

Summary of culture-based fisheries developments in Lao PDR

This summary is based on the following publications, either in the primary literature, or as manuals and reports posted on the website of the Network of Aquaculture Centres in Asia-Pacific (NACA) that have emanated from projects funded by the Australian Centre for International Agriculture research (ACIAR) since 1997.

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- Saphakdy, B., Phomsouvanh, A., Davy, B., Nguyen, T.T.T. and De Silva, S.S., 2009. Contrasting community management and revenue sharing practices of culture-based fisheries in Lao PDR. *Aquaculture Asia Magazine*, 14 (3); 2-6.
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- Ingram, B.A., Chanthavong, K., Nanthalth, T. and De Silva, S. (2014). Guidelines for hatchery production of Pa Phia fingerlings in LAO PDR *Fisheries Victoria Internal Report Series No. 17*. 31 pp.
- Phomsouvanh, A., Saphakdy, B. and De Silva Sena S., 2015. Production trends, monetary returns and benefit sharing protocols from the extensive aquaculture practice of culture-based fisheries in rural communities in Lao PDR. *Aquaculture*, 439; 29-38.

Lao PDR, or Laos, is a land-locked nation (18° 00' N; 105° 00' E) with a land area of 236,800 km² and a population of 6.6 million with a per caput GDP of US\$ 3,100 per annum. It is considered as one of the most impoverished nations in Asia. It is also a nation with considerable renewable inland water resources estimated at 333.5 km³ (<https://www.cia.gov/library/publications/the-world-factbook/geos/la.html>). Its economy is mainly agricultural, and the main animal protein in the diet of Laotian people is fish.

Many changes have occurred in the fisheries sector of Laos in the past two decades where the contribution of the aquaculture sector to the food fish supply has bypassed the capture fishery production since 1997 (FAO, 2014). In 2011, aquaculture production in Laos accounted for 73.6 % of the total food fish supply of 116,900 t, reflecting the global trend where aquaculture accounts for over 50 percent of the fish consumed (FAO, 2014). However, the Government of Laos does not reckon intensification of aquaculture as the sole means of meeting the increasing fish food demand by the growing population. It is in the above context that the government recognises the importance of developing CBF in remote, rural areas, utilising the multitude of small water bodies for food fish production (Ministry of Agriculture and Forestry, 2010).

Laos embarked on CBF as a strategy in 1997 to increase food fish production among rural communities, initially under the auspices of the Australian Centre for International Agricultural Research (ACIAR).

R&D activities pertaining to CBF were conducted in Vientiane Province, Bolikhamxay Province and the Vientiane Capital Territory since 2007. Water bodies that under normal circumstances incapable of supporting even a subsistence fishery through natural recruitment were chosen, on agreement with the village organisations for conducting R&D activities, and to act as demonstration practices for adjacent communities. In Laos, as most of Asia, the water management of small water bodies suitable for CBF - the stock and recapture strategy for enhancing food fish production - was often undertaken through village committees constituted with legislative backing for this purpose. For CBF, R&D and further developments of this practice, such

organisations were chosen and personnel were provided with the required training on CBF protocols. Training was provided by the Fisheries Division personnel of the Department of Livestock and Fisheries of the Ministry of Agriculture and Forestry. Personnel of the Fisheries Division were responsible for coordination and providing guidance when and if required by individual communities.

Apart from the main thrust of R&D on CBF in small water bodies in Laos that concentrated on optimisation of food fish production, the nature of community management and related aspects on income/benefit sharing work and development of artificial propagation and broodstock management of indigenous species suitable for CBF (and aquaculture) were also undertaken. The overarching

CBF practices in Laos are a very communal activity with the community engaged from stocking onwards; fry and fingerlings may be cared for a few weeks in hapas to ensure higher survival (top left); harvesting is a communal activity with a multitude of gears used and whole families taking part (bottom); a happy villager with the catch on the final day of a harvest (top right).



objective of this latter component was to encourage the use of indigenous species with suitable consumer preference in CBF developments, and in doing so take steps to ensure impacts on genetic diversity are minimised through the incorporation of relevant broodstock management strategies.

The CBF R&D in Laos has clearly shown its community benefits, and the gains for each household in village communities. The communities that adopted CBF in Laos, unlike elsewhere in Asia, fall into one of three categories, based on the nature of the harvesting and the manner in which the benefits are distributed within the community. The details of these are given in Tables 1.

Table 1. The three basic forms of management (based on the harvesting patterns) of the water bodies that are adopted through a consensus of each of the communities. Adopted from Phomsouvanh et al., 2015).

Harvesting	Gains to community households
Category 1 Permit the village households to fish for their daily needs using scoop nets and hook and line, five months after stocking. The community embarks on harvesting the remaining stock via a ticket system where the public can purchase the right to catch fish for sale, when the water level recedes approximately 8 to 9 months after stocking. The ticket price varies according to the gear to be used (for example, use of a lift net, often operated by women folk, 20, 000 Kip; cast net, 40, 000 Kip; where 8,000 Kip= 1US \$). The harvesting associated with ticket sales could go on for two to three days, but generally there is about 10% reduction in the ticket price after the first day.	Daily fish needs in this manner and households are not permitted to catch for sale; gear limited to small drag net and traditional traps only.
Category 2 Similar approach to category 1.	Daily fish needs and households are not permitted to catch for sale; gear limited to small drag net and traditional traps only; a portion of the ticket sales are provided to each household.
Category 3 Harvested only as the water level recedes, generally 8-9 months post stocking with engagement of the whole community; harvesting is publicised widely and the harvest auctioned on site.	Fish for communal social occasions/festivities; monetary gains based on net gains after harvest.

Table 2. The disbursement protocols of each of the categories of management (these are coupled to the harvesting strategies given in Table 1; adopted from Phomsouvanh et al., 2015)

Category 1 Restricted to ticket sales; 10-20 % of the proceeds reserved for purchase of seed stock for the next CBF cycle. The rest of the monetary gains invested in community amenities; These include improvements/developments such as improvement to the local school (providing electricity), improving the temple community hall, investing on improving another water body in the village for CBF activity by improving the dam structure/slucice gates etc.
Category 2 Of the ticket sales 10-20 % is retained for the purchase of seed stock for the next cycle. Of the remainder 50% is divided among the households; every household in the community is entitled for this benefit. The rest is utilised as follows: 6% advisors and committee members; 6% accountant and cashier; 10% labour (keeping watch etc.); 20% improving public amenities; 38% other social welfare, religious activities and associated hospitality.
Category 3 50% of the total revenue is shared amongst households of the community. The remainder is disbursed as follows: 20% purchase of fry and fingerlings; 6% advisors and committee members; 6% accountant and cashier.; 10% labour (keeping watch etc.); 20% improving public amenities; 38% other social welfare, religious activities and associated hospitality.

Figure 1. Boxplots presenting the distribution of production per cycle per ha (kg) in the three categories of CBF practices, for the period from 2007 to 2013. Bold horizontal bars are the medians, circles represent data points for each water body and triangles represent the means with \pm SE among water bodies (from Phomsouvanh et al., 2015).

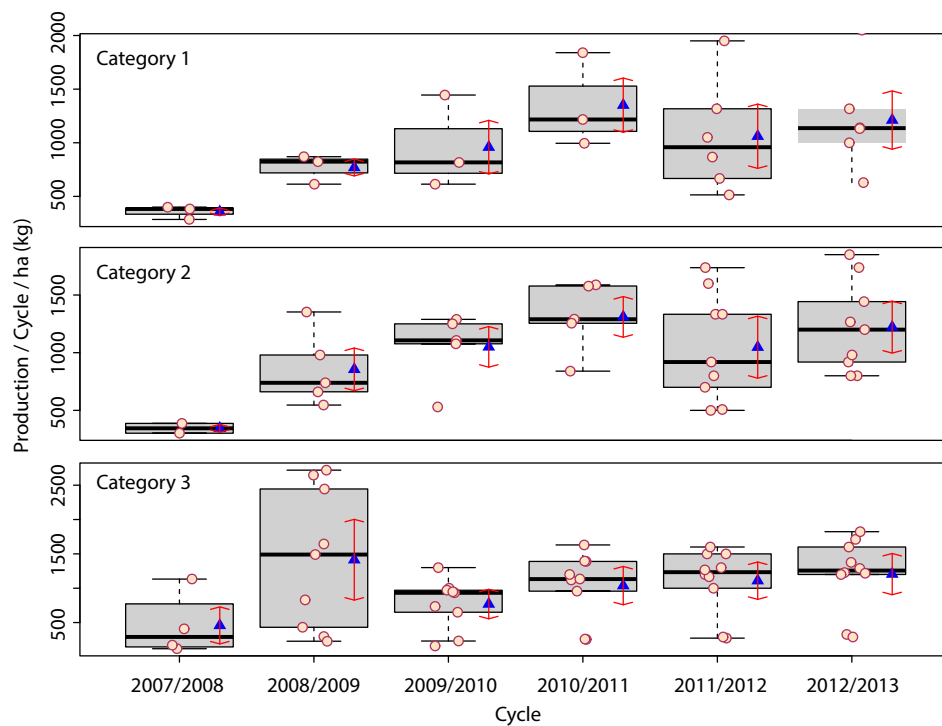
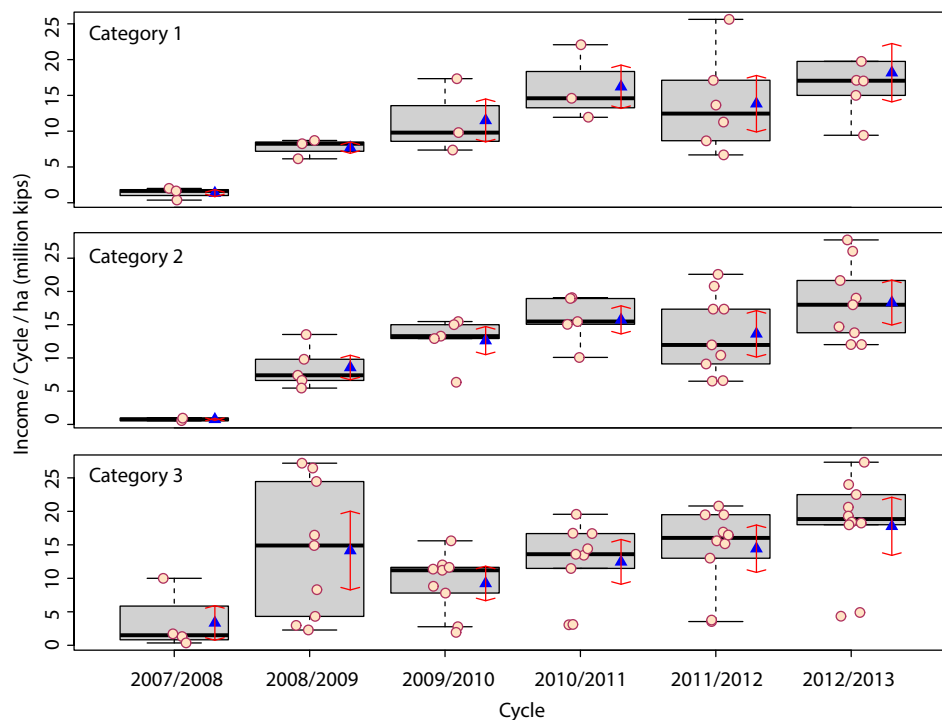


Figure 2. Boxplots representing the distribution of income per cycle per ha (million kip; 1 US \$= 8,000 kip) in three categories of CBF practices, for the period from 2007 to 2013. Bold horizontal bars are the medians, circles represent data points for each water body and triangles represent the means with \pm SE among water bodies (from Phomsouvanh et al., 2015).



and 2., respectively. Overall, it is evident that adoption of CBF, irrespective of the management category practiced, will benefit every household in the village community through the provision of food fish needs and or food fish needs and monetary benefits. An equally important fact is that, irrespective of the management category adopted, the community as a whole gains through the provision and improvement of communal amenities.

The production trends and the monetary benefits from CBF for the three management categories are depicted in Figures 1 and 2. It is evident that for all three categories of CBF management the returns tended to increase initially and then stabilise after three to four cycles of activity. The details on these aspects and the likely reasons for the above observations and other related aspects are dealt with in detail by Phomsouvanh et al. (2015). Overall, it is evident that CBF yielded significant returns to the communities augmenting food fish needs and subsidiary income.

In addition to the above the R&D activities also indicated major trends in relationships between the size of water bodies used for CBF and the corresponding returns. These generalised observations may and or could have applicability in the Asian region and will assist in determining the scope and help in the planning of adopting CBF.

References

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