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Benefits of Rearing Fish in Paddy Fields

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Rice today is grown in 113 countries in the world in a wide range of ecological conditions and water regimes. Over 90% of the world's rice, equivalent to approximately 134 million hectares, is grown under these flooded conditions providing not only home to a wide range of aquatic organisms, but also offering opportunities for their enhancement and culture. Pest management in rice has evolved tremendously over the past decades, and the culture of fish and other aquatic organisms can reinforce environmentally and economically sound farming practices.

Keywords: Paddy-fish, social benefit.

Introduction

In the strictest sense rice-fish farming means the growing of rice and fish together in the same field at the same time. However, it is also taken to include the growing of rice and fish serially one after another within the same field or the growing of rice and fish simultaneously, side by side in separate compartments, using the same water. Fish by no means strictly refers to fin-fish. It means aquatic animals living in rice fields including freshwater prawn, marine shrimp, crayfish, crab, turtle, bivalve, frog, and even insects. rice-fish farming as practiced in different countries, explores the similarities and differences, and identifies experiences that may be useful to promote rice fish culture in other parts of the world. An early review on rice-fish culture showed that by the mid-1900s it was practiced in 28 countries on six continents: Africa, Asia, Australia, Europe, North America and South America (FAO 1957). Common carp was then the most popular species, followed by the Mozambique tilapia (*Oreochromis mossambicus*).

Benefits aquatic fauna on the rice ecosystem

Fish plays an important role in the nutrient cycle of the rice fi eld ecosystem. Cagauan (1995) lists four ways how fish may influence the nutrient composition of the flood water and the oxidized surface soil as well as the growth of the rice plant. First, by contributing more nutrients to the rice field through faeces excretion as well as through decomposition of dead fish. Second, by the release of fixed nutrients from soil to water when the fish swims about and disperses soil particles when disturbing the soil-water interface. Third, by making the soil more porous when fish disturb the soil-water interface, fish increase the nutrient uptake by rice. Finally, fish assist in the recycling of nutrients when they graze on the photosynthetic biomass and other components of the ecosystem. At the same time, fish may help conserve nitrogen by reducing photosynthetic activity (by grazing on the photosynthetic aquatic biomass and by increasing turbidity) and thus keeping the pH lower and reducing volatilization of ammonia.

Fish also affect the phosphorus cycle. Phosphorus is often a limiting nutrient for primary production as it often becomes fixed in the soil and is unavailable to plants in the rice field. Fish, by disturbing the soil, increase soil porosity and promote phosphorus transfer to the soil.

Economic impacts of paddy-fish culture

1. **Economics of production**: Specifically considered are only those cases where both figures were obtained within the same locality during the same period of time. Many of the papers available do have some cost and returns figures for the rice-fish operation, but usually lack the figures for rice only. Indonesian figures show that having two crops of rice-fish and using the rice field for a short intermediate crop or penyelang of fish has a 116% higher return than having two crops of rice and leaving the rice field fallow for two months or so. In the Philippines, rice-fish farms yielded a 27% higher net return with fish compared to a single crop of rice (Sevilleja 1992). Thailand, in contrast to previously mentioned countries, showed lower net returns in the rice fish fields than in the rice-only fields. The Thai figures indicate that profitability in the rice-fish fields was only 80% that of rice monoculture.
2. **Benefits to communities**: The immediate beneficiaries of the production of fish and often improved rice yield in rice fish farming are the farmers who adopt the technology. Many farmers in different countries continue to practice it year after year, even without any government program, would seem to be proof enough of the benefits derived from this type of rice farming. One indication that fish farming in rice fields must be satisfactory (economically or otherwise) from the farmers' perspective is that in many cases farmers on their own continue or even expand the extent of their rice-fish farms after having tried the technology. Improvements of a farming household's nutrition as a result of culturing fish in the rice fields may just be an incidental and perhaps even indirect effect, such as being able to buy meat or chicken as a result of the extra cash earned from fish. The main benefit of rice-fish farming is often seen as providing an opportunity to earn cash.
3. **Improved nutrition**: One benefit that is often assumed, but never supported by solid evidence, is that farmers who culture fish in their rice fields have improved nutrition. Villadolid and Acosta (1954) and Coche (1967) and other writers postulated that fish could prevent protein deficiency and contribute to the improved socioeconomic welfare of populations. Improvement in the local community's nutrition has been cited as one of the benefits of rice-fish farming. With greater availability of fish, the local population of a rice farming community will have easy access to fish at affordable prices.
4. **Social impact**: It seems far-fetched that stocking fish in rice fields can have a significant impact on the society as a whole, particularly so with isolated cases of technology adoption by one or a few farmers widely dispersed. However, when there is a large scale adoption involving an entire community the social impact can be quite profound. The situation prevailing in Indonesia in the past was that landless tenants were allowed to use the rice fields for fish culture during the fallow season, giving birth to the palawija system. Nowadays, the use of the rice fields for fish production during the fallow season is not limited to landless tenants, but involves fish breeders requiring a larger area for raising fingerlings proving its impact on society.

Conclusion

The impact of rice farming on the environment, including its contribution to the greenhouse effect, should be a matter of concern to everyone. There is no doubt that the development of rice lands has resulted in the loss of natural wetlands and marshlands, although this made a difference between widespread famine and food sufficiency in many parts of the world. Since rice-fish farming often reduces the need to use chemicals for pest control, this assists in preserving a diverse rice fi eld biota. Utilizing the existing - native - species for rice-fish culture serves to actively preserve the biodiversity.

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