

# Identifying research methods in adoption of cage culture, Bangladesh

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## BACKGROUND

The DFID funded NGO CARE, CAGES (Cage Aquaculture for Greater Economic Security) project, Bangladesh, was established to promote and develop the use of small-scale cage aquaculture for the benefit of the rural resource poor. It particularly focuses upon the empowerment of women.

Owing to the recent decline in capture fisheries, a prominent livelihood of the rural poor, and an increase in the demand for fish protein, there exists a potential for aquaculture to fill this void. Traditional aquaculture in Bangladesh has focused on pond and gherl systems that necessitate the ownership of a pond/waterbody. The rural resource poor do not have access to resources such as land, excluding their participation in such ventures. Cage aquaculture, however, overcomes this constraint as participants need only access to the various waterbody types available throughout inland Bangladesh, keeping their stock in a self contained unit of known ownership supplied by CAGES and distributed by collaborative NGOs.

Cage aquaculture is a relatively novel concept in Bangladesh with a brief and mostly unsuccessful history. Previous attempts at introducing the technology had failed, primarily due to the wholesale transfer of technology from other regions. To be successful, cage culture must be appropriate to the technological, economic, social and institutional context of cage operators, in this case the rural resource poor. The DFID funded research project R7100 'The improved management of small-scale tropical cage culture' is concerned with

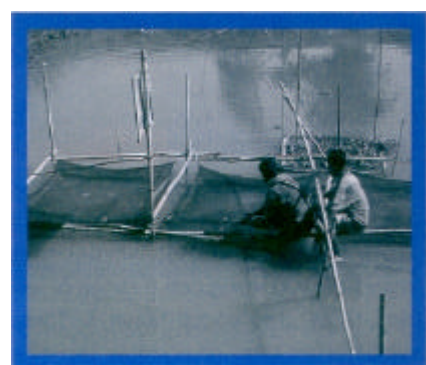
opportunities and constraints concerned with these issues, assisting the CARE-CAGES project and further focusing research to be of benefit to the rural resource poor. As a collaboration between four institutes, Project R7100 is concerned with two Asian countries, as outlined below, but its findings are appropriate to small-scale low input cage culture throughout Asia.

- Vietnam, marine cage systems, a collaborative study carried out by the Asian Institute of Technology, Thailand and The University of Fisheries, Vietnam.
- Bangladesh, inland cage systems, a collaborative study carried out by the Institute of Aquaculture and CARE CAGES.

The latter forms the focus of the present article.

## METHODOLOGIES AND APPROACHES:

Because it is working with an existing development project, R7100 has a rapid and targeted pathway for the dissemination of research findings. Non-governmental organisations (NGOs) are the driving force behind the development of cage aquaculture in Bangladesh. Through CARE's CAGES project the capacity of smaller NGOs to develop and disseminate small-scale cage aquaculture technology has been strengthened. There exists a synergy in the relationship between CAGES and the regionally-based NGOs in that CAGES has strong technical staff and a training capability which, when coupled with the NGOs abilities to work with groups of rural households, creates a mechanism



Small-scale, low input cage aquaculture, Bangladesh. The fixed 8m<sup>3</sup> cages are composed of black polythene netting and a bamboo frame



where cage aquaculture can be developed more quickly and information shared on a wider scale than if agencies were operating independently. This partnership between a diverse range of organisations seems to be an effective one for developing and disseminating aquaculture technology. The process is in marked contrast to past efforts that focused on developing cage aquaculture packages then disseminating them: a top down approach. The innovative approach adopted by CAGES works to the advantage of R7100 which can utilise the existing framework to identify research needs, conduct research and disseminate the results to those most in need.



In order to assess whether small-scale cage culture was appropriate to the technical, economic, social and institutional context, Project R7100 instigated a series of 'on farm trials' and social surveys. These identified an array of possible technical options upon which more focused research could be concentrated. In addition they assessed the reasons behind the adoption or abandonment of cage culture and its impact, both on the community and women, again identifying any issues for further research.

## ON-FARM TRIALS

CAGES collaborates with local NGOs in six regions throughout Bangladesh. In each region on-farm trials were carried out by cage operators themselves in field situations, overseen by CAGES Technical Officers (TOs) and NGO staff. As trials were conducted by operators in field situations they intended to offer a more realistic assessment of the technical and economic validity of an option rather than if they were a piece of disassociated research.

Trials initially encompassed a wide range of topics and from the assessment of their performance, key research topics were identified, including:

- The culture of indigenous fish species
- The performance of the various strains of tilapia available for culture
- The suitability of various materials for cage culture
- Happa breeding of tilapia and nursery rearing of fry

The outcome has been the identification of appropriate options for CAGES beneficiaries. Risk avoidance has been identified as a major influence on choices by cage operators; this has directed research efforts towards strategies that minimize these risks.

For example the culture of indigenous species such as pangas (*Pangasius sutchi*) was found in many cases to be technically feasible. Yet the economics were poor due to high feed costs and mortalities which deterred uptake by many potential operators. Although wealthier individuals may not be deterred from operating a number of cages such losses to an individual with one or two cages would be



**Fish produced from small-scale cage culture. The poaching of such fish, led to the abandonment of cage culture by some participants.**

devastating. This is supported by data from the CAGES project. In 1998 13% of cage operators produced no fish at all. Lower risk methods or 'appropriate entry points' were therefore required to enable the rural resource poor to adopt cage aquaculture. Such low risk methods have since been investigated and are described later in this article

## SOCIAL SURVEYS

To complement these essentially technical on-farm trials, the social context of small scale cage culture was investigated in order to further focus and clarify research needs. Through social surveys the following three topics were examined:

- The reasons for continuation and abandonment of cage culture
- The role of gender in small-scale cage culture
- The impact of cage culture on the community

All three topics aimed to identify the constraints and opportunities raised by the implementation of cage culture by the rural resource poor and serve to identify strategies leading to its sustained adoption by targets, including women.

Rapid Rural Appraisal was conducted in three villages selected by TOs in the regions where CAGES operates. Included was one village where cage culture had been implemented for less than one year. To examine the role of gender and reasons for cage culture continuation or abandonment in each village three households were interviewed. The majority of data on gender issues were obtained via semi-structured interviews. Information was triangulated with key informants - in particular with staff from NGOs involved in the project and CARE-CAGES field staff. The interview followed a checklist of open-ended questions designed to gather

TABLE 1: MAIN FACTORS AFFECTING THE SUCCESSFUL REARING OF FISH BY CAGE OPERATORS IN THE DHAKA, SYLHET, COMILLA, BARISHAL AND JESSORE AREAS, RANKED BY DECREASING ORDER OF FREQUENCY OF MENTION.

Dhaka area	Sylhet area (*)	Comilla area	Barishal area	Jessore area
<ul style="list-style-type: none"> <li>· Escapees</li> <li>· Floods (1998)</li> <li>· Small fingerlings</li> <li>· Poaching</li> <li>· Fish mortality</li> <li>· Lack of interest, and therefore lack of care</li> <li>· Distance from the water body</li> </ul>	<ol style="list-style-type: none"> <li>1. Lack of co-operation</li> <li>2. Unequal share of workload</li> <li>3. Poor feed quality and feeding techniques</li> <li>4. Stocking water</li> <li>5. Lack of care and time</li> <li>6. Floods (1998)</li> <li>7. Feeding costs</li> </ol>	<ol style="list-style-type: none"> <li>8. Poaching, poisoning</li> <li>9. Net cutting (crabs)</li> <li>10. Fish mortality</li> <li>11. Escapees</li> <li>12. Weather (storm)</li> <li>13. Lack of co-operation</li> <li>14. Lease of pond</li> <li>15. Water retention</li> <li>16. Family problem</li> </ol>	<ol style="list-style-type: none"> <li>1. Initial mortality</li> <li>2. Theft of cage and poaching</li> <li>3. Escapees during the 1998 flood</li> <li>4. Problem with getting feed</li> <li>5. Small cages</li> </ol>	<ul style="list-style-type: none"> <li>· Jute retting</li> <li>· Poor net quality (nets cut by crabs)</li> <li>· Aquatic weed decomposition</li> <li>· Parasites (fish death)</li> <li>· Boat theft</li> <li>· High feed cost</li> <li>· Low quality seed</li> <li>· Poisoning</li> </ul>

(\*) Cages are managed co-operatively by a group of cage operators.



qualitative data. In most cases, husbands and wives were interviewed separately. However, in a number of instances cultural restrictions meant that a wife could not be interviewed separately from her husband, even with female interviewers. To ensure consistency, the same interviewer and CARE Technical Officer carried out all interviews, and notes were taken by another CARE staff member, acting only as an observer. To prevent intimidating the villagers, no other persons were present during the interview.

To examine the impacts of cage culture meetings were pre-arranged with villagers and mapping exercises conducted. The use of communal resources and the impact cage culture had on these uses was then described. Of particular interest to project R7100 was the identification of conflicts of interest that would require further research in order to facilitate the adoption of cage culture by CAGES targets.

Although the adoption of cage culture had perceived benefits and negative impacts on the community were rare, and described at worst as a 'bearable nuisance', certain risks were still involved. These included environmental factors such as flooding and also the effect of poaching. These risks figured highly among the reasons given for abandonment of cage culture. Mechanisms to address these issues were clearly needed in order to encourage the adoption of cage culture by CAGES targets (Table 1).

The on-farm trials and social surveys showed that for cage culture to be adopted and sustained by the rural resource poor, the element of risk, both real and perceived, has to be reduced. Low risk livelihood strategies or entry points were required to offer the rural resource poor options to participate in small-scale cage culture. As a result, project R7100 has focused research on the strategies outlined below:

1. Happa breeding of tilapia.
2. Over wintering of fry to fingerling stages
3. Fattening of fish/prawn species

The first two strategies produce fry and fingerlings which can be sold to local pond operators and because entry points are of shorter duration than for on-growing they are subject to less risk. Fish are less susceptible to theft because of their small size and lower value. The third option reduces risk by implementing a continuous cycle of stocking and harvesting, whereupon fish or prawns spend a relatively short period of time within the cage. Subsequent research on such strategies by R7100 and their implementation by CAGES, possibly combined with methods such as on-growing, should increase the adoption and continuation of cage culture by the rural resource poor beyond the life of the