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Title	:	*Water Management of Integrated Rice-Fish Farming in Inundated Floodplains of Balajtala-Kalmadanga Subproject*
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The burning issues that currently surround the countries in South Asia are food security and ecosystem security. While food security is of paramount importance, protein requirement is also an important issue, since many of the rural children and older people suffer from severe protein malnutrition. In Bangladesh, fish is the only source of free animal protein for the poorer sections of the community. One of the potential scopes for improving fish production in Bangladesh is to integrate aquaculture with rice farming, and considerable scope is there to exercise such practice in inundated rice fields during the monsoon season through local community based water management.

In this study, the potential of integrated rice-fish farming was explored in inundated areas of a small water management project, namely, Balajtala-Kalmadanga Subproject in Gopalganj district of the Southwest region of Bangladesh. The study followed an interdisciplinary approach through technical assessments as well as application of participatory tools to address different dimensions of integrated rice-fish farming in the study area, including physical, socio-economic, institutional and environmental aspects. Using a set of criteria and indicators, the system was evaluated from a sustainability point of view; for example, whether the existing physical systems are suitable for integrated farming practice, whether the new system is able or has the potential to have a positive impact on the socio-economic condition, whether the system will be environmentally sound, and what kind of management infrastructure and water management system are required for the integrated farming system to be sustainable over long periods.

The water management infrastructures in the project area were found to be conducive to the adoption of the new farming system. Desired water levels required for minimization of rice yield reduction and increasing favorable conditions for fish culture were analyzed, which can be met from the available water in the study area. Results indicate that standing water depth up to 50% of plant height is recommended during the different growing stages of rice that maximizes yield and increases the favorable condition for fish culture. Benefits obtained by the community were more than what was obtained in previous years from rice monoculture. However, potential of further enhancement of benefits are there in the study area. While, introduction of fish culture is still in the experimental stage in the study area, the existing fish yield is relatively on the lower side at 0.10 ton/ha. However, there is immense potential to increase the yield by many folds by increasing the stocking of fish fingerlings feasible for the study area. With increased stocking of fish fingerlings, the simulated fish yield was 6.20 ton/ha, which is much higher than the present yield. Full implementation of the project by Local Government Engineering Department (LGED) will allow more area to be brought under cultivation during Kharif-II season. The existing benefit-cost ratio (BCR) for rice only is 0.61 compared to 0.78 in the projected post-project condition. Integration of fish with rice will increase the BCR manifolds; the simulated BCR for rice plus fish cultivation system is 4.11 compared to the existing ratio of 1.18.

The integrated farming system was found to be socially acceptable. The quality of soils was enhanced with the introduction of fish in inundated rice field, which is favorable for Boro crops to be followed in the field in the dry season. Organic carbon, organic matter and nitrogen content in soil after fish cultivation in rice field recorded about 2, 3 and 19 times higher, respectively than that of only rice cultivation system. However, no remarkable impacts on soil quality were found in PH, phosphorous and potassium content between with and without rice-fish cultivation system. The integrated farming system improved pest management and weed control, and did not negatively impact water quality, indigenous capture fisheries and biodiversity.

There are some shortcomings in the management process with the integrated system, including community-based fish farming through Water Management Co-operative Association with fair distribution of shares and benefits among landowner, landless, traditional fisher men and women. The study suggests some management processes, and anticipates that these will pave the way for more motivation and social acceptability among the community members with disparate socio-economic status, which in turn will help sustain the system.

The results conclude that community-based fish culture approach in the study area has the potential of being technically feasible, economically profitable, environmentally sound, and socially acceptable.