Culture-based fisheries: A low-tech, greenhouse friendly approach to improving food and income for Cambodian families

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Existing agricultural activities provide nutrients that stimulate production of natural food supplies that can be used by fish.

People have a fascination with technology, and so it is with the aquaculture industry. It is widely stated that agricultural systems must be urgently intensified in order to increase production to meet the food needs of our growing population. And it is often assumed that "more technology" - high-tech, mechanised, centralised and industrialised approaches - are the path that will deliver the food that we will need. But there are other means that can contribute to this end.

Culture based fisheries offer an alternative to the paradigm of intensification via industrialisation, increasing food production by harnessing the natural productivity of small water bodies. Put simply, culture-based fisheries are practices to enhance fish stocks in waters that don't have enough natural recruitment to sustain a fishery. They are usually applied in small water bodies such as village dams and agricultural reservoirs, including ephemeral water bodies that dry up or are drained on a seasonal basis. Unlike intensive aquaculture practices, there is usually no feeding or aeration provided and stocked fish are left to forage on natural food supplies.

Improvements to fish yield in small water bodies as well as to the incomes and nutritional status of rural communities have been demonstrated in Laos, Sri Lanka and Vietnam[1,2,3] but culture-based fisheries practices are not yet widespread, despite having significant potential in tropical climates.

Since 2015 NACA has been implementing a project that aims to introduce culture-based fisheries practices to Cambodia, working with communities around 24 small inland water bodies in six provinces circumnavigating the Great Lake (Tonle Sap). The project is funded by the Australian Centre for International Agricultural Research (ACIAR). In February NACA staff visited project sites and held consultations with communities participating in the project.

One of the challenges in establishing culture-based fisheries in Cambodia is that inland waters are open access for fishing. In the interests of food security, and by law, anyone is free to fish. This means that fingerlings are vulnerable to fishing-related mortality immediately upon being stocked, whereas

A culture-based fishery, Cambodia.

usual culture-based fisheries practice is to refrain from taking fish for a period to let them grow to a reasonable size before harvesting starts. Many water bodies in Cambodia may also retain water year round, rather than drying up seasonally or being drawn down during a crop cycle, which makes complete harvesting difficult or impracticable.

To reduce predation and fishing-related mortality of young fish stocked the project has taken advantage of another Cambodian legislative arrangement, which is that each water body must have a conservation area set aside where fishing is not allowed. Rather than releasing fingerlings directly into the open waters, part of the conservation area was netted off by the project to form a nursing ground for a period to allow them to grow prior to release.

The good news is that it seems to have worked. While data analysis is progress, all participating communities reported substantial increases in daily catch rates on the order of 1-3 kg / day / fisher from around 0.2 – 2 kg / day / fisher previously. The number of people participating in fishing activities has increased substantially at all sites, in response to the improved fisheries resource, with both locals and outsiders from neighbouring districts coming in. For the local people fishing is generally a supplementary activity, with gear set in the evening and harvested in the morning before engaging in their regular agricultural activities, which is chiefly rice farming.

The improved availability of fish has had several knock-on effects. As households now often have fish surplus to their immediate requirements some have begun to sell their excess fish for cash, representing a significant boost to their incomes. Household food costs have also fallen, as they have less need to purchase fish, given that they can obtain their own more easily and excess fish may be preserved for later consumption by manufacture of fermented fish paste. As we have observed elsewhere, the community-managed nature of the culture-based fisheries activity generated synergies and improved harmony in participating communities[4].

An effect that we did not plan or anticipate is that the value that participating communities place on the conservation areas has greatly increased. Communities strongly attribute their increased catches to the stocking and nursing of fingerlings within the conservation area. As a result, communities are taking a more active role in protecting the conservation areas and they are also assisting local authorities to crack down on use of illegal fishing gear. This appears to have increased catches of naturally recruited species, ie. those that were not stocked by the project.

While the yield per unit area of culture-based fisheries is low compared to intensive aquaculture systems that rely on feeds and power to boost productivity, the benefits to poor rural communities in developing countries such as Cambodia can be very high. Regular supplies of fish for the table or a couple of dollars of extra income per day represent meaningful improvements to household nutrition and incomes, especially in rural communities where employment opportunities are scarce.

With adaptation culture-based fisheries practices can potentially be applied across a wide variety of rural settings, supplying local demand for food rather than foreign supermarkets and relying on scale and distribution of production rather than raw intensity and centralised monocultures.

Consider also the environmental implications of culture-based fisheries: No feeding means no water pollution, in fact nutrients are extracted from the water body when fish are harvested. Since the fish are produced mainly for local consumption and there is no aeration or power consumption involved, there are negligible greenhouse gas emissions associated with fish production or transportation.

Unfortunately one of the limitations of project-based funding is that projects have to end and funding for the present project runs out in June. There has been considerable discussion with communities on how to sustain culture-based fisheries activities once project funding, which was primarily used to purchase seed and hapas, is withdrawn. As in other countries such as Lao PDR, target communities are discussing models for collecting contributions from the enhanced fisheries resource to fund stocking in the next season. While the approach varies from village to village, a common theme is making use of existing village revolving funds, or establishing reservoir management committees to coordinate funding and stocking activities.

Project team discussing arrangements with a community in northern Cambodia.

References

1. De Silva, S. S., 2003. Culture-based fisheries: an underutilized opportunity in aquaculture. Aquaculture, 221, 221-243.
2. Pushpalatha, K.B.C. and Chandrasoma, J. (2010). Culture-based fisheries in minor perennial reservoirs in Sri Lanka: variability in production, stocked species and yield implication. Journal of Applied Ichthyology, 26, 99-104.
3. Phomsouvanh, A., Saphakdy, B. and De Silva S.S. (2015). Production trends, monetary returns and benefit sharing protocols from culture-based fisheries in rural communities in Lao PDR. Aquaculture, 439, 29-38. DOI: 10.1016/j.aquaculture.2015.01.02
4. Saphakdy, B., Phomsouvanh, A. Davy, B., Nguyen, T.T.T., De Silva, S.S., 2009. Contrasting community management and revenue sharing practices of culture-based fisheries in Lao PDR. Aquaculture Asia Magazine, XIV (3), 2-6.