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ORIGINAL ARTICLE

Existing Status and Potential of Fish Farming of Lalpur Upazila Under Natore District of Bangladesh

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Abstract

Background: Fish farming in Lalpur Upazila under Natore District plays a vital role in local livelihoods and food security, necessitating an assessment of its current status and potential for future development. **Objective:** The general objective of the study was to assess the existing status and explore the future potentials of fish farming in Lalpur Upazila under Natore District of Bangladesh. **Methodology:** This study was designed as a descriptive survey to evaluate the current status and potential of fish farming in Lalpur Upazila under Natore District of Bangladesh. Data were collected through structured questionnaires, interviews, and field observations to ensure comprehensive coverage of farming practices and challenges. The study was conducted in various villages within Lalpur Upazila, where fish farming is actively practiced. The study period spanned from January to June 2024. A combination of purposive and random sampling techniques was used to select respondents, including fish farmers, local authorities, and fisheries officers. Collected data were analyzed using both qualitative and quantitative methods to draw meaningful conclusions. **Results:** Most respondents (44.0%) were aged 30 to 40 years, 36.0% had education beyond Higher Secondary Certificate, and 48.0% received formal training in fish farming. Farmers mainly cultured Indian major carps, silver carp, and common carp, while rotenone and phostoxin were used to remove unwanted species. Fertilizers like urea, TSP, SSP, mustard oil cake, and cow dung and supplementary feeds were widely used. Production ranged from 710.40 to 10,785.10 kg/ha/year, with an average yield of 3,744.98±2,530.40 kg/ha. Net profits varied from 48,127.80 to 377,157.00 Tk./ha/year. Constraints included low-quality seed, technical gaps, labor shortages, diseases, lack of credit, high input costs, theft, and water pollution. Fish production increased from 3,280 MT in 2017 to 4,750 MT in 2021. **Conclusion:** Based on the findings, it can be concluded that fish farming in Lalpur Upazila holds significant potential for expansion and increased productivity, provided that existing challenges are addressed through improved support, resources, and training. *[Journal of Current and Advance Medical Research, July 2024;11(2):97-101]*

Keywords: Fish farming; carp fish; production; constraints; potentials

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Introduction

Aquaculture is vital to Bangladesh's economy, providing employment, nutrition, and income. Lalpur Upazila in Natore District has seen increasing interest in fish farming due to favorable climatic conditions and water availability. However, various challenges hinder optimal production. Assessing the current status, profitability, and challenges of fish farming is

crucial for sustainable development. Bangladesh has vast inland water resources, covering 4,704,195 ha, with 843,729 ha of closed water bodies and 3,860,466 ha of open water bodies[1]. Ponds and ditches make up 8.6% of total inland waters, covering 407,625 ha.

Over the past 37 years, aquaculture's contribution to total fish production has grown significantly from 15.5% in 1983 to 84 to 57.4% in 2019 to 2020[2]. Of the total 3,939,989 MT inland fish production, 57.1% (2,638,745 MT) comes from culture fisheries, with 2,090,787 MT produced in ponds and ditches[3]. Bangladesh ranks third in inland open water capture and fifth in aquaculture production globally. In 2020 to 2021, the fisheries sector contributed 3.6% to GDP and 26.5% to agricultural GDP. Over 12.0% of the country's 170 million people depend on fisheries and aquaculture for their livelihood. The general objective of the study was to assess the existing status and explore the future potential of fish farming in Lalpur Upazila under Natore District of Bangladesh.

Methodology

Study Area and Duration: Selecting a suitable study area is crucial for research, as it determines where data will be collected based on the study's objectives. Natore district is a major fish-producing region in Bangladesh, with Lalpur Upazila located in its northeastern part (24.1833°N, 88.9750°E). Covering an area of 327.92 km², Lalpur experiences high temperatures and low rainfall, making it a key fish production zone supplying both local and distant markets.

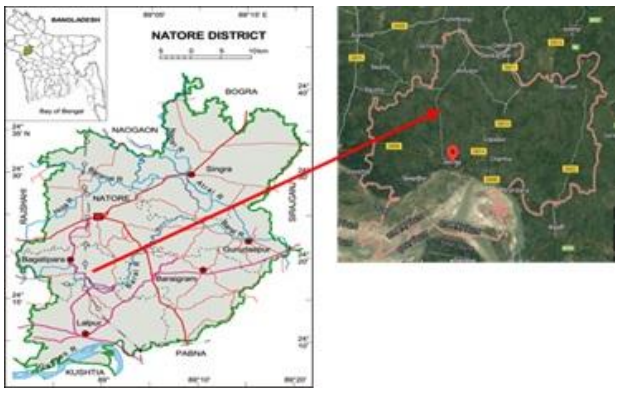

Figure I: Site of Study Site

Data Collection Methods: Data were gathered using a structured questionnaire through group and individual interviews. Various PRA tools were applied to collect farmers' insights. Methods included farm walks, interviews with key informants like fisheries officers, experienced farmers and individual farmers, focus group discussions (FGDs), mapping, and consultations with Upazila fisheries officers and local authorities.

The study was conducted in several villages of Lalpur Upazila, selecting 50 farmers through a stratified random sampling method. Data collection took place from June 2021 to May 2022. A draft questionnaire was initially prepared to ensure relevant data collection, with an English version used for documentation.

Processing and Analyzing of Data: All collected information was compiled, carefully examined, and recorded a master sheets. Finally, several relevant tables were prepared as per the requirements of the analysis to meet the studied objectives. Data analysis was conducted using various statistical methods such as arithmetic means, percentages, ratios, and standard deviation (±SD).

Results

Pond Ownership: The study identified two main pond ownership types: own ponds and leased ponds. Lease durations varied, including less than one year, 1 to 3 years, and over 3 years. Payment conditions also differed, with some farmers paying upfront, others splitting payments, and some paying annually. Most leased ponds (48.3%) had lease costs ranging from 30,000 to 50,000 Tk/ha/year.

Pre-Stocking Management: Farmers commonly repaired pond bottoms and dykes, removed weeds, and eliminated predatory fish using pesticides, either alone or with netting or dewatering. Rotenone (7.6±1.02 kg/ha) and phostoxin (842.64±380.99 kg/ha) were the primary pesticides used. Lime application followed within 4–5 days at a rate of 19–285 kg/ha (mean 102.28±57.40 kg/ha). After a week, inorganic fertilizers such as urea (56.66±32.36 kg/ha), TSP (47.35±26.10 kg/ha), and MP (6.67±2.36 kg/ha) were applied. Organic fertilizers such as mustard oil cake (56.5±48.58 kg/ha) and cow dung (75±5 kg/ha) were also used. Ponds were ready for stocking within 7 to 10 days.

Stocking Management: Most farmers (44.0%) obtained fish seed from hatcheries or their own ponds, while only 8.0% sourced from the wild. The preferred species were Indian major carps (rui, catla, mrigal) and common carp (88.0%), followed by silver carp (74.0%). The average stocking density was 4,496.82 fry/ha.

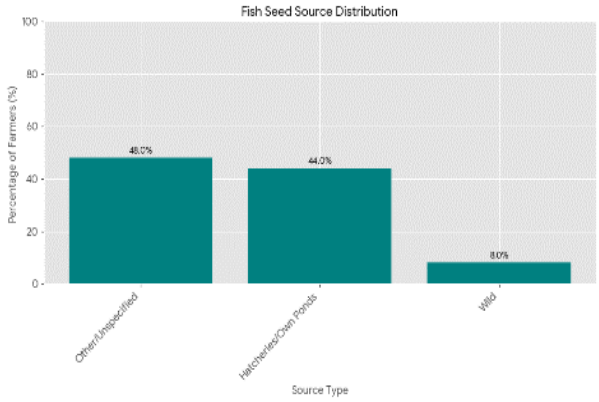

Figure II: Distribution of Fish Seed Source

Post-Stocking Management and Maintenance: Farmers applied inorganic fertilizers—urea (464.99±223.85 kg/ha/yr), TSP (285.62±109.45 kg/ha/yr), and MP (144±26.48 kg/ha/yr). Organic fertilizers included mustard oil cake (922.39±282.68 kg/ha/yr) and cow dung (1,455.12±439.11 kg/ha/yr), applied fortnightly or monthly. Supplementary feed was provided at 6,139.58±2,397.88 kg/ha/yr. Fertilizer and feed application was sometimes irregular due to high costs, limited availability, or adverse weather.

Harvesting and Production: In the study area, 18% of farmers practiced partial harvesting throughout the year, 8.0% practiced only final harvesting within 8 to 10 months, while 74.0% practiced both methods. Most ponds (41.0%) yielded 2,001 to 5,000 kg/ha/yr, and only 4.0% produced over 10,000 kg/ha/year. The observed production ranged from 710.4 to 10,785.1 kg/ha/year, with an average of 3,744.98±2,530.40 kg/ha/year.

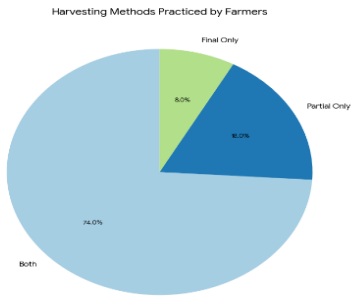

Figure III: Harvesting Method Practiced by Farmers

Cost Analysis: Pre-Stocking Management: Lease costs ranged from 30,000 to 140,000 Tk./ha/yr (mean 65,172.41±26,375.37 Tk./ha/yr). Pond preparation costs ranged between 1,968 and 18,002 Tk./ha (mean 8,128.86±4,243.52 Tk./ha).

Stocking Management: Fish seed costs ranged from 17,705 to 216,599 Tk./ha/yr (mean 76,313.4±49,734.05 Tk./ha/yr). Rui had the highest stocking cost like 21,809.68±13,739.45 Tk./ha.

Post-Stocking Management: Costs ranged from 170,190.4 to 623,532 Tk./ha/yr (mean 306,831.06±118,413.1 Tk./ha/yr). Harvesting, marketing, and other expenses ranged between 12,000 and 32,000 Tk./ha/yr with a mean ±SD of 17,450±4,804.42 Tk./ha/year.

Cost-Profit Analysis: Total production costs ranged from 214,601.4 to 1,027,651 Tk./ha/year with a mean 446,523.3 ± 206,701.8 Tk./ha/year. Gross returns ranged from 239,010 to 1,000,689 Tk./ha/year with a mean±SD of 479,703.24 ± 197,224.8 Tk./ha/year. Net profits varied between 48,127.8 and 377,157 Tk./ha/year (mean 172,872.17±85,515.25 Tk./ha/yr).

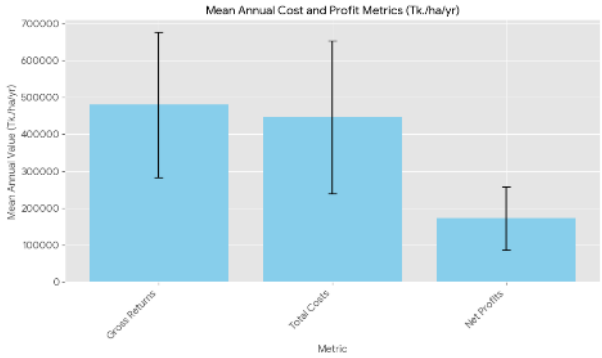

Figure IV: Cost-Profit Analysis

Constraints of Fish Farming: Key challenges included multiple ownership (40.0%), labor shortages (32.0%), lack of fish culture knowledge[4], financial constraints (56.0%), and unavailability of quality fingerlings[5]. Low dissolved oxygen (42.0%) and fish diseases (36.0%), such as gill rot, fin rot, dropsy, fungal and protozoan infections, parasites, and nutritional deficiencies, were also reported.

Discussion

Fish farming in Lalpur Upazila has the potential to boost economic growth and food security. Despite challenges, the increasing fish production indicates opportunities for expansion. Enhancing access to quality fish seed, providing technical training, ensuring financial support, and strengthening market connections can improve productivity and

profitability. Addressing these issues will help the sector grow and contribute to Bangladesh's aquaculture industry. Future research should explore technological innovations and policy measures to promote sustainable fish farming.

The study highlights several important aspects of pond aquaculture management in the region. Pond leasing remains a dominant practice, with lease values (30,000 to 50,000 Tk./ha/yr) consistent with earlier reports by Mohsin[6], though some farmers face higher costs, reflecting market inflation and increased land competition. Pre-stocking practices indicate that farmers are aware of the need for pond preparation, using lime, fertilizers, and pesticides effectively. However, compared to Saha[7] and Rahman et al[8], the use of organic fertilizers is much lower in this study, which may influence pond productivity. This reduced use may be due to higher input costs or limited availability of organic matter.

Stocking practices suggest that hatchery and farm-sourced seed dominate, reducing dependence on wild fry. However, overstocking tendencies, observed here, reflect a misconception that more seed guarantees higher yields. Past studies, such as Faruk[9] and Alam[1], recorded much higher stocking densities, but those studies involved smaller-sized fry. The lower density here could reduce intra-specific competition and improve survival rates. Post-stocking management showed that fertilizer and feed application levels were lower than those recommended by Rahman et al[8] Farmers reported irregular application, largely due to high input costs, which directly affects production. Still, the supplementary feed usage indicates an increasing trend toward semi-intensive practices. Harvesting and production results (average 3,744.98 kg/ha/yr) are higher than those reported by Saha[7] and Pravakar et al[10]. This suggests that improved seed availability, feed practices, and farmer knowledge may have enhanced productivity over time. However, only a small proportion of ponds achieved yields above 10,000 kg/ha/year, indicating room for intensification. Economic analysis shows profitability, with average net returns (172,872 Tk./ha/year) considerably higher than those reported by Biswas et al[5], Sohel[11] and Awal et al[4].

This improvement reflects rising market prices and expanded market access, though high variability in costs means not all farmers enjoy equal profitability. Constraints identified such as financial limitations, lack of modern knowledge, poor fingerling availability, water quality issues, and fish disease—are consistent with earlier findings[12-19]. These recurring problems highlight the need for targeted interventions, including credit facilities, improved hatchery management, disease diagnostics, and farmer training programs. Overall, while aquaculture in the study area is profitable and showing improvements in yield and management practices, challenges related to input costs, disease, and knowledge gaps continue to hinder its full potential.

Conclusion

The study found that fish farming is a widely practiced and economically significant activity in Lalpur Upazila, contributing notably to the livelihoods of local farmers. Most farmers use semi-intensive farming methods, relying on pond culture with limited technical support. Despite the potential for higher productivity, challenges such as lack of quality fingerlings, inadequate training, and insufficient access to credit were identified. The study also revealed that farmers are generally interested in expanding their operations if proper support and resources are made available. There is strong potential for growth through improved management practices, modern technology adoption, and government or NGO support. Overall, the findings highlight both the importance and the untapped potential of fish farming in the region.

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None

Conflict of Interest
We declare that we have no conflict of interest.

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Contributions to authors: Hossain MD, Ilah NEF conceived and designed the study, coordinated data acquisition, performed the initial analysis, data visualization and drafted the manuscript; Kumar SA contributed to data compilation, validation, and critical interpretation of microbiological and epidemiological aspects; Joadder MAR provided input on methodological design, contributed to the interpretation of temporal trends, public health framing, and critical revision of the manuscript. All authors revised the manuscript for important intellectual content, approved the final version, and agreed to be accountable for all aspects of the work.

Data Availability
Any inquiries regarding supporting data availability of this study should be directed to the corresponding author and are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate
Ethical approval for the study was obtained from the Institutional Review Board. As this was a prospective study the written informed consent was obtained from all study participants. All methods were performed in accordance with the relevant guidelines and regulations.

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