



# International Journal of Fisheries and Aquatic Studies

E-ISSN: 2347-5129

P-ISSN: 2394-0506

(ICV-Poland) Impact Value: 5.62

(GIF) Impact Factor: 0.549

IJFAS 2018; 6(1): 170-173

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www.fisheriesjournal.com

Received: 23-11-2017

Accepted: 24-12-2017

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## Pond fish culture in Southwestern Bangladesh: An overview of the post stocking management practices

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### Abstract

The post stocking control mechanism of pond fish culture in Abyaynagar, Manirampur, Bagherpara and Chaugacha Upazila under Jessore district was observed from May to November 2016 by interviewing 200 fish farmers. It reflects, majority farmer (56%) cultured tilapia fish but only 3% cultured Shrimp/Prawn. The highest stocking density (63%) was found 100 to 200 fry/decimal having 0.5 to 2.0 cm (72%) fingerling size with directly grow out pond stocking (52%). About 58% farmer used balance feed with broadcasting method in the morning feeding (77%) only. Most of the farmers did not exchange water (58%) and can't culture properly (66%) due to lack of money. Only 7% farmers went to the government fisheries officials where 40% went to chemical shopkeepers for getting tips if any problems took place. It's therefore, important to offer with institutional and organizational helps, credit and extension services for sustainable fish production in the Southwestern Bangladesh.

**Keywords:** Post stocking, management, fish farmer, Jessore district, Bangladesh

### 1. Introduction

Fish has been an important component of the people's diet in many parts of the world. Its consumption is directly related to protein intake in the human body<sup>[1]</sup>. Moreover, most of the people in Bangladesh depend on fish for their animal protein<sup>[2-6]</sup> and fish provides 60% of animal protein consumption<sup>[7]</sup>. It is also an important source of micronutrients such as vitamin A, calcium and iron<sup>[8]</sup>. Due to the degradation or overexploitation of natural resources the household nutritional prerequisite is in critical condition in many countries of the world including Bangladesh<sup>[9-11]</sup>. So, to overcome this situation increased aquaculture production is thought to be an important alternative<sup>[12]</sup>.

In Bangladesh, annually average fish uptake of each person is 24.08 kg where demand is 24.74 kg<sup>[7]</sup>. In order to mitigate the continuous demand of fish for the growing population of the country and to reduce the pressure of capture fisheries from natural resources it is a current issue to focus on culture fisheries in Bangladesh<sup>[13-15]</sup>. In the past, fish farming was an extensive method and subsistence in nature, stocked with wild fry and fingerlings caught in rivers and cultured without the use of fish feeds<sup>[14, 16]</sup>.

Following the introduction of technology for inducing carp to spawn in the late 1960s and the subsequent development of fishpond management technologies in the 1970s and 1980s, fish farming became widespread and market driven<sup>[17]</sup> and culturing of various carp and exotic fish species in ponds and lakes became popular all over the country<sup>[14]</sup>. At present, most of the freshwater pond fish farming systems in Bangladesh are either extensive or semi-intensive and in very few cases intensive<sup>[15]</sup>. The present study was conducted to be acquainted with the existing post stocking pond management systems in Jessore district and to make some suggestions for development and management of pond fish production.

### 2. Materials and Methods

#### 2.1 Study Area

The study was conducted at the Jessore district (23.17°N 89.20°E) located in the Khulna Division of southwestern Bangladesh (Figure 1) with an area of 2570 sq. kms having the population of 2471554<sup>[18]</sup>. Four Upazila namely Abyaynagar (23°1'N 89°26'E), Manirampur (23°1'N 89°14'E), Bagherpara (23°13'N 89°21'E) and Chaugacha (23°16'N 89°1.5'E) of Jessore district were selected for the present study.

## 2.2 Collection of Data

The present study was based on field survey where primary data were collected from farmers who are involved in pond fish farming. For collecting data both individual and group interviews were also applied to different degree of effectiveness of the farmers' information from May to November 2016.

Data were collected from 200 pond owners randomly covering the selected areas considering the intensity of fish farming, dependency of farmers on fish farming. The questionnaire was designed with both closed and open form of questions. In this research, Focus Group Discussion (FGD) was used to get an overview of particular issues such as existing fish production system, constraints of fish farming and farmers' socio-economic condition. A total of 20 FGD sessions was conducted where each group size of FGD was 5 to 7 farmers. After collecting the data through questionnaire interviews and FGD, crosscheck interviews were conducted with Upazila Fisheries Officer, Assistant Fisheries Officer, Field Assistant and relevant NGO workers, School teacher, Chairman and Members of the Union councils and fry traders at their offices or home.

## 2.3 Data processing and analysis

The collected data were scrutinized and summarized carefully before the actual tabulation. Microsoft Excel 2013 was used to compile and analyzed the data upon completion of data collection.

## 3. Results and discussion

### 3.1 Post- Stocking management

#### 3.1.1 Cultured Species

In this study, tilapia (56%) was the mostly cultured fish species and the other cultured species were Pangas (20%), Carp (21%) and Shrimp/Prawn (3%). The carp was cultured in polyculture system.

#### 3.1.2 Stocking practice

Most of the fish farmer directly stocked the fishes in grow out pond (52%). On the other hand 18% stocked firstly in a nursery pond and 30% stocked in the Hapa (A net enclose placed in the pond) before releasing of the fry in the grow-out pond (Figure 2).

#### 3.1.3 Fingerling size

Size of the fingerlings also increases the survivability of the fishes. If there are the larger sizes of the fry there is lower risk of mortality. In the present study most of the fish farmer (72%) stocked the fingerling size are from 0.5 to 2.0cm. But in 2.5 to 4.0 cm were 22%, 4.5 to 6 cm were 5% and 6.5 cm to above occupied 1%.

#### 3.1.4 Stocking density

Growth and production of fish mainly depends on the stocking of fingerlings at a fixed number in different layers of the pond which make less competition for food. The standard stocking density of carp culture is 35 to 40 per decimal [19]. From the study it was found that all traditional farmers used unbelievably high stocking density (averagely more/less 200 fingerlings/ decimal without any concern of layer wise distribution). The highest stocking density (63%) was found 100 - 200 fry/decimal in the study area (Figure 3). Rahman [20] found that the average stocking density was 25,250/ha in Gazipur; Hassanuzzaman [21] stated that the average stocking

density was 16,196 fry/ha in the district of Rajshahi and Hossain *et al.* [22] observed that the range of stocking density was from 10,000-31,000/ha in a village of Mymensingh district.

#### 3.1.5 Feed

Supply of feed is a key factor for fish production. In the study area, most of the farmer (58%) used balance feed and 42% farmer used the supplementary feed. Farmer was not used commercial feed due to high cost. Rahman [20] and Hassanuzzaman [21] found in the Rajshahi district, the use of the supplementary feed by the majority of the farmers. Farmers were not maintained any scientific method to prepare balance feed for fish [23].

#### 3.1.6 Time of feeding

Time of feeding is also an important factor for the proper growth of the fishes. In the study area 77% farmer practiced their feeding in the morning, 11% farmer in the evening and 12% practiced their feeding both morning and the evening. Most of the farmers (58%) ensured that, they were busy with their other work and rest 42% fish farmer ensured that, they had not any knowledge about feeding times.

#### 3.1.7 Water Quality Management

Good water quality suggests the exchange and enhances fish production. About 42% farmer exchanged their pond water and 58% farmer did not exchange the pond water in the culture period. But many farmers in the study area were a poor monitoring of the water quality parameters. Only 13%, 4% and 7% farmers measured temperature, salinity and pH respectively but no farmer measured the ammonia and nitrate (Figure 4).

### 3.2 Problems Associated with Fish Culture

Most of the pond in Jessore district is under improved fish culture from where yearly production is moderately high. Furthermore different types of fish diseases, low growth rate, water pollution lowered the fish production. Lack of knowledge and capital of fish culture are the main causes of the less production from large water body. In the study area for the each identification of the each problem it was seen that 43% farmer faced the water quality problem and 17% had no problem, disease outbreak occurred in 42% pond and 58% were free from any harmful disease. But no farmer had the problem of flooding of their pond in the rainy season (Figure 5). Rahman [20] also explored in the Mymensingh that disease outbreak, water quality problem and Belton *et al.*, [25] stated poor technical knowledge are the major problems of pond fish production in the aquaculture.

### 3.3 Suggestion to mitigate the problems

Culture period is the crucial time for the farmers. In the study area 7% farmers went to the Government fisheries officers (Table 1).

In this time there are the outbreaks of many diseases. Khan *et al.* [24] found that lack of extension work for fisheries improvements caused the highest difficulty in pond fish culture.

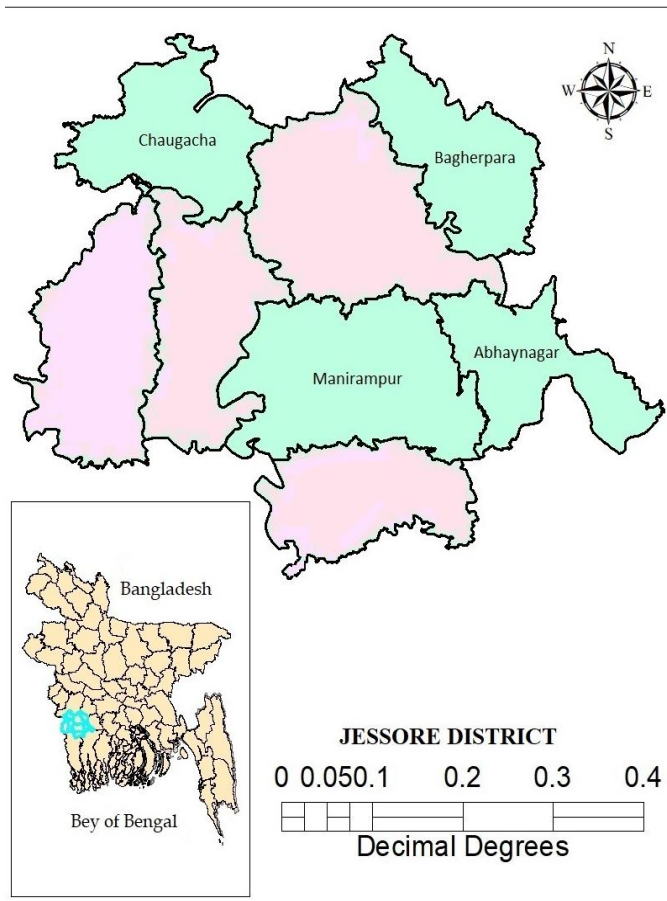


Fig 1: Geographical location of the study area

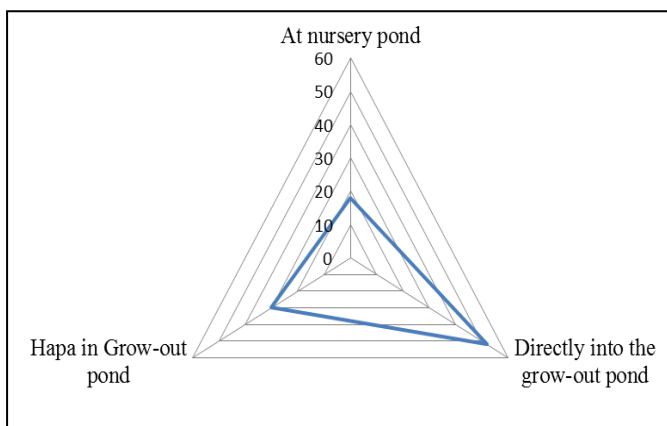


Fig 2: Fish stocking practice in different study area of Jessore district

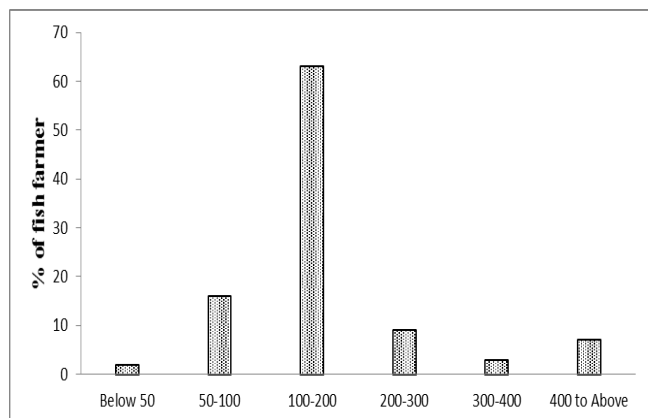


Fig 3: Stocking density of fish fry in culture pond of Jessore district

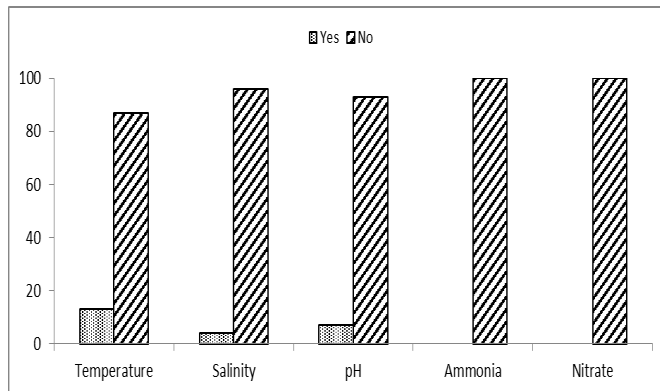


Fig 4: Water quality management in the fish pond

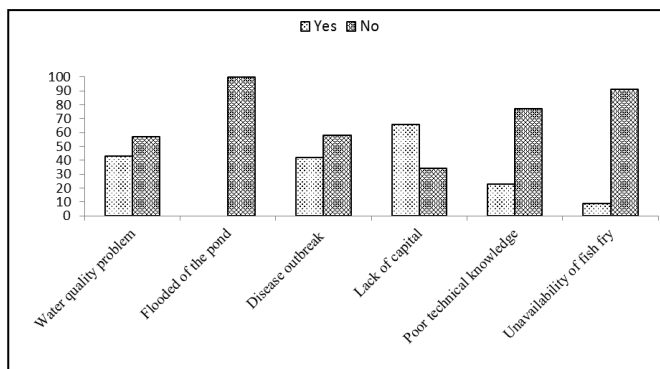


Fig 5: Problem associated with fish culture in Jessore district

Table 1: Suggestions from the people when problem/disease occurs

Category of People	% of the Fish Farmer
Government fisheries officers	07
Local/NGOs expert	03
Drug and chemicals shopkeeper/salespersons	40
Hatchery personnel	38
Seed traders	12

4. Acknowledgements

We express our gratitude to the local fish farmers (Jessore, Bangladesh) for giving times and extending co-operation during our interview sessions. Special thanks are extended to those people who were helped in different capacities in this research.

5. Conclusion

Bangladesh is an overpopulated country having very few resources to satisfy its demand. The result suggests that the lightening future of the aquaculture sector if progress traditional technology can be adapted to the fish farmers. It can also be assumed that utilization of improve technology can increase the fish production two and half time more than that of current production. For this government and other associated NGO's have to ought to take right step to make the fish farmers adapted with improve technology. Authorities and other organizations must play their assigned role via disseminating records to the farmers and arranging vital training for culture strategies in pond fish culture.

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