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Prospects and problems of Integrated Fish farming in West Bengal

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Integrated Fish farming (IFF) is a system in which different farming components like crop, livestock, horticulture, poultry, fish are combined together with fish as the chief component so that optimum resource use can be made by creating mutually beneficial cycle. West Bengal has a huge prospects and potential for integrated fish farming because of its vast network of water bodies. The present study is an attempt to highlight the prospects and problems associated with practicing integrated fish farming by the small and marginal fishers of West Bengal. In order to understand the prospects of Integrated Fish farming in West Bengal different studies highlighting the practices of integrated fish farming was analysed. Although, IFF has huge prospects in West Bengal but it is also facing several challenges with regard to price fluctuations, lack of infrastructure, poor management skills, lack of knowledge.

KEY WORDS: Food security, Rice-fish farming, rice-duckery farming.

Introduction:

The Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines, 2014) are the first international instrument dedicated entirely to the immensely important small-scale fisheries sector(https://www.fao.org/voluntary-guidelines-small-scale-fisheries/en). These guidelines are meant for both Marine and inland fisheries. Inland fisheries, as defined in the Indian context, covers fishing in freshwater, brackish water, estuarine; in both lotic and lentic; natural and manmade water bodies. In short, inland fisheries can be said to consist of all capture and culture-based fishing, and aquaculture which does not take place in marine waters. (Narayanan Sumana 2016). In India fisheries sector contributes 60 percent of the fish production of the country, provide employment to around 23 lakh household in the country. (Paul Pintu 2016) There are many criteria for defining small scale fishing (SSF) in India like ethnic origin of community in fishing; size and material used in case of fishing craft; fishing gear used; depth of fishing ground and distance from the shore; nature of fish landing; market channels; fishing crew and their remuneration; economics/ benefit-cost ratio of fishing, etc. The entire inland fishery in India fits this criterion. (Giri Shib Sankar 2018). Recently, Inland fishing is gaining importance due to several economic, environmental and social factors. Overfishing in oceans has reduced marine fish availability. Therefore, inland fisheries provide an alternative and sustainable source of fishing. Millions of people, especially in rural areas depend on inland fishing for their livelihood. Inland fishing is basically an activity meant for small-sector. This sector mostly comprises of small and marginal fishers, many of them are also part-time fishers –doing farming activity along with fishing.

According to the Handbook of fisheries statistics 2018, fish production in Inland fisheries has increased from 2.28lakh tonnes in year 1950-51 to 89.02 lakh tonnes in the year 2017-18. During these period, Marine fisheries has also increased from 5.34 to 36.88 lakh tonne, but the rate of increase was quite higher in case of inland fisheries. Despite these scenario Inland fisheries were highly neglected compare to Marine fisheries. There is huge deterioration of Inland water bodies due to deposition of industrial and agricultural waste. A large portion of production of inland fisheries comes from Aquaculture. Aquaculture, in 2012-13, contributed over one third

of the country's total fish production which is 9.02 million tonnes (Narayanan Sumana 2016). In West Bengal, inland aquaculture emerged as a first growing enterprise and a stable alternative to the declining capture fisheries. (Paul Pintu 2016). West Bengal is one of India's top fish producing states, with inland fisheries playing a vital role in the livelihoods, income and food security of small fishers. Over 2.5 million people in West Bengal depend on inland fisheries for their livelihood. Major fish producing districts are South 24 Parganas, North 24 Parganas, East Midnapore, Howrah, Hoogly, Murshidabaad and Nadia. Small fish farmer earns from pond culture, integrated fish farming and wet-land based fishing. Integrated fish farming may be defined as sequential linkages between two or more agriculture related farming activities with fish as the major commodity in the system (Debnath 2013). The present study is an attempt to highlight the prospects and problems associated with practicing integrated fish farming by the small and marginal fishers of West Bengal.

Rationale for Integrated Fish Farming:

Presently, in the face of extreme climatic volatilities it is not wise to rely on producing a single farm commodity. Small and marginal farmers find it extremely hard to survive in case of crop failures. They have a very small plot of lands where they could grow only a single crop for meeting their subsistence needs and during bad harvest they suffer from starvation. These small and marginal farmers are in most cases also do part-time fishing. So, for this marginalised section of rural population a sustainable way of livelihood can be achieved by integrated ricefish farming, fish-duckery farming or fish-livestock farming. Faced with the increasingly recognized adverse impact of chemical agriculture on the ecology and environment, the concept of ecology-based production system has been gaining importance in the recent past. (Tangjang2015). In Arunachal Pradesh at the time of harvest of paddy the same field is used for fish farming. It is evident from the study that both rice and fish has mutual benefits under this system. The fish waste works as manure for the soil. Fish can also control aquatic weeds and algae that carry diseases and provides a natural barrier for the rice crop. In extreme temperature paddy crops provides shed to the water and helps the fish to thrive in a better way. (Tangjang 2015). This type of integrated rice-fish farming will increase production of both fish and rice and can help in providing food security to the rural poor. The system is sustainable so long as there is no use of synthetic and chemical fertilisers for paddy cultivation and also no such antibiotic for fish is used which may hamper rice production.

Prospects of Integrated Fish farming in West Bengal:

An experiment on paddy cum fish culture was started in West Bengal in 1945 in an area of 280 hectares adjoining the paddy fields and it was remarkably noted that the growth of tank fishes was slower than those liberated in the paddy fields. The then rice committee of FAO in 1948 strongly advocated the practice of fish culture in the rice field for increased production of rice. (ICAR, Cuttack 2019). West Bengal is the largest fish producing state in India after Andhra Pradesh. In West Bengal where fisheries play a crucial role in food security and rural livelihoods, adopting integrated fish farming can enhance productivity and economic stability. The key reasons for integrated fish farming in West Bengal is that it is highly cost effective in the sense that wastages is minimised by reusing the by-products of different constituents of farm in an efficient manner. Moreover, it provides all year-round employment opportunities, especially for the small and marginal farmers leading to an improvement in their socioeconomic conditions. West Bengal is prone to climate related disasters, Integrated fishing offers income diversification, reducing the risk of total crop failure in case of disasters. Common models of Integrated fish farming in West Bengal is Fish-rice farming and fish-duck farming. In order to understand the prospects of Integrated Fish farming in West Bengal different studies highlighting the practices of integrated fish farming needs to be analysed.

In a field experiment (Bhaumik 2013) carried out in Tangramoni of North 24 Pargana by fisheries department of WB and two other agencies, an integrated management approach was employed to optimise fish production. Along with fish production three salinity tolerant rice varieties were harvested. The benefit from rice-fish farming for the small households comes from both nutritional and financial sides. The system provides subsistence fish and rice to the households, as a result they are now nutritionally secure. Moreover, they can sold fish and rice at market which increases their income and hence improves their economic status. The small households can use their income in making payments for paddy and fish labourers and also for buying inputs. Thus, if a judicious integrated management is introduced the prospects and profitability of integrated fish farming will definitely rise.

Jalpaiguri district of West Bengal has huge prospects for practising integrated farming systems as evident from different reports of ICAR. Most of the small and marginal farmers practised the traditional way of farming and they also have small to medium sized ponds, along with they also practice poultry, livestock and agro forestry. The farming activity is mostly carried out to meet subsistence needs and if they receive proper training and

advice, they could increase their income by indulging in fishery based integrated farming. There is building up of a circular economy where wastages from different constituents of farming can be minimised. The crop residue along with residues from vegetable farming can be used for vermi-composting and also for livestock feeding. Cow dung, goat droppings are used as natural manure for field and pond which helps in improving water quality thereby reducing the possibility of diseases in fish. Again, decomposed form of poultry waste is used as natural feed for fish. Hence, the cost of fish farming is reduced thereby increasing the profitability of the farm. Now, in Jaipaiguri particularly in Moynaguri district fishery based integrated farming is encouraged because water level in the pond remains on average at 10 to 14 ft. which is conducive for fish farming.

In a study conducted on Purulia-I block of Purulia District (Majhi 2018), it is found that most beneficial form of fishery based integrated farming is Duck-fish system of farming. Fish cum duck farming not only has the best economic benefits but also demonstrates a close integrated relationship. The input –output relationship has been described as the residue of duck feed and duck droppings gets added in the pond water thereby increasing supply of food for the fish and also increases the bio-mass of natural food organisms in water, whereas fish pond provides an excellent environment to ducks preventing them from infection of parasites. From the study it is evident that integrated fish cum duck farming has increased the income and profitability of small households and rural youth employment has increased because of the adoption of this practice.

South 24 Pargana is highly suitable for fishery based integrated farming as most of the households in this district have at least one pond. Earlier, the households use to do fresh water fish farming but due to increase in natural calamities they no longer rely on production of single commodity instead they adopted "fish+crop+vegetables+livestock" integrated farming. Crop residue, vegetable residue and livestock waste after decomposition were added in pond water which increases fish production. The bottom soil of pond is used in rice and vegetable field thereby increasing the yield of crops. In few blocks of Dakhshin Dinajpur also fishing based integrated farming is practised which incorporates duck, goat, crop along with fish. Therefore, it is evident from all these studies that West Bengal has huge prospects and potential for integrated fish farming.

Problems of Integrated fish farming in West Bengal

The success of integrated fish farming mostly depends on the climatic conditions of the region, socio-economic status of the households, quality of fish seeds, training and management of the whole system and above all financial support from the Government. In case of fish-paddy integration it has to be kept in mind that overuse of chemical fertilizers in paddy field will hamper the fish production. Moreover, the input-output relation is such that there is a high chance of transmission of disease from one component of the farm to the other. This is true in case of fish-duck system of integrated fish farming. Fishery based integrated system requires more energy and exertions and therefore integrated fish farming is mostly male dominated. So, sex serves as a barrier in case of integrated fish farming (Abiona B.G 2011). Integrated fish farming (IFF) in West Bengal, like in many other regions faces numerous challenges and problems. There should be a comprehensive planning regarding the management of the system. Lack of proper management can lead to loss of productivity and profit earned from the system. Knowledge of the Integrated system can lead to optimisation of resource use by minimising waste. There should be proper training of how land use can be increased vertically when there is little chance of horizontal expansion of land. In many of the districts of West Bengal it has been noticed that pond embankment is used for vegetable farming along with fish culture in pond and rice farming in field. These knowledge of intensive and efficient use of land utilization can be developed among the farming community only through proper training. In absence of any knowledge and training rural household may get engaged in integrated fish farming without knowing the benefit of it. Small farmers should be given hands on training to make them understand that instead of focussing on one component they should integrate different constituents of farm, which will increase their income and would uplift their socioeconomic status. In integrated fish farming, disease control is very crucial but it is quite expensive in controlled environment. Farmers often face difficulties in accessing lucrative markets for their products. Price fluctuations for both fish and other integrated products like poultry or vegetables can impact profits. Poor infrastructure and lack of proper cold storage facilities in rural areas further worsen this problem. The lack of extension services and advisory support from local agricultural departments can limit the adoption of best practices. Integrated fish farming needs initially a good amount of investment. It is difficult for the small and marginal farmers to undertake such investments. In absence of supports from Government or agricultural development agencies they cannot reap the benefit of integrated farming. Mismanagement of water, excessive use of chemicals, and poor waste disposal practices can lead to the degradation of natural resources, including water bodies and surrounding ecosystems. This could harm the sustainability of integrated systems over time. The policies related to water use, fish farming, and agricultural subsidies may not always support integrated farming. Sometimes, farmers face issues with

obtaining permits, particularly for the construction of ponds or other infrastructure. Finally, the unpredictability of climate patterns can make integrated farming systems less reliable in the long term.

Conclusion

Despite many challenges, integrated fish farming (IFF) remains a promising avenue for sustainable agriculture in West Bengal. Government assistance, suitable training programmes, knowledge development and finally creation of proper infrastructure for IFF will help in providing food and nutritional security to the rural population of WestBengal. Integrated fish farming often combines aquaculture with agriculture, livestock, or even horticulture. Fish are raised in ponds or waterlogged areas that can also be used for growing rice, vegetables, or crops like sugarcane. With this approach land and water can be used more efficiently and overall productivity of the system increases. By diversifying farming activities through integrated fish farming, farmers can increase their income. Fish farming can be highly profitable, especially when combined with rice, vegetable and livestock. Earlier, Fishers find it very difficult to purchase fish feed, medicines because they are quite expensive. But with IFF, livestock droppings are used for fish feed and also decomposed field waste added to the pond act as nutrients for the fish. As a result, returns from fishing was higher compare to the traditional method and reduction in cost increases the profitability of the poor households. This helps in improving the economic security of farmers, many of whom are small households in rural West Bengal. Integrated fish farming is labour intensive, therefore the farmers had to remain engage in the activity throughout the year from the production, processing, and marketing of fish to the management of farm operations. This reduces migration of labour and employment potential of the rural fishing sector increases. This can help in poverty reduction and can improve the socio-economic status of the household. The Government of West Bengal has supported integrated fish farming through various schemes, training programs, and subsidies. Initiatives like the "Blue Revolution" aim to improve aquaculture practices, including integrated fish farming. These programs help farmers' access modern technology and better practices, increasing productivity and sustainability. The scheme is essential in the fisheries sector because it helps to improve the socio-economic conditions of the people involved. It further helps to increase people's knowledge of new technology in this sector, increase fish production using sustainable approaches, and generate employment and export opportunities. The districts like south 24Parganas, North 24 Parganas, Medinipur which have significant freshwater and brackish water resources, have benefited the most from the Blue Revolution. Through financial support, technological innovations, training, and infrastructure development, the Blue Revolution has transformed fish farming in these regions, helping improve productivity, sustainability, and the livelihoods of farmers. Moreover, the initiative has contributed to improving food security in these districts by enhancing fish availability and promoting integrated farming systems.

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