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POLICY Brief

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Sustainability of Community Aquaculture – a Study of Transaction Costs from Sri Lanka

Over the last decade there has been a major push within policy circles to strengthen community initiatives related to natural resources management. The success or failure of such projects is an important issue for decision-makers who are interested in poverty alleviation. A new SANDEE study from Sri Lanka looks at the factors that affect the performance and sustainability of one such group of projects. It focuses on Community-Based Aquaculture (CBA) schemes in the interior of the country. Although these have the potential to be an important source of protein for poor communities, many CBA projects in the country are failing.

The study looks in particular at one of the key challenges the aquaculture projects face – the amount of time and resources that must be devoted to the organization and planning of collective work. These factors are valued economically as the "transaction costs" associated with such community-oriented projects. The study finds that transaction costs have a substantial negative impact on a significant number of the CBA schemes. Thus, policy makers must find a way of reducing the transaction costs if community aquaculture projects in central Sri Lanka are to be more profitable and sustainable.

AQUACULTURE AT A CROSSROAD

CBA is carried out in many of the traditional irrigation tanks that are a feature of the interior region of Sri Lanka. However aquaculture is not a traditional use of these village tanks. Indeed, the village tank aquaculture programme was only launched in the late 1970s when government breeding stations provided fish 'fingerlings' to kick start the aquaculture process. This was an attempt by the government to provide easy access to protein in the interior areas of Sri Lanka. Despite early signs of success, the aquaculture programme faced total collapse in 1990 when the government decided to withdraw support. However, the programme was resumed again in 1994 as a community-based venture with the government providing only initial catalytic support. The outcome of the programme since then has been mixed. While a handful of communities have succeeded in completing a few production cycles, the programme has faced problems in many tanks.

These failures are usually attributed to practical problems such as lack of extension staff, scarcity of fish fingerlings or poor coordination among relevant stakeholders. Although these explanations go some way towards explaining the slow progress of the state programmes they do not give the whole picture. Transaction costs represent another, more fundamental, reason for failure. In this study, transaction costs constitute the economic, resource and time investments needed to organize collective action. They include work such as gathering information, undertaking negotiations, making agreements, preventing 'free rider' activity (e.g. stopping poachers), ensuring compliance, organizing harvesting and monitoring the distribution of benefits. It is clear that if these costs are too high, and returns comparatively low, then people will be discouraged from taking part in any CBA scheme.

This policy brief is based on SANDEE working paper No. 18-06, 'Transaction Costs and Institutional Innovation: Sustainability of Tank Aquaculture in Sri Lanka' by Athula Senaratne and Kalpa Karunanayake from the National Aquaculture Development Authority of Sri Lanka. The full report is available at www.sandeeonline.org

THE IMPORTANCE OF COMMUNITY-BASED AQUACULTURE

Rural poverty and malnutrition are common in the inland dry zone of Sri Lanka. One of the key reasons for this is that fish (which makes up a large percentage of most Sri Lankans' protein intake) from the sea is limited in supply. The low availability of animal proteins in the inland dry zone areas makes the production of freshwater fish using the existing village infrastructure very attractive.

The potential for village tanks to help the poor is shown by their historical usage by communities. The tanks are basically communally-owned rainwater-harvesting devices for paddy cultivation and have helped successive generations achieve food security for over two millennia. In addition to irrigation, tanks also provide water for domestic use: bathing, washing and animal husbandry. Given such a time-tested record of collective action, there is obviously great potential to develop CBA in these tanks.

CBA in village irrigation tanks has specific features that appeal strongly to policy makers. The major policy advantages are: (a) the involvement of local resources and the direct contact with the rural poor; (b) the obligatory need for community participation due to common ownership of tanks; (c) the ability to cater to the needs of a large section of the population; (d) the low cost nature of the technologies involved and their success in demonstration projects; and (e) the potential to address the problems of poverty, malnutrition and unemployment simultaneously.

THE CURRENT STATE OF THE CBA PROGRAMME

Athula Senaratne and Kalpa Karunanayake of the National Aquaculture Development Authority of Sri Lanka address two key questions facing policy makers and community leaders - why collective action is successful in managing certain common property resources while it fails in others, and what conditions would ensure successful cooperation among community groups. This study was conducted between 2003 and 2004 in the Anuradhapura district, which is located in the heart of the dry zone in Sri Lanka. It is also the district with the highest inland fish production in the country and is the location of some 2,334 inland water bodies, covering a total inland water area of 51,500 ha. It ranks first in the country in terms of production of freshwater fish.

The study is based on primary data collected both at the community and household level. Information comes from a total of 41 communities (each community linked to a specific irrigation tank CBA programme). This represents a total of 340 households and covers a majority of locations where CBA had been recently carried out. Information about each tank and the community it supports comes from a number of sources, including official records, village officers, agriculture and irrigation officers, members of farmer organizations and village elders.

Transaction costs are assessed by looking at the amount of time that people spend on 'transaction' activities linked to the CBA programme. The cost of this work is then assessed using local wage rates as a proxy for the value of people's time. The calculation of transaction costs for the monitoring of poachers is done in a slightly different way. This is because monitoring is usually undertaken during the night and the use of general wage rates in this case is not appropriate. Hired watchers carry out monitoring for a number of the tanks. The average wage rate paid to these watchers is therefore used to estimate this cost in all the other tanks.

TABLE : TRANSACTIONS IN CBA IN VILLAGE IRRIGATION TANKS

Type	Transactions
Searching and information	Accessing scientific methods and species for culture
Collective decision making	Organizing meetings, reaching agreements, coordinating with authorities
Enforcement and monitoring compliance	Organization of tank preparation actions, stocking, etc.
Prevention of free rider activity	Protection from poaching
Distribution of benefits	Organizing harvesting
	Monitoring the distribution of benefits

COSTS AND CHALLENGES

The study finds that CBA involves three main types of management: farmer organizations (FO), a sub-group within a FO called a Fisheries Sub-Committee (FSC) and out-sourcing to third parties. A FSC is the most popular CBA management scheme and is found in two-thirds of the sample. The major advantage of this arrangement is that it limits the number of people claiming benefits from CBA to a manageable number. It also allows for management activities to be undertaken by a limited number of active participants in an independent manner.

All three institutional arrangements involve transaction costs associated with information provision, collective decision-making, and the protection of fish harvests from poachers. While the costs of information provision and collective decision-making are relatively low under all three institutional arrangements, the cost of fish protection from poachers is significant in all cases. However, this latter cost is considerably reduced when an entire FO is involved in tank management. This means that the lowest average aggregate transaction cost is reported in FO-managed village tanks, while, the impact of transaction costs is particularly significant in FSC-managed tanks.

The high cost of protecting fish from poachers is not surprising: of all the problems facing the people involved in the CBA programmes this is the most widespread. This problem is reported in two-thirds of the tanks in the sample. In a few tanks it is at a crisis level and the authorities have been called in to deal with the problem. Hence, the so-called 'free-rider' problem has the potential to cause a significant impact on the sustainability of the CBA programme, making it difficult to rally the necessary cooperation among community members.

ARE THE BENEFITS OF CBA ENOUGH?

On the whole, CBA helps FOs to generate much needed cash revenue in a majority of tanks. It also moderately increases the supply of animal proteins to the rural poor. However, while community-based fisheries contribute cash to farmer organizations and bolster village food security, the benefits to individual farmers are low. This means that farmers have little incentive to participate in collective action. Moreover, once the transaction costs are taken into consideration, particularly the cost incurred by monitoring activities, CBA becomes even less economically attractive. In fact, only 35% of the 41 tanks indicate a positive net benefit from aquaculture once all transaction costs are taken into account.

Notably, of the three institutional arrangements, the FSC is the most successful in terms of generating benefits to individual members. However, once transaction costs are accounted for, a smaller percentage of FSC run tanks (33%) show a positive net benefit from aquaculture relative Farmer Organization (50%) run tanks. Thus, including transaction costs changes our understanding of which institutional regime is likely to be more successful.

SANDEE

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In terms of people's attitudes towards CBA, it seems that households with variable, seasonal sources of income are more attracted towards it than households that have a more regular source of income. This is quite understandable given the fact that the opportunity costs involved are usually higher for regular income earners than for those with seasonal employment.

Another key factor that affects the benefits provided by CBA are the tanks themselves. It is clear that different tanks have significantly different productivity levels. Hence, selecting tanks with adequate productivity levels is vital to future success.

HOW TO MAKE CBAS MORE PRODUCTIVE AND SUSTAINABLE

Overall, Senaratne and Karunanayake's extended cost analyses show that transaction costs have a substantial economic impact on a significant number of tanks. They find that the impact of these costs is particularly significant in FSC-managed tanks, which are in fact the most widespread and productive of the CBA schemes.

FO schemes have the largest number of beneficiaries and the lowest transaction costs. But they have a lower return per beneficiary. This poses a dilemma. If the transaction costs are to be decreased, one would choose an FO scheme but perhaps because of coordination problems, these tanks also generate less revenue.

This study suggests that the sustainability of tank-aquaculture will depend on both reducing transaction costs and enlarging the share of benefits that go to those people who bear these costs. Senaratne and Karunanayake conclude that further experiments with institutional arrangements are required to make this happen.

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