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Impact of small indigenous species of fish (SIS) on livelihood of local fishing community in two upazilas of Mymensingh

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Abstract
The fisher folk used to catch small indigenous species of fish (SIS) from rivers, canals, wetlands and floodplains at little or no cost for their livelihood. Surplus fish was sold at the local market to generate some little capital for the households. The livelihood and consumption of SIS in fishing community of two upazilas *viz.* Trisal and Ishwarganj under Mymensingh district were studied for 3 months in 2004. Most of the fisher folk of the study areas belong to resource-poor section of the society living below the poverty level. Majority of them had no cultivable land. As professional fishers they face many problems during lean fishing period from January to April due to little or non-availability of fish. Majority of the fisher households consumed SIS three to four days a week. The fisher households of Trisal upazila consumed more small fish than those of Ishwargonj upazila. More than 50% respondents consumed <20 g SIS/day and 20% consumed >40 g SIS/day in Trisal upazila. On the other hand, in Ishwargonj upzila, most of the fisher households (66%) were found to consume <20 g SIS/day. SIS was mostly available from July-December in rivers, wetlands (*beels*), and canals, and income from fishing was reported to be good. The dominant SIS was *Puntius* spp., *Mystus* spp., *Anabas testudineus,* catfishes, mola, and small prawns. Non-indigenous species like tilapia was also dominant in Trisal upzila where aquaculture practices were well established.

Key words: Fisher folk, SIS, Fish consumption, Livelihood

Research findings

- Forty-eight of the surveyed fishers were between 41-50 age groups. Family size of 76% was larger (6-8 nos.) than the national average. No woman was found to be participating in fishing operations.
- The fishers were permanent settlers, every one had at least own house. Among respondents, 46% had no cultivable land. More than 50% had 0.08 – 0.16 h homestead and 26% had less than 0.20 h agricultural land. Only 28% had pond in their homestead.

- Fishers were found to be fully employed at least 2 days/week in non-fishing activities. Non-fishing employment was limited to agriculture (56%) and net making (32%). The daily earning from fishing ranged from Tk. 100 to 150 for 60%, < Tk. 100 for 22% and >Tk. 150 for 18% of the respondents. Earning was high in Trisal than Ishwarganj due to aquaculture activities in Trisal upazila.
- The small fish, jatpunti (*Puntius shophore*) ranked number one in both the studied upazilas. Tilapia as a cultured species was dominant in the Trisal study area.
- About 80% of the surveyed households were found to consume SIS 3-4 days a week while about 20% consumed >5 days a week.
- The fisher's households of Trisal upazila consumed more small fish than those of Ishwarganj upazila. More than 50% respondents consumed <20 g SIS/day and 20% respondents consumed >40 g SIS/day in Trisal upazila while 66% in Ishwarganj upzila consumed <20 g SIS/day.
- SIS was mostly available from July-December in rivers, wetlands (*beels*), and canals and income from fishing was reportedly good.

Policy implications

- Policy decision should be taken to develop modalities to protect the open water fisheries resources.
- Department of Fisheries may take a policy to establish and maintain fish sanctuaries, update fish protection acts and ensure their judicious implementation.
- Steps should be taken to re-excavate and restore silted up water bodies to provide suitable habitats to the open water fishes.
- Community based fisheries management system should be developed to improve the SIS production.

Livelihood implications

Fishing communities are poor and socially disadvantaged. They maintain their livelihood by catching fish from natural sources. But, due to declining production from capture fisheries their catch and income have been gradually dwindling putting them in economic crisis. Fisher families have a diverse range of strategies for their livelihoods. Full-time fishing families are engaged in making and repairing fishing gears, fish cleaning, fish trading and fish drying in addition to actually fishing. Many of the other livelihood strategies pursued alongside fishing rely on the natural assets of the open water environment and these vary according to the region and its characteristics. A higher proportion of the landless people than those owning land are full-time fishing families, as a result, SIS have considerable implications on their livelihoods.

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Culture practices of freshwater giant prawn in some selected areas of Mymensingh

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Abstract
A study was conducted to examine the culture practices of freshwater giant prawn, *Macrobrachium rosenbergii* in some selected areas of Mymensingh. Based on a sample of 100 farmers from three different upazila, namely Phulpur, Gouripur and Ishwargonj in Mymensingh district, 94% of farmers cultured prawn with fish in their pond. Only 6% of farmers cultured prawn, fish and dike crops for higher economic return. The culture period is typically nine months; hatchery produced post-larvae were stocked from May to June and harvested from November to January. Per hectare production of prawn, 375 kg/yr was very low because the farmers followed simple culture method. Most of the farmers made a profit of Tk. 68,403/ha/yr and the major costs incurred were for purchasing prawn seed and feed. The culture of prawn in pond system is technically possible under different conditions though expansion of small-scale prawn farming mainly depends on reduction of production costs. Future targets could be integration of pond prawn culture with other agricultural activities especially dike cropping and rice production in the monsoon.

Key words: Freshwater prawn, Culture, Socio-economic aspects

Research findings

- The culture period of integrated prawn farming was typically nine months. Hatchery produced post-larvae were stocked in between May and June and harvested from November to January.
- The average stocking density of post-larvae was found to be 20,415/ha/yr.
- A variety of feeds such as cooked rice, rice bran, oil cake, wheat flour and fishmeal were used for prawn culture.
- Prawn yield varied considerably because of simple culture method and the average yield was around 385 kg/ha/yr. Average cost of production and net returns were respectively Tk. 53,763 ha/yr and Tk. 68,403 ha/yr.

- Constraints of prawn farming as reported by the farmers were: higher production costs as well as poor financial support, low supply of hatchery produced post-larvae, lack of technical knowledge for prawn farming and inadequate extension services.

Policy implementations

- Considering the lack of technical knowledge for prawn farming, basic technical knowledge of integrated prawn farming should be provided to the farmers with the help of DOF, BFRI and NGO's.
- More prawn hatcheries should be established in prawn farming areas throughout the country.
- Training, extension services, institutional and policy supports should be provided to the prawn farmers for sustainable prawn production.

Livelihood implications

In spite of various socio-economic constraints, 71% of the households (farmers) have improved their economic status through prawn farming and have clearly brought out positive changes of economic activities. Farmers have improved their food consumption, standards of living, purchasing power, choice, and ability. However, concerns arise about the long-term sustainability of their livelihoods due to poor institutional and organisational support, lack of training facilities and extension works. It is, therefore, essential to provide them necessary institutional and organisational supports and extension services for sustainable livelihoods.

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Input-output relationship and economics of pangas monoculture and carp-pangas polyculture in two districts of Bangladesh

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Abstract
An attempt was made to study the input-output relationships and economics of pangas monoculture and carp-pangas polyculture in Bangladesh. By analyzing the data collected from 50 pangas farms and 55 carp-pangas farms, the study has investigated the production systems of two technologies and the effects of fingerling stocking and applications of feed and fertilizer on fisheries income. The data were collected from the fishermen of Trishal and Bhaluka of Mymensingh district, and Kahaloo and Adamdighee of Bogra district during 2001-02. For pangas monoculture, the stocking density was 31,561 per ha while it was 55,017 per ha in carp-pangas polyculture. Most of the farmers used urea, TSP and lime before stocking. Rice and wheat bran happened to be the most common feed ingredients for both types of culture in general. Other important ingredients used were mustard oil-cakes, rice polish, wheat flour, fish meal, bone meal, soybean meal and poultry litter. In terms of quantities, rice bran and wheat bran dominated the farmers list. Rice and wheat bran together constituted about 60% of all studied feeds. Feed cost constituted 59.13% of total costs for pangas monoculture and 67.44% for carp-pangas polyculture. Per ha productions of pangas and carp-pangas in a single culture cycle were 15,508 kg and 19,745 kg, respectively. Per ha gross profits were estimated to be Tk 310,311 and Tk 464,418 for pangas monoculture and carp-pangas polyculture, respectively. Net profit appeared to be Tk 264,216 per ha for pangas monoculture and Tk 416,509 per ha for carp-pangas polyculture. The BCRs calculated were 1.46 and 1.68 for monoculture and polyculture, respectively. The break-even costs per kg of fish were estimated at Tk 36.93 for pangas and Tk 30.93 for mixed species which was much lower than the prices the producers received Break-even productions were estimated at 10,702 kg per ha for pangas monoculture and 11,784 kg per ha for carp-pangas polyculture. Fingerling and feed cost, and pond size significantly explained the variation of income from pangas monoculture. These factors have significantly influenced the income from the crop. Functional analyis shows that 1% increase in the feed cost might increase 0.51% of pangas income and 0.41 % in carp-pangas income. No other inputs had shown this much of responses to increasing income from a fish.

Key words: Pangas monoculture, Carp-pangas polyculture, Economic analyses

Research findings

- The stocking density per ha for pangas monoculture and carp-pangas polyculture were 31,561 and 55,017, respectively. The density appeared to be consistent with the given level of intensity.
- Urea, TSP and lime were most frequent fertilizers applied in fish culture. About two-third of the farmers did not use cow dung
- Rice bran and wheat bran were the most frequently used feed ingredients. In addition, there were a variety of feeds in use, however, very few were common across farmers.
- Feed cost constituted about 60% of total production cost in both type of cultures. Both the culture practices were found to be profitable and viable both in short and long run. However, in terms of undiscounted BCR, carp-pangas technology was more profitable than pangas monoculture.
- The break-even cost and production were much lower than the actual price received and yield obtained
- Fingerling and feed cost were significant at 1% level and influence the variation of fisheries income positively.

Policy implications

- This study established the importance of feed in aquaculture once again. Thus proper feed ingredients and their quantity is very important for theculturists.
- The use of some feed and non-use of others is not consistent with the production technology.
- Relevant GOs and NGOs should come forward with extension effort and training emphasizing the proper feed mix and quantity.

Livelihood implications

Both the technologies evaluated were profitable and the adopters derived benefit out of the practices. As production proceeds, all stakeholders in the production-distribution chain including consumers would be benefited. The greater availability of fish would provide animal nutrition at a cheaper cost to the people of Bangladesh. Moreover, exporting higher amount of fish might provide more foreign currency. Farmers with small ponds and ditches could make use of the technology and reap the benefit of increased income and improved livelihood.

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Economic analysis of carp based culture technologies in selected areas of Bangladesh

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Abstract
Six carp based culture technologies such as, carp-pangas, carp polyculture, carp-golda, pangas monoculture, golda monoculture and nursery have been selected to determine the cost and returns of respective technologies in Bangladesh. The sample farmers selected for these technologies were 55, 100, 65, 50, 51 and 55 respectively and thus the total sample size stood at 376. The study covered 7 districts of Bangladesh, namely, Mymensingh, Bogra, Noakhali, Comilla, Jessore, Khulna and Bagerhat. Both primary and secondary data were used for this study. It was found that farmers used a good number of feeds for the selected technologies and they maintained no standard doses for them. Remarkable differences were found among the prices of different feeds and other inputs used for different technologies in different locations. Prices of all inputs were found to be increasing and this increase was more in recent years compared to previous years. Though all the technologies were found to be profitable, the feed situation was not satisfactory. Except rice polish all the local feeds showed deficit in supply to meet the national demand for the country. If this situation persists and no proper measures are taken to secure the local feed supply, the present development of supplementary feed-based aquaculture would be fully dependent on imported feeds and would not be sustainable in future. This study strongly suggests the corresponding authority to handle the matter with proper attention considering its significant livelihood impact on the economy of the country.

Key words: Economic analysis, Carp culture, Feed supply

Research findings

- Average sizes of ponds of culturing carp-pangas, carp polyculture, carp-golda, golda monoculture, pangas monoculture and fingerling nursery were found to be 0.32, 0.26, 0.64, 0.60, 0.36 and 0.29 ha respectively.
- Fish farmers used 14 species of fingerling for the selected technologies. In case of nursery, spawn and fingerlings were purchased in weight and number basis respectively.

- More than 35 feed items were found to be used for the selected culture technologies. Among them rice barn, rice polish, wheat bran, wheat flour, oil cake, fish meal, meat bone, soybean meal and vitamin premix- these 9 feed items were used for all the technologies practiced.
- Out of different feed items most of the farmers used rice bran, rice polish, wheat bran, wheat flour, oil cake, maize polish and soybean meal for culturing fish in respective technologies.
- On an average per hectare feed requirements for local feed items were estimated to be 4.56, 1.43, 3.84, 0.43, 1.62 and 0.18 t respectively for rice bran, rice polish, wheat bran, wheat flour, oil cake and maize polish.
- On the basis of availability and demand-supply estimates, except rice polish, all other local feed ingredients showed deficit in supply. As the culture fisheries exhibits increased production, fish feed should be made available to the fish farmers even through importing feed from abroad.

Policy implications

- Government, NGOs and other stakeholders should come forward to establish more feed mills to provide required supply of fish feed to meet up the requirement of fish farmers both for intensive and extensive aquaculture.
- Department of Fisheries (DoF) should organize training programme for fish farmers so that they can acquire knowledge on scientific fish culture and management.
- Capital should be supplied to fish farmers who suffered from the lack of sufficient capital for fish farming.
- Department of Fisheries (DoF) should implement monitoring system to check the adulteration of fish feed in the country.
- Subsidy/tax reduction policy on imported feed ingredients should be imposed to reduce the cost of fish feed ingredients.

Livelihood implications

The present study revealed that fish farming could create employment opportunity for unemployed rural youth of the country. Moreover, many people have already found their ways of earnings in feed processing and marketing. Therefore, carp based aquaculture should be made sustainable with local feed ingredients to explore its potential for the poverty alleviation and economic development of the country.

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Poor fish farmers' accessibility to credits: A review

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Abstract
Fisheries sector contributes about 5.3% to GDP and about 6% of the export earnings of Bangladesh. There are about 4.1 million ha of inland water bodies in Bangladesh. However, over last two decades the catch from inland capture fishery has decreased due to filling of wet lands and other anthropogenic reasons. Accordingly, the production of inland fish has decreased not only for the decrease of water bodies but also due to irrational catch of fish fries, brood fishes and use of current nets for fishing. Significant responses from the fisheries entrepreneurs have not been received for the small loan scheme of the Bangladesh Bank. The bank could not disburse more than Tk. 500 million under the scheme. The total revolving credit under the scheme was Tk. 1,000 million with the assistance from the World Bank. The business houses having fixed assets of value not more than Tk. 10 million will be eligible to borrow from this fund. About Tk. 0.2-5.0 million can be borrowed as term loan and working capital from Bangladesh Bank through commercial banks. The loan was given to the commercial banks at 5% interest (bank rate) and the commercial banks shall also bridge finance to the entrepreneurs at a lower rate of interest. Working capital time limit is for a maximum of 1 year with half yearly rest, mid-term loan maximum of 3 years in 5 installments and with 6 months grace period and long-term loan maximum of 5 years in 9 installments with 6 months grace period.

Key words: Fisheries sector, Institutional and non-institutional credit, Fisheries policy

Research findings

- The average rate of interest for the fisheries sector was estimated to be 9.05% which was quite high for fisheries entrepreneurs.
- Although the target for disbursement of 4% of the total agricultural loan was set for fisheries alone but the disbursement was only 3% in the FY 2004.
- Inland fish production increased by 10.26% for the last three years but the delivery of credit especially for fish farming was very cumbersome and inadequate.
- Rational and interested farmers can derive benefits from the subsidized institutional credits to improve fish culture and management.
- Landless, small and marginal farmers faced problems in getting access to the formal institutional credits and they were compelled to depend on the mercy of the non-

institutional and individual money lenders at an exorbitant rate of interest and/or stringent conditions.

- Rural moneylenders took advantage of charging high rate of interest, which was 5-10 times higher than the formal lending rate.
- Different types of rural credits are offered by commercial banks and NGOs. However, BRAC, PROSHIKA and other NGOs charged higher rate of interest (15%) for fish farmers.
- The formal sector's rate of interest for fisheries entrepreneurs was lower by 5.95% and it was within the reach of the poor farmers for various reasons. Women working under PROSHIKA implemented 50.13% of the fisheries programs borrowing 48.90% of the loan portfolio.

Policy implications

- There is no fisheries insurance provision against natural calamity, disease and theft as a result farmers are to some extent helpless in time of unfavorable conditions of farming. As a result, some times they abandon the farm.
- The necessity of insurance mainly against natural calamity and partially against theft was highly felt by the farmers.
- Lower rate of interest, simplification of lending provision without collateral but of supervised credit was highly recommended.
- The National Policy for Fisheries 1998 needs drastic and specific amendments immediately. Proper implementation and amendments of the various Fisheries Laws like the Protection and Conservation of Fish Act. 1950, the Protection and Conservation of Fish Rules 1985, the Private Fisheries Act. 1889 and the Marine Fisheries Ordinance 1983 should be made in favor of fishers and fisheries.

Livelihood implications

The nation can have more protein intake and better health by fish farming, but is deprived of such opportunities due to lack of proper management and credit facilities in this sector. The majority of the fish farmers are illiterate but the number of literate people is increasing due to limited employment opportunity elsewhere and increased demand and high price of fish. The family intake of fish protein has also increased due to availability of fish at their own farm. The implications for small farmers, traders, and poor consumers, both in terms of availability of cheaper food and higher income are quite significant. About 87% were attracted to fish farming because of its profitability and the rest came for household consumption, availability of pond, seed and additional source of income. The savings of fish farmers were used in various ways, such as for child education, health care, housing and sanitation. Over all life standard has improved by fish farming and 90% of the fish farmers intended to continue fish farming.

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GIS in Aquaculture

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