensifying irrigated rice production out-competes inland fisheries for water, the decline of wild aquatic species further jeopardizes food security and biodiversity (Freed, Kura, et al., 2020; Phala et al., 2019).

Historically, fish have served as a vital safety net during times of food insecurity (Sithirith et al., 2024). Community Fish Refuges (CFRs) are a recent innovation in the Tonle Sap floodplain to retain floodwater and provide dry season aquatic habitats. They offer a sustainable strategy to enhance fish productivity within rice field fisheries (RFFs) by protecting fish populations in communal water bodies managed by local communities, with support from the regional Fisheries Administration (FiAC) and NGOs.

A CFR Committee is responsible for the management of a CFR. Composed of local volunteers, CFRs are tasked with sustainable CFR management including prevention of illegal fishing and balancing competing demands for water by extractive uses including agriculture and household use. However, the success of the CFR's sustainability is not only dependent on the CFR committee, but on the entire community of members who have access and use the CFR system.

As new shared multiple-use assets, CFRs represent a need for a new management and learning system that can foster resource management that is both a collective effort and integrates the needs of multiple water stakeholders, which marks a departure from more sector-based approaches. While the ecological and production benefits of CFRs are well documented (Freed, Ou, Sean, & Sun, 2024a, 2024b), the challenge is how communities and CFR Committees can adapt, through collective learning, to collectively managing this shared asset in the long term.

While current CFR management benefits from the integration of local knowledge with formal management tools, it remains essential to advance learning mechanisms that actively engage a wider range of rural actors. These approaches should foster flexibility and resilience, enabling communities to better respond to environmental and social pressures as well as underlying structural inequalities.

Key messages

- CFRs in Cambodia foster multiple forms of knowledge—experiential, ecological, social, and management—through everyday practices and collaboration with NGOs and government agencies.
- Unequal access to learning—driven by social inequalities, hierarchical communication structures, and short project cycles—undermines inclusive participation, peer learning, and leadership renewal in CFRs. In addition to stifling adaptive management, these structural barriers threaten institutional continuity, as knowledge is often not systematically shared across community levels or during leadership transitions.

Recommendations

- **Prioritize long-term, sustained funding for CFR learning initiatives that match the timescale of social and cultural change**, while strengthening CFRC governance to ensure inclusive representation and active stakeholder engagement.
- **Support peer learning and leadership development for marginalized groups** by enabling CFRCs to foster equitable participation and shared decision-making.
- **Promote learning approaches that empower communities, enhance food security, and support democratic environmental governance through more open and consultative CFRC practices.**

What are the knowledge creation practices?

The CFR initiative in Cambodia has fostered various types of local knowledge within the communities, which we divide in mainly four areas identified in empirical research (see Disclaimer):

1. **Experiential knowledge:** Gained from hands-on CFR management, this knowledge includes practices such as pond fencing, flood-resistant planting, and water regulation techniques, which enable community members to directly influence the CFR's environment.
2. **Ecological knowledge:** Developed by combining hands-on experience with pre-existing local knowledge, this integration deepens the community's awareness of aquatic ecosystems—including the roles of plants in fish habitats, fish species and behavior in relation to seasonal changes, and key aspects of the fish life cycle such as spawning seasons, migration patterns, and natural food sources.
3. **Social dynamics knowledge:** The local representatives – Commune Council members and CFR Committee – strengthens social bonds and disseminates management insights among Commune Council members, fostering mutual assistance between local representatives, and developing communication strategies from the leaders to the general population based on traditional channels of information, particularly for monitoring CFR areas and controlling illegal fishing.
4. **Management knowledge:** Local representatives have enhanced their awareness of CFR budgeting, management, and regulatory practices, from eco-shelter installation to understanding fishing laws and leadership roles within the CFR Committee.

These knowledges are created through various management practices, such as CFR cleaning and provisioning, ecology management, patrolling, fundraising, water management, and biophysical monitoring of the CFR (Kim, et al, 2019). These enhance local biodiversity, protecting fish populations, and promoting sustainable fishing practices. Moreover, the region's historical knowledge systems in agrobiodiversity and water management, deeply rooted in Cambodian heritage, have been effectively adapted to the CFR model development by local partners, within which WorldFish and the regional Fisheries Administration (FIAC) play a key role. This is a key strength and achievement in terms of co-production of knowledge.

Access to management knowledge is primarily through training and collaboration with NGOs and government agencies such as the FiAC. Programs on nutrition, illegal fishing, and CFR benefits are widespread, while CFR Committee members receive leadership and law enforcement training, which they use to educate others on sustainable practices (Ou, Sean, Sun, & Akester, 2024). CFR Committee representatives are responsible for communicating information about the CFR to villagers; however, this process tends to be largely unidirectional—from committee leadership to the broader community—highlighting structural limitations in inclusive participation, as outlined below.

What are the challenges and structural limitations for collective learning?

1. **Social differences—such as gender, education, age, and socioeconomic status— limit equal participation in CFR learning processes.** Social norms often determine who takes on key roles, excluding those with limited literacy, time, or resources. These inequalities are not experienced in isolation; rather, they intersect in complex ways to shape individuals' access, authority, and visibility in collective processes. Such dynamics undermine inclusive leadership, reduce community engagement, and risk sidelining especially marginalized perspectives, ultimately weakening broader support for CFR management and creating learning inequities.

These dynamics influence who is included or excluded, whose voices are heard, and who perceives themselves as legitimate participants. For many, particularly those living in poverty, this exclusion is internalized—people may self-censor or withdraw because they have absorbed the low value others place on their contributions. These entrenched hierarchies are especially difficult to shift through current learning models, as they are deeply embedded in broader social norms and everyday interactions.

2. **Knowledge sharing and institutional continuity.** While the CFR Committees have made advances in fostering knowledge exchange among local leaders, knowledge dissemination to and discursive dialog with the wider community remains constrained by hierarchical structures. This limits broad-based understanding and participation, undermining the democratic and inclusive governance principles at the heart of CFR. Furthermore, institutional continuity is at risk when knowledge is not systematically transferred from outgoing to incoming committee members. Assessments of CFR achievements also tend to focus more on quantitative indicators, overlooking qualitative dimensions such as inclusiveness, dialogue, and leadership development. Striking a better balance between quantitative and qualitative evaluations is essential to capture the full scope of progress and challenges.
3. **Disconnect between short-term funding and longer processes of learning:** The internalization of new ways of thinking, behaving, and engaging for the management of a new common resource as the CFR, contends with deeply rooted norms and practices, making the shift to inclusive and democratic alternatives a complex and gradual process. However, current funding schemes are based on short-term goals which are not accompanying long-term processes of inclusive learning and management.

WorldFish and local partners have advanced processes of learning by taking the CFR learning process beyond the management dimension to include nutritional aspects, gender differences, and the teaching of fisheries sustainability awareness in schools and local community meetings. They have implemented these new learning and knowledge mechanisms in a CFR process during the period 2021-2024. However, longer implementation periods are still needed for peer learning processes that include a wider variety of local voices, along with efforts to identify potential CFRs to serve as Learning Hubs for knowledge-sharing and the dissemination of information.

A key challenge lies in the sheer number of CFRs requiring ongoing support. This highlights the need for robust exit strategies that are integrated from the outset of interventions. However, designing and implementing such strategies remains difficult without adequate timeframes for engagement and capacity-building.

How can support strategies be reevaluated to enhance sustainable and inclusive CFR learning?

To enhance sustainable and inclusive CFR learning, support strategies must prioritize long-term investment in both the learning processes and the cultural dimensions of CFR governance. Future program development should focus on sustained funding and initiatives that accompany governance and management frameworks with equitable and inclusive learning.

A central component of this effort is the institutionalization of more robust, inclusive mechanisms for knowledge-sharing. While initial steps have been taken—such as documenting best practices and building the capacity of key communities in skills like adaptive management planning, facilitation, and the use of simple training materials for peer-to-peer learning—these efforts require greater enforcement and sustained funding to reach their full potential. This means moving beyond approaches centered primarily on the CFR Committee, toward dialogue-based communication involving all CFR members. Such engagement can help communities cultivate critical awareness of environmental challenges, strengthen collective strategies, and tailor management practices to local conditions—fostering more endogenous, locally rooted CFR systems. Integrating traditional ecological knowledge with modern practices is vital to ensuring both ecological and social sustainability.

To support this shift, we advocate for greater involvement of Cambodian educationists in CFR-related work. Their expertise is essential for interpreting local dynamics and ensuring culturally relevant and socially responsive governance. Furthermore, action-research into the learning processes of the CFR Committee is recommended to reinforce ongoing efforts by WorldFish and local partners, and to strengthen the social sustainability of CFR initiatives.

Ultimately, all learning processes must be guided by local needs and contextual realities, and grounded in approaches that affirm local communities' rights to food security, self-determination, ongoing processes of collective learning, and inclusive participation in environmental governance.

References

1. Freed, S., Kura, Y., et al. (2020). Rice field fisheries: Wild aquatic species diversity, food provision services and contribution to inland fisheries. *Fisheries Research*, 229, 105615. <https://doi.org/10.1016/j.fishres.2020.105615>
2. Freed, S., Ou, P., Sean, V., & Sun, V. (2024). Rice-fish co-production pathways for sustainable development in Cambodia. Penang, Malaysia: WorldFish. Policy Brief: 2024-10.
3. Freed, S., Ou, P., Sean, V., & Sun, V. (2024). Key lessons and priority research and investments for community fish refuge-rice field fisheries. Penang, Malaysia: WorldFish. Policy Brief: 2024-11.
4. Ou, P., Sean, V., Sun, V., & Akester, M. (2024). Sustainable Aquaculture and Community Fish Refuge (SAFR) project: Final report 2024. Penang, Malaysia: WorldFish. Technical Report: 2024-14.
5. Phala, C. et al. (2019) 'Assessment of community fish refuge management practice in the Siem Reap Province of Cambodia', *Environments - MDPI*, 6(1). Available at: <https://doi.org/10.3390/environments6010001>.
6. Sithirith, M., Sao, S., de Silva, S., Kong, H., Kongkroy, C., Thavrin, T., & Sarun, H. (2024). Water governance in the Cambodian Mekong Delta: The nexus of Farmer Water User Communities (FWUCs), Community Fisheries (CFis), and Community Fish Refuges (CFRs) in the context of climate change. *Water*, 16(2), 242. <https://doi.org/10.3390/w16020242>



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