



Pond polyculture technologies combat micronutrient deficiencies and increase household income in Bangladesh



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Summary

Two sustainable, low-cost pond polyculture technologies have been developed to culture carps and mola in ponds, and culture carps and mola in ponds connected to rice fields.

These technologies can increase total fish production from ponds. Farmers depend on carps as an income source, and mola is rich in micronutrients that can help to meet the nutritional requirements of the rural poor, particularly women and young children.

These carp-mola pond polyculture technologies should be widely adopted throughout rural Bangladesh to increase fish production and household income, and to provide access to micronutrient-rich small fish for household consumption.

Background

The rates of malnutrition have declined drastically since 1990 in Bangladesh and it is on target to reduce the prevalence of underweight children under five years of age by half by 2015. However, levels of malnutrition are still high, particularly among women and young children, who are particularly at risk of food insecurity and malnutrition.

Micronutrient deficiencies of vitamin A, iron, zinc, and calcium, is a key aspect of malnutrition. Poverty, lack of access to animal-source foods and micronutrient-rich vegetables and fruits, and traditional food habits restrict rural families to a diet that is heavily dependent on rice. An increase in the consumption of small fish can play a major role in combating micronutrient deficiencies. Small fish consumed whole (i.e. with heads, bones, and internal organs) are particularly rich in micronutrients. Fish also help the absorption of micronutrients from other foods in the meal.

One local small fish species, mola (*Amblypharyngodon mola*) is particularly rich in vitamin A, calcium, zinc, and iron. This species is found naturally in ponds, ditches, rice fields, wetlands, and rivers. To increase the production of this micronutrient-rich small fish for consumption and sale, two polyculture technologies are used: polyculture of mola with carps in ponds, and polyculture of mola with carps in ponds connected to rice fields. Golda (freshwater prawn, *Macrobrachium rosenbergii*) may also be grown in the ponds.

Benefits

Carp-mola polyculture in household ponds

It is estimated that there are more than 4.2 million household ponds throughout Bangladesh, which are often an underutilized asset. Pond aquaculture technology has favored the production of large fish such as carps, pangas and tilapia, as they give a good yield and can be sold in the market as a cash crop. This has been to the detriment of small fish, which have been regarded as competitors for pond resources and have been removed from the pond. Carps and other large fish have a lower micronutrient content than small fish. When they are consumed, they provide less nutritive value than mola on an equivalent weight basis.

An initial brood supply of mola can be collected from the wild and successfully transported using appropriate techniques. The fish reproduce rapidly and a brood stock can be maintained from year to year in a deep-water area in the pond. Mola does not compete with carps for the same food resources. Adult mola should be regularly partially harvested to enhance production and maintain the brood stock. These harvests can be used for home consumption.

Growing mola together with the commonly-farmed carps in household ponds, or larger water bodies is technically simple and leads to the overall productivity increasing to 3.6 metric tons per hectare per year, increased income from fish sales, and improved family nutrition.

Carp-mola polyculture in ponds connected to rice fields

Growing fish in ponds connected to rice fields is becoming increasingly popular. The area of fish habitat increases as the rice field essentially becomes an extension of the pond during the wet months. The productivity of household ponds can be increased by up to 7.4 metric tons per hectare per year by connecting them to rice fields.

Rice fields are rich in natural food organisms, particularly insect larvae and periphyton on which fish feed. By reducing levels of insect larvae and aquatic weeds, the fish effectively contribute to increasing the rice yield (10%) and straw yield (15%), and remove the need for the use of pesticides.

Costs are reduced and profits increased. During the wet season, fish move between the pond and the rice field. In the dry season, when the water level in the rice field is low, fish gather in the pond and continue to grow.

Policy recommendations

The pond polyculture technologies described above should be widely adopted throughout rural Bangladesh to increase fish production and household income, and to provide access to micronutrient-rich small fish for household consumption.

- The Department of Fisheries (DoF) under the Ministry of Fisheries and Livestock should provide financial support for adoption and dissemination of these two technologies through their and their partners' extension networks.
- The Ministry of Fisheries and Livestock should ensure that these technologies are included in existing and future government policies and strategies.
- The Ministry of Fisheries and Livestock should provide financial and logistical support for training opportunities for government and NGO extension personnel so they can effectively communicate the technologies to farmers.
- The Ministry of Fisheries and Livestock and Bangladesh Agricultural Research Council (BARC) under the Ministry of Agriculture should provide financial support for research by national research institutions and universities for continued refinement of these technologies, and ways of addressing the challenges faced by farmers and extension personnel in their large-scale adoption.

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