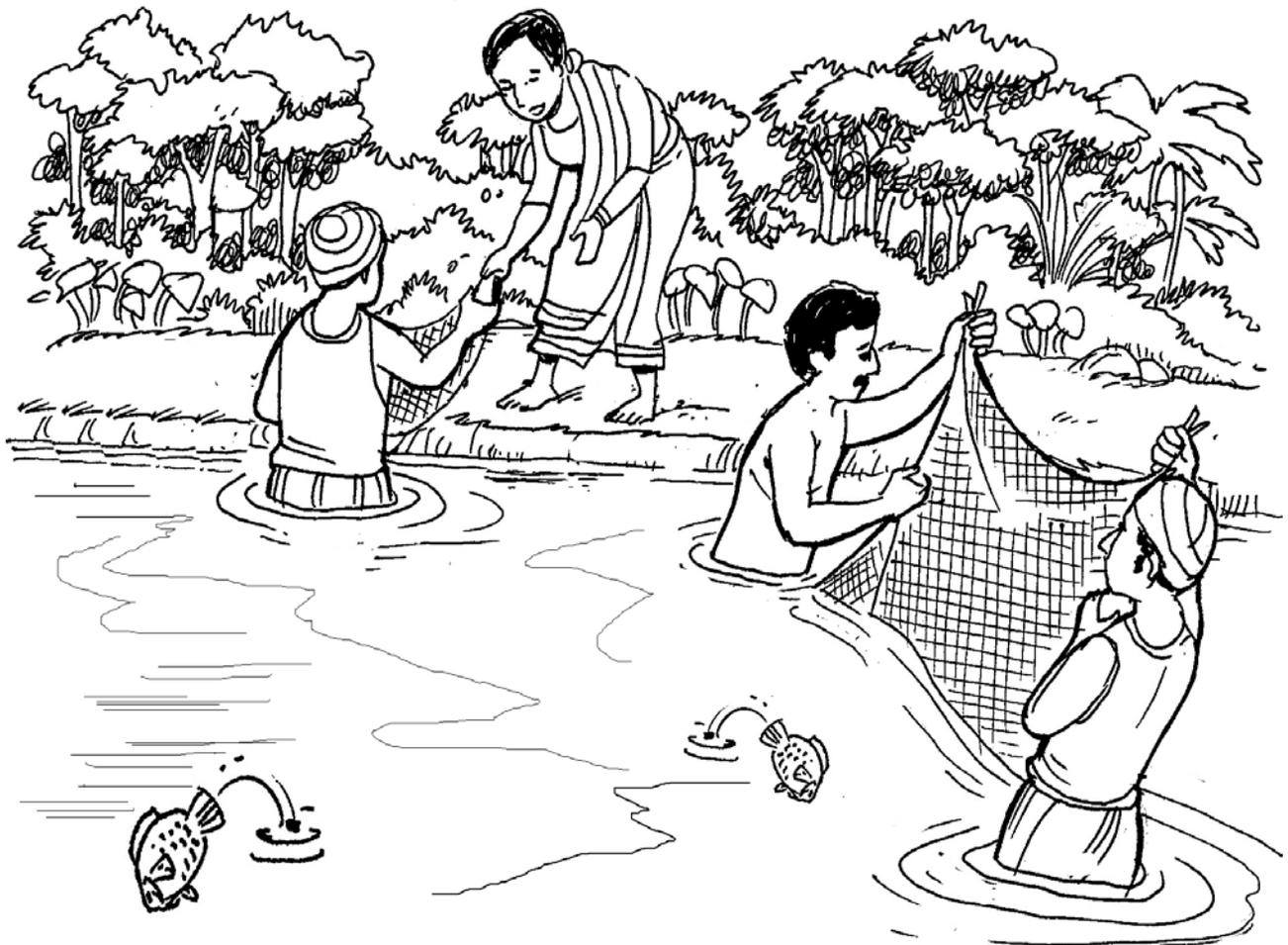


Collective Action in Community-Based Fish Culture in Seasonal Floodplains and Irrigation Systems



The CGIAR Challenge Program on Water and Food (CPWF) project, 'Community-based fish culture in seasonal floodplains', was a 5-year interdisciplinary action research project that aimed at enhancing fish production in seasonal floodplains to improve and sustain rural livelihoods. The research was carried out in seasonally flooded areas, where rice is cultivated on individual household plots during the dry season. During the flood season, the same land is inundated, creating an open access waterbody for capture fisheries.

The project sought to develop technologies and institutional arrangements appropriate for a variety of environmental and socio-cultural settings to support collective fish culture in the flood season. This project was implemented in five countries: Bangladesh, Cambodia, China, Mali and Vietnam.

The project focused on developing institutions for community-based management, negotiating access to floodplain resources and creating benefit-sharing arrangements. The variable success of

community-based fish culture activities in the project countries led to a deeper consideration of the context and its contribution to the success or failure of collective action under differing socio-ecological conditions.

Methods

Sites were selected based on hydrological conditions (height, extent, duration of flooding), existing infrastructure (dikes, irrigation canals), willingness of local communities to participate in the project and support from local authorities.

Fish stocking was carried out at each of the project sites under the guidance of national partners with expertise in local aquaculture systems. Locally preferred species were stocked in polyculture systems, with stocking densities and proportions varying from year to year as the culture systems evolved. Similarly, enclosure designs were locally adapted and modified.

Collective approaches to aquaculture have variable success in each of the countries, with the project delivering different levels of benefits both within and between countries. Negotiating access and creating and reshaping institutions and benefit-sharing arrangements within a system where rights are dynamic were some of the key challenges experienced.

Bangladesh

Successes have been substantial in some project sites, whereas disputes, conflicts, and ultimately discontinuance have occurred at others. Building on previous community-based fisheries management experience in the country, community-based fish culture has been introduced in floodplains, subject to a complex array of administrative arrangements. The project was

implemented in the floodplains under public and private ownership, in which the public portion was leased to a fishers' community, while the floodplains were completely under private ownership. In each system, enclosures were created within floodplain depressions. Fish culture was managed by a floodplain management committee, made up of representatives from all communities surrounding the floodplain, with participation of landowners and the landless. As described by Haque *et al.* (2008), however, the complexities of access and ownership to land, water and fishing rights have created serious challenges for the project. Despite these challenges, the community fishers' society at Kalmina Beel floodplain in Mymensingh (which is completely under private ownership) is still operating successfully. Fish culture is now financed by savings set aside from successful fish culture during previous years. In the Beel Mail floodplain in Rajshahi District, under public and private ownership with the support of local authorities, the fishers' society was able to extend its rights to use the floodplain for 2 more years after the project ended in 2010. However, it was recently leased to another fishers' society in the area.

Vietnam

Fish culture activities in southern Vietnam have been introduced on a collective basis in flooded rice fields of the Mekong Delta. In contrast to Bangladesh, the flooded land is entirely under private ownership, with members of the fish culture group drawn from households whose land is situated within the flooded area. Where annual flood height is low enough to permit the creation of enclosures around individual household plots, there has been a general preference towards fish culture on an individual basis or a third rice crop. There is insufficient incentive for farmers to work together collaboratively to raise fish. Consequently, there have been high levels of discontinuance of community-based fish culture in these areas. At

present, however, approaches to collective fish culture are evolving among groups of households who favor fish culture in a small number of enclosed rice fields. In the provinces of the Mekong Delta that border Cambodia, floodwaters are deep, permitting only two rice crops each year. In these areas, the cost of creating individual enclosures, using fences of sufficient height to contain stocked fish is prohibitive, making collective fish culture a more viable option. Benefit-sharing arrangements, management of fish culture and leadership of community groups continue to pose challenges and need to be addressed.

Cambodia



Establishing community groups to successfully manage fish culture within flooded areas in Cambodia has been problematic. Fish culture activities have been introduced in open access reservoirs and flooded rice fields. Initially, households were keen to participate in the project. Farmers have since demonstrated a preference for fish culture on an individual basis, introducing the technology instead on their own homesteads and private plots. As in Vietnam, in some areas, there has been a move toward collective fish culture among smaller fish culture groups of 10-12 households, who practice fish culture in

3-4 enclosed rice fields. Members of these fish culture groups are currently improving the rice field environment for fish culture by creating ditches along the rice field perimeter, which act as refuges when waters are shallow. Fish culture activities have only continued in Takeo province, a fish-deficit area. The approach has met with less success in Prey Veng province. Although the reasons for this failure were not clear, it is possible that incentives to participate may have been lower due to the presence of support from numerous international organizations and NGOs. During the final phase of project development, community-based management of dry-season fish refuges was introduced.

Lessons for successful collective fish culture

- ◆ Understanding the historical context and impact of recent historical events of a country can provide insights into the likelihood of uptake by a community of fish culture on a collective basis.
- ◆ The presence of existing community-based institutions and evidence of collective action is a pre-condition for successful collective action.
- ◆ Labor is important to the success of fish culture, as protecting and harvesting the fish stock is labor-intensive.
- ◆ The employment opportunities provided by fish culture may provide a strong incentive for participation and cooperation, particularly where alternative occupations are limited or absent.
- ◆ The support of local authorities is a critical factor in the successful development of community-based fish culture.
- ◆ Flood management infrastructure is essential to control unpredictable flooding events and the associated damage to the fish culture system. Flood management infrastructure and fencing are strongly linked technical requirements.
- ◆ The presence of a market for distribution of culture products is crucial to the success of any fish culture enterprise. The cost and availability of inputs for fish culture, particularly fingerlings, were also limiting factors.

China

Farmers in China have adopted a different approach to collective fish culture than their counterparts in other project countries. The project was implemented in two provinces, Yunnan and Jiangsu. In Jiangsu province, fish culture was introduced into irrigation canals. In Yunnan, fish were stocked in flooded rice nurseries that are also used for the production of lotus. In both cases, management of fish culture was entrusted to an individual who acts as a caretaker, feeding and guarding the stocked fish. In return, this person receives a larger proportion of the benefit from production, with the remainder distributed among project participants and local community funds.

Lessons learned



The variable success of the community-based fish culture activities in the project countries has led to a deeper consideration of context and its contribution to the success or failure of collective action under differing socio-ecological conditions, recognizing that the results of stocking are often unexpected (e.g., Lorenzen and Garaway 1998, Garaway 2006, Garaway *et al.* 2006). Socio-political history, in particular, is likely to have a strong influence on project success. For example, the suggestion that private property, although no longer recognized as privately owned during the flood season, should revert to collective management fish culture, has important

implications in countries such as Cambodia and Vietnam, where collectivity is socially sensitive. At the local level, a range of factors can influence the sustainability of community-based institutions, including social context and motivation for collective action, group leadership, local markets, ecological context and the role of the implementation process itself.

The key challenges faced in collective approaches to fish culture had to do with overcoming sensitivities to collective action, negotiating benefit sharing with a range of stakeholders, ensuring equitable access to resources among multiple users and promoting participatory decision-making in the identification and implementation of technical and institutional options for fish culture. Water and the aquatic resources it supports are often subject to multiple use and overlapping access and use rights (Bene 2003, Benda-Beckmann *et al.* 1996, Meinzen-Dick and Knox 1991).

- ◆ Property rights play a significant role within the context of community-based fish culture. Dry-season private property is submerged during the flood season, creating open access water bodies available for use by multiple resource users.
- ◆ In addition to this complex set of land and water rights are the rights associated with the capture of wild fish. Despite private ownership of the flooded land, the capture of wild fish is generally not restricted, and landowners accept open access conditions on otherwise private land. Numerous overlapping rights, coupled with issues of enclosure and fisheries enhancements, introduce additional layers of interest to the management of land, water and fish resources. However, integrating aquaculture into existing water systems can change this dynamic (e.g., Lorenzen and Garaway 1998, Garaway 2006).

Conclusion and recommendation

Research results show that significant benefits can be derived from community-based fish culture, including a 10% lower cost of rice production and net returns from fish production amounting to US\$220-400 per ha. Significantly, these benefits were obtained with no reduction in the wild fish catch. The returns from fish culture were distributed among the group members according to sharing arrangements pre-negotiated at the beginning of the season. This includes a share in benefits for the landless members, which is significant as they have limited income-generating opportunities.

Socio-ecological context plays a major role in the success or failure of collective action. Despite the processes of adaptation and evolution of collective fish culture systems to fit local needs, the approach appeared to have variable success within and between countries, suggesting that the conditions under which collective fish culture is appropriate must be better understood.

Community-based or co-management approaches to resource management must respond and take into consideration local complexities and acknowledge that the associated incentives to adopt collective approaches may not always be sufficient to support sustainable community-based institutions. The complexities of rights and access encountered in the floodplain context add an extra dimension to learning and experience regarding collective action. It is essential to understand the local context and evaluate the potential impacts of intervention on existing access and ownership dynamics prior to the introduction of any new technology.

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Key References

Sheriff, N. et al. 2010. *Community-based fish culture in seasonal floodplains and irrigation systems*. CPWF project Report. Colombo, Sri Lanka: CGIAR Challenge Program on Water and Food.
<http://hdl.handle.net/10568/3924>

Sheriff, N., R. Arthur, B. Barman and M.C. Hong 2008. Community-based fish culture in seasonal floodplains and irrigation systems. In: *Fighting poverty through sustainable water use: Proceedings of the CGIAR Challenge Program on Water and Food 2nd International Forum on Water and Food*, Vol.2, 10-14 November 2008, Addis Ababa, Ethiopia, eds. E. Humphreys et al.; 246-249. Colombo, Sri Lanka: CGIAR Challenge Program on Water and Food.

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Bibliography

Bene, C. 2003. When fishery rhymes with poverty: A first step beyond the old paradigm on poverty in small-scale fisheries. *World Development*, **31**, 949-975.

Dey, M.M. and M. Prein 2003. Participatory research at landscape level: flood-prone ecosystems in Bangladesh and Vietnam. In: *Managing natural resources for sustainable livelihoods: Uniting science and participation*, eds. B. Pound, S. Snapp, C. McDougall and A. Braun. London: Earthscan.

Garaway, C.J. 2006. Enhancement and Entitlement—the Impact of Stocking on Rural Households Command over Living Aquatic Resources: A Case Study from the Lao PDR. *Human Ecology*, **34**, 655-676.

Garaway, C.J., R.I. Arthur, B. Chamsingh, P. Homekingkeo, K. Lorenzen, B. Saengvilaikham and K. Sidavong. 2006. A social science perspective on stock enhancement outcomes: lessons learned from inland fisheries in southern Lao PDR. *Fisheries Research*, **80**, 37-45.

Haylor G., A. Lawrence and E. Meusch 1997. Identification of technical, social and economic constraints to the rearing of fish in rice fields in Lao PDR. Project Report, 3 volumes for DFID, NRSP Project R6380CB. London: DFID.

IIRR. 2000. *Rice-fish culture in deepwater rice farming system*. Report of the International Institute of Rural Reconstruction.

IIRR, IDRC, FAO, NACA, and ICLARM. 2001. *Utilising different aquatic resources for livelihoods in Asia: a resource book*. International Institute of Rural Reconstruction, International Development Research Centre, Food and Agriculture Organization of the United Nations, Network of Aquaculture Centers in Asia-Pacific, and International Center for Living Aquatic Resource Management.

Lorenzen, K. and C.J. Garaway. 1998. How predictable is the outcome of stocking? In: *Inland fishery enhancements*. FAO Fisheries Technical Paper, ed. T. Petr; 133-152. Rome: FAO.

Bibliography

Meinzen-Dick, R. and A. Knox 1991. Collective action, property rights, and devolution of natural resource management: a conceptual framework. In: *Collective action, property rights and devolution of natural resource management*, eds., Meinzen-Dick, A. Knox, and M. Di Gregorio. CGIAR.

Sinhababu, D.P., B.C. Ghosh, M.M. Panda and B.B. Reddy 1984. Some preliminary observations on physicochemical characteristics of soil and water under rice-cum-fish culture. *Journal of the Inland Fisheries Society of India*, **16**, 58-61.

von Benda-Beckmann, F., K. von Benda-Beckmann and H.L.J. Spiertz 1996. Water rights and policy. In: *The role of law in natural resource management*, eds. H.L.J. Spiertz and M.G. Wiber. VUGA, the Netherlands.

WorldFish. 2002. *Increasing and sustaining the productivity of fish and rice in flood-prone ecosystems in South and Southeast Asia*. Final Report to IFAD prepared by WorldFish Center, Penang, Malaysia.