



*Strengthening local capacity
in the economic analysis
of environmental issues*

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Can Mariculture be Profitable and Accessible to Local Fishing Families? A Study from the Philippines

Since the early 2000s, the Philippine government has promoted fish farming through its mariculture park program. The aim of the program is to tackle poverty in the countryside by providing an alternative source of livelihood for marginalized and small-scale fishing households. However, mariculture in the Philippines has faced a number of early critical challenges, one of which is the low participation of the local fisherfolk (its main target).

To help address this issue, a new EEPSEA study has assessed whether mariculture operations are profitable. It also looked at the issues that stop local fishing households from taking part in such operations. The study, which is the work of a team led by Dr. Alice Joan Ferrer from the University of the Philippines Visayas, found that, in general, mariculture operations are profitable. However, the high start-up and operational costs are stopping local, small-scale fishing households from participating. The study highlights a number of policies, including financial assistance, training, and marketing, that will help resolve these challenges.



A summary of EEPSEA Research Report No. 2017-RR7: "A Typology of Mariculture Production Systems and Their Profitability in Selected Sites in the Philippines," by Alice Joan G. Ferrer, Herminia A. Francisco, Canesio D. Predo, Benedict Mark M. Carmelita, and Jinky C. Hopanda. Comments should be sent to: Dr. Alice Joan G. Ferrer, Division of Social Sciences, University of the Philippines Visayas, 5023 Miagao, Iloilo, Philippines. Tel: +63-33-5137012. Email address: agferrer@upv.edu.ph

The mariculture challenge

Mariculture parks in the Philippines cultivate high-value fish and marine life in large enclosures (pens, tanks or cages). This is done in the open sea or in municipal waters. Species cultivated in mariculture parks include milkfish, siganids, groupers, red snappers, seaweeds, mussels, oysters, lobsters, and seahorses. It is claimed that this method gives higher yields and better-quality fish than fish from fishponds.

The Bureau of Fisheries and Aquatic Resources (BFAR) provides technical assistance and financial support for the development of mariculture parks. The BFAR also takes a lead in mariculture park research and provides support and training. To drive participation of local fishing families, the BFAR runs a cage-for-rent program. To attract investors, the BFAR also provided key inputs, such as fingerlings and nets.

However, these initiatives have not been successful. As of 2016, less than 1% of the target for mariculture development have been achieved. Even though the program has been in place for more than a decade, only 62 mariculture parks and about 2,200 investors have been established.

Assessing profitability and participation

The study was undertaken to look at the profitability of mariculture in the Philippines and to assess the reasons for the low participation of local fishing households. Seven mariculture sites were selected

for the study. These were (1) Balingasag, Misamis Oriental and (2) Lopez Jaena, Misamis Occidental in Region 10 (Northern Mindanao); (3) Calape and (4) Talibon, Bohol in Region 7 (Central Visayas); (5) Sto. Tomas, La Union, and (6) Bolinao and (7) Sual, Pangasinan in Region 1 (Ilocos Region).

Some of the sites were managed by (1) a council chaired by the officials of local government units (LGUs) and co-chaired by the BFAR (*BFAR and LGU-led*); (2) private sector companies working closely with the LGU (*private sector and LGU-led*); and (3) private mariculture operations inside and outside of designated mariculture parks (*private sector and BFAR-led*).

The data in the study came from a larger data set developed for the *Economic, Social, and Distributional Aspects of Mariculture in the Philippines* project, which was funded by the Economy and Environment Program for Southeast Asia.

This research focused on the profitability of dominant mariculture technologies in selected mariculture study sites. The information was collected using multiple field data collection methods from November 2014 to August 2015.

Profiling operators and other stakeholders

The project were able to gather the profiles of 381 mariculture operators. Key informants consisted mainly of stakeholders who were involved in the different stages of mariculture operations. These included suppliers of feeds and fingerlings, cage and net fabricators, operators, caretakers, watchmen and laborers, and traders and processors. Other key informants included local mariculture area managers and aquaculture experts from local government agencies and BFAR.

In addition, 48 focus group discussions (FGDs) were also conducted in the seven study sites. The 315 FGD



participants were selected based on two criteria: (1) they had been residents of their *barangay* (village) before the establishment of their local mariculture area and (2) they were familiar with the mariculture operations in their regions.

The designated mariculture parks and zones were also visited. Major activities were observed, such as transporting fingerlings and feeds from the shore to mariculture areas, feeding, changing nets, fabricating cages, harvesting, and trading. Relevant secondary data were also collected. This came mostly from the BFAR's central office and regional offices, the local governments of the study sites, and from other agencies' official websites. All of the study data were analyzed using frequency counts and descriptive statistics. Financial analysis was used to estimate the profitability of the various mariculture operations.

Variability in operations, but lack of diversity in species cultivated

The mariculture production systems in the study areas varied widely. They were differentiated by (1) the material used for their cages and pens (bamboo, GI pipes, rope-framed, or HDPE); (2) their scale, (3) their surface shape (circular, rectangular, or square), and (4) their structure (fixed or floating). Production harvesting and marketing practices also varied significantly.

There was, however, a lack of diversity in species cultivated in the seven mariculture sites.

Milkfish was the primary species farmed in all sites. Milkfish is suited to the exposed conditions found in these sites, but the price it commands is low, and it has little international market. Pompano and siganids were cultivated in Balingasag and Lopez Jaena, but in small numbers.

Among the seven sites, grouper was only found in Sto. Tomas. The production levels of this species were low, but the price obtained for the fish was six times higher than the price obtained for milkfish. This is because grouper farming caters to the live-fish restaurant trade.

High variability in profitability across the seven sites

In general, mariculture was found to be profitable. However, there was a high variation in the profits produced. Generally, the *private sector and LGU-led* mariculture operations in Sual and Bolinao delivered the highest annual gross and net profits.

On a per kilogram basis, the *private sector and BFAR-led* mariculture areas in Sto. Tomas registered the highest net profit at PHP 618/kg; and were delivered by green grouper farming in fish pens outside of designated mariculture park area. Green grouper farming using fish cages was the next most profitable type of mariculture, producing a profit of PHP 78/kg. In contrast, green grouper farming in a designated mariculture area using a rope-framed cage delivered the biggest net loss of PHP 313/kg.

There were also marked variations in the yields

produced by different mariculture operations. Milkfish farming, which uses a relatively small number of relatively small cages, had better or similar yields to those sites that used bigger or more numerous cages. Mariculture operations in the *LGU and BFAR-led sites*, located in Balingasag and Lopez Jaena, had the highest yields.

Key challenges facing local fishing families

Overall, mariculture in the seven sites was found to be capital intensive. For example, the investment cost for mariculture operation in the *private sector and LGU-led* mariculture areas ranged between PHP 36.65 million and PHP 97.18 million in Sual, and between PHP 3.13 million and PHP 3.97 million in Bolinao. Cages and nets were found to be the most costly initial investment items.

High start-up costs make it difficult for small-scale fishing families to establish mariculture operations. It is clear that without the support given by the BFAR (through its rent-to-own scheme), small operators cannot engage in mariculture because the initial outlay is beyond their capacity.

Commercial pelleted feeds were found to be the most expensive operational input in the mariculture production of milkfish. Small-scale fishers do not have the financial resources necessary to purchase pelleted feeds. This is another key reason for their low participation in mariculture. Only a few feed companies supply the seven mariculture sites, so there is little competition on price. In addition, the distribution

channels for pelleted feeds are not widely available in the study areas, thereby limiting fish farmers' access to this type of feed.

A lack of affordable and accessible pelleted feeds is also a major constraint on grouper mariculture production. Groupers are currently fed on trash or low-value fish, which has ecological and localized environmental impacts. It also requires long hours of feeding.

Wild seed fish supplies dwindling

The availability of seed fish was found to be a major constraint on mariculture operations, and it was found that there was a heavy reliance on the capture of wild fry/fingerlings/sub-adults for stocking. This problem is being compounded by the fact that the supply of seeds from wild sources is dwindling and that seeds are getting more expensive to obtain.

Another problem was that at three sites (i.e., Calape, Talibon, and Sto. Tomas), the majority of the cages were not in the correct designated areas. Most of the cages at these sites are in unsuitable locations (for example, in locations with strong currents).

What can be done to develop mariculture?

Because wild sources of seed fish are dwindling, fish hatcheries must become the norm for the industry. Successful partnerships between hatcheries and

backyard nurseries and farmers should therefore be encouraged. Overall, there is an urgent need to focus R&D efforts on the development and standardization of commercially viable seed production technologies.

The development of hatcheries will increase the availability of fingerlings. This will encourage competition among hatcheries, and will drive the price of seed fish down. This should encourage mariculture production.

Given the high cost of pelleted feed and the factors that drive up these costs, a price ceiling on feeds needs to be imposed. More should be done to encourage feeding companies and distributors to work with mariculture farms. Likewise, efficient feed formulations and feeding techniques should also be encouraged.

The dependence on trash fish in grouper mariculture should also be reduced. Appropriate cost-effective pelleted feeds should be formulated and commercialized to help the expansion of grouper cage farming.

The need for financial assistance and marketing

More financial assistance from the government or from the BFAR is needed to enhance mariculture in the Philippines. In particular, more should be done to develop market chains to vertically integrate the different players

in the industry and to bring about more efficiency and cost-effectiveness. On-farm research is needed to address the technological challenges involved. There is also a need for the standardization of many techniques used in cage farming operations.

Various mariculture policies need strengthening. Currently, there is no uniform leasing policy for cage sites and no regulatory measures for farming. There is also no uniform definition for a small, medium, and large operations. Moreover, there is no agreed uniform compensation for mariculture laborers. In addition, the cage location issues in Calape, Talibon, and Sto. Tomas indicate that the site selection protocol needs to be reviewed.

Alongside the recommendations above, marketing strategies should be enhanced to help improve the profitability of mariculture in the Philippines.

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