



Present Status of Pond Fish Farming: Evaluation from Small Scale Fish Farmer under Saidpur Upazila, Nilphamari, Bangladesh

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Authors' contributions

This work was carried out in collaboration between all authors. Author SA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors KRH and YM managed the analyses of the study. Author MKR managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JEAI/2017/35682

Editor(s):

(1) Ana Margarida Violante Pombo, Polytechnic Institute of Leiria, ESTM, Peniche, Portugal.

Reviewers:

(1) U. D. Enyidi, Michael Okpara University of Agriculture Umudike, Nigeria.

(2) Mbadu Zebe Victorine, University of Kinshasa (UNIKIN), Congo.

Complete Peer review History: <http://www.sciencedomain.org/review-history/21187>

Original Research Article

**Received 25th July 2017
Accepted 19th September 2017
Published 1st October 2017**

ABSTRACT

The present study was conducted to know the status of pond fish farming in Saidpur upazila under Nilphamari district of Bangladesh. The survey research was conducted on 40 fish farmers during October 2016 to March 2017. Farmers were randomly selected from selected areas. Primary data were collected through a survey questioner; secondary data were collected from relevant literature. Average size of ponds was 8-30 decimals and containing 3-6 month water holding capacity with 65% seasonal pond. Average stocking density was found 1500-2000 fry/ha. Most of the farmer applied locally feed. About 30 % people did not found fish diseases, 55 % people mentioned that diseases occurred occasionally and 15% found outbreaks of diseases in every year. Production rate of the 40% respondents were very low only 20% were high, main problem is water scarcity and inadequate technical knowledge therefore more extension and research are needed to increasing production.

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Keywords: Evaluation; present status; fish farming; Saidpur; Nilphamari; Bangladesh.

1. INTRODUCTION

Fisheries sector play an important role in develop the socioeconomic condition of an agricultural based country, like Bangladesh. Contribution in fisheries sector of Bangladesh is now well recognized in the world [1]. It has been increasing the demand of fisheries sector in national economy day by day. This sector contributes about 3.69% of total GDP and around 22.60% in case of agricultural GDP in 2013-2014 [1]. 11%, people are now involved in this sector. About 17.8 million people are partially engaged in fisheries sector for their livelihoods [1]. Total pond area in Bangladesh estimated as 3.71 lakh hector (ha), which can contribute 4.1 mt. of fish production. Freshwater fish farming plays an important role in the livelihoods of rural people in Bangladesh [2]. Aquaculture production, particularly pond aquaculture may be are liable source of attaining increased fish production so as to provide and feed the continually rising population of the planet [3]. Apart from direct self-employment opportunities from fish farming, pond fish farming offers diverse livelihood opportunities for operators and employees of hatcheries and seed nurseries and for seed traders and other intermediaries. Pond fish farming has been proved to be a profitable business than rice cultivation. So many farmers in rural areas are converting their rice field into aquaculture pond many pond fish farmers in rural areas have taken fish farming activities as their secondary occupation and most of the people involved in fish farming improved their socio-economic condition through pond fish farming activities [4]. Irregularly and supplemental feed consisting of rice-bran and oilcakes are given. In extensive method fishes are grown on natural feeds and feeds and fertilizer are rarely used if used then also in small quantity and or irregular basis [5]. The stocked fish are not specifically selected, predator are not eliminated and are not fertilized or managed through-out the production cycle. In general fish culture in Bangladesh is characterized by the use of both extensive and semi-intensive systems. Syedpur is an important upazila in the district of Nilphamari, northwest of Bangladesh. Its total area is 121.68 km². There is 2574 pond in which 16 ponds are public and 2558 ponds are private (Personal communication, Upazila Fisheries Officer, Syedpur, Nilphamari) [5]. Tiesta Barrage Project, one of the biggest irrigation projects of the country, begins from Dalia of this district. Number

of fishermen in the Saidpur is 376 and yearly production is very low 459 mt. although the total area of pond is 668 acre which contains of 2570 numbers of ponds [6]. The pond area remains under water almost throughout the year. Normally, households use pond water for various domestic and sometimes agriculture purposes. Ponds are also generally used for fish culture. In view of the above consideration; the present investigation was carried out to evaluate the status of the current fish farming in Saidpur Upazila under the district of Nilphamari and to find out the socio-economic constraints connected with fish farming.

2. MATERIALS AND METHODS

The present study was carried out in Nilphamari district, under Saidpur upazila for the assessment of current fish farming system, the study were conducted during November 2016 to March 2017. Fourty (40) farmers were randomly selected from selected areas. The target group was selected in different criteria especially who are already engaged in pond fish culture in seasonal or permanent. Saidpur upazila were selected due to a transitional point of several districts of Northern region. Pond fish farming in this area is not satisfactory for environmental extremities and there is a deficiency in fish production so a huge potentiality to introduce short cycle fish species in these areas. Research organization, DoF and several NGOs are trying overcoming this problem. Good communication facilities also help to researcher work in this area to increase fish production so there is need a baseline study for proper management and planning. The study was based on collection of primary and secondary data. Before collecting the primary data a well structure questioners were developed. In the pre testing much attention were given to any useful information for the completeness of the objective. After improving the final questionnaire, primary data were collected through survey of farmer household in selected areas by applying participatory Rural Appraisal tools such as directly interview of the farmer, focus group discussion, crosscheck etc. Relevant secondary data were collected from district and Upazila fisheries office. The literatures were also collected from different study (The resources include online publications, books, governmental reports, international reports, scientific journals and news articles that focused on pond farming

system and livelihood condition of a fish farmer). All the information of the study then compiled, accumulated and analyzed by MS excel and presented in tabular and graphical forms to understand the present pond farming system.

3. RESULTS AND DISCUSSION

3.1 Personal Information

3.1.1 Age group

Among the total 40 fish farmers, the highest 35% belonged to the age group 31-40 years. The lowest 7.5% belonged to the age group above 60 years (Table 1). In the study area it has been found that the majority of the fish farmers were 30-50 years old. [7]. found that most fish farmers (50%) belong to the age group of 31-40 years in the district of Mymensingh. Similar results also observed [8]. Have investigated majority of the fish farmers in Dinajpur were 31-45 years old, which is more or less similar to the present findings.

Table 1. Age distribution of the fish farmers in the study area

Age group	No. of farmer (N=)	% of total
20-30	07	17.5
31-40	14	35
41-50	12	30
51-60	04	10
61-70	03	7.5
Total (N=)	40	100%

3.1.2 Family size

In this study, only 10% had family members 7-8 (Table 2). The family size is much smaller compared to other areas and communities of Bangladesh. It happened because they were economically poor, as the children are separated from their families when parents grown [9]. stated that Most of the farmer (45%) belonged to the family of member 4-5 in Mymensingh district.

Table 2. Family size of the fish farmers in the study area

Family size	No. of farmer (N=)	% of total
2-3	13	32.5
4-5	15	37.5
5-6	8	20
7-8	04	10
Total (N=)	40	100%

3.1.3 Religious

Religion plays a vital role in the social and cultural environment of people in a given area. It acts as a notable constraint and modifies social pattern of people. In the study area, 91.66% of the pond owners were Muslim and 8.33% were Hindus. [10]. was found that maximum fish farmers were muslim (94%) while small proportions (6%) were hindus in some selected areas of Bagmara upazilla under Rajshahi district. This result is similar to the present study.

Table 3. Religious status of fish farmers in the study area

Religion	No. of farmer (N=)	% of total
Muslim	33	91.66
Hindhu	03	8.33
Others	00	-
Total (N=)	40	100%

3.1.4 Principal occupation

In the study area majority of the fish farmers were involved in agricultural farming as a principal occupation (62.5%), followed by business including small trading and shop keeping (17.5%). About 12.5% of the farmers were occupied with fish farming as their principle occupation while 7.5% labors (both unskilled and skilled labor). (Table 4) [2]. found that 17%, 52%, 3% and 28% farmers were related to agriculture fish culture, business and others as secondary occupation in Habigonj district.

Table 4. Principal occupation of fish farmers

Occupation	No. of farmer (N=)	% of total
Agriculture	25	62.5%
fisherman	05	12.5
Day labour	03	7.5
Others (jobs, business, student, housewife)	7	17.5
Total (N=)	40	100%

3.1.5 Secondary occupation

Primary occupation cannot provide full time employment and the income derived therefore may be insufficient to provide adequate means of livelihood. In the study area 57.5 % respondents stated that their secondary occupation was fish farming while, 22.5%, 12.5%, and 7.5 % were occupied in business, agriculture, day labor

(Table 5) [11]. found that 22%, 28%, 8% and 6% were occupied in business, agriculture, services and poultry rising as the secondary occupation in Noakhali district.

Table 5. Secondary occupation of fish farmers in the study area

Occupation	No. of farmer (N=)	% of total
Agriculture fisherman	05	12.5
Day labor	23	57.5
Others (jobs, student, housewife)	03	7.5
	9	22.5
Total (N=)	40	100%

3.1.6 Educational status

Fish farmers were categorized into 4 categories on the basis of the level of education. Out of 40 fish farmers, 15% had no education, 40% had primary level, 27.5% had secondary level, and 17.5 % had higher secondary level). The reported literacy rate was found higher than the national adult literacy level of 65% due to variation of the region and Gov facilities day by day increased in primary and secondary and higher education [2].

Table 6. Education status of the farmers in the study area

Educational status	No. of farmer	% of total
No education	06	15
primary	16	40
Secondary	11	27.5
SSC and above)	07	17.5
Total	40	100%

3.2 General Pond Condition

General pond conditions play an important rule for proper management of ponds. In our study area we found that average size of the ponds were 8- 30 decimal, most of the ponds were located in the adjacent resident or paddy field area [8]. Stated that the efficiency of fish culture varies with the size of the pond. The two categories of ponds we found of which 65 % were seasonal and 35% perennial. Seasonal pond were unsuitable for fish culture in dry seasons farmer mainly culture short cycle fish species in late April to October. Water retention capacities of perennial ponds were decaling in the dry seasons but few farmers continue their

fish culture by semi deep tube well water. Water retention capacity of the pond is decreasing day by day as a result the number of seasonal pond increasing [12]. Farmer of the surveyed area also mentioned that they were sometimes drying pond before stocking. It was observed that the number of ponds (90%) was occupied by the single owners followed by multiple owners (10%), ownership although a big constraint in many areas but our survey revealed those multi ownership ponds were few in amounts due to the study consider mini seasonal ponds in Northern regions. The multiple pond ownership was a main constraint for pond aquaculture [13,14,15].

3.3 Stocking and Feed Management

In the study area fish fry or fingerlings were stocked in late April to June, most of the farmer mention that they were stocked mainly GIFT/ mono sex tilapia (*Oreochromis niloticus*) with carp (*Labe orohita*, *Catla catla*, *Cirrhinus cirrhosus*, *Hypophthalmichthys molitrix*, *Cyprinus carpio* polyculture system. The average stocking density in the study area was found 2500-3500 fry/ ha [16]. Found that the average stocking density was 25,250 fry/hac in Gazipur district few farmer also cultured shing (*Heteropneustes fossilis*), magur (*Clarias batrachus*), GIFT and shorpunti (*Barbodes gonionotus*) and Vietmanese koi (*Anabus testudineus*) in mixed combination in an average 30,000- 40,000 fry/ha They collected fry from private fish hatchery and gov. fish farm of the adjacent locality or patilwala. Transport system is carried by van, bicycle, patil and auto rickshaw etc. some of the farmer also stocked non target fish species such as mola, darkina, taki, bele,guchi baim etc. they reared the fish in 4-6 month and few farmer have no fixed culture period. Sampling and monitoring of water quality is done occasionally and 95% of the fish farmers have no water quality instruments, when they faced problem they go to the fisheries related office or NGOs people. From the survey it was found that 40% of farmers applied supplementary feed, 36% use locally available feed with mixture of rice bran, white bran, mustard oil cake and 16% did not used any feed in their pond and depend on the natural food in the pond [17]. Found in his study Shahrasti upazila of Chandpur district it was found that 95% of the farmers applied supplementary feed such as rice bran, mustard oil cake and commercially manufactured feed and rest 5% of the farmers depended on the natural food in the pond [18]. Found that 80% of the farmers applied supplementary feed such as rice bran and mustard oil cake. The use of rice

bran and oil cake by the farmers varies from place to place. In our study revealed that maximum farmer does not use supplementary feed due to non commercialization of the culture technology in this region.

3.4 Inputs and Fish Diseases

It was observed that majority of the fish farmer have no fishing inputs, few farmer have only ber jal, cast net and other traditional fishing inputs. About 80% of the fish farmer invests money for different types of pond inputs; they also mentioned that during pond preparation they used lime 0.5 kg/dec and apply TSP at the rate of 50- 100 g, Urea 100-150 g/dec and cow dung 7-8 kg/ dec. for pond management which brought from feed shop or local market. 30% of the farmer mentioned that hired labor during pond drugging and harvesting and paid the labor bill 250-300 BD Tk/day. Due to unplanned stocking density and lack of knowledge in pre stocking management, some of the fish diseases occurred in this regions. About 30% people did not found fish diseases, 55% of the people mentioned that diseases occurred occasionally and 15% of people found outbreaks of diseases in every year. Most common symptoms of these diseases were red spot in fin and tail, wounded, flot in water, abnormal structure, argulosis, and some nutritional diseases occurred in carps, tilapia, shing and shorpunti species. Some of the farmer also stated that about 3-5 kg fish died every cycle due to diseases. Farmer used lime, kmnO_4 , sumithion ammocure, bio-ox for curing of diseases and 20% of the farmer mentioned that they cannot applied any kinds of chemicals or aqua drugs for fish diseases and maximum farmer used only lime and kmnO_4 . There were 15% fish farmers who did not find fish diseases in the pond, 73% farmer reported that their cultured fish was sporadically affected by diseases, while 12% fish farmers found disease outbreak every year in Trishal, Mymensingh [19] and more or less similar result of our study.

3.5 Harvest and Yield

Harvesting depends on several conditions, usually farmer caught their fish when money in required, home consumption, and relatives comes to the home, but peak seasons of harvesting between Octobers to December. Harvest held 3-4 times per cycle, during the surveyed it was observed that 60% farmer sold out about 60-70% of the total production, 10% farmer reared fish only for home consumption

and 30% farmer sold out only 50% of total production, rest of the fishes they distributed among relatives and fishermen. Fish farmer harvested their fishes by seine net and cast net and lastly captured the fishes by dewatering. Most of the farmer sells the fishes in the local market by arotder and some farmer also sold out in the adjacent people during netting. Although the surveyed mini ponds were seasonal but due to lack to species selection and stocking density production rate were low in the Saidpur upazilla. In the study area, it was found that the level of production of the 40% respondents were very low (< 2000 kg/hac/yr), only 20% were high (4001-5000 kg/hac/yr). It was also found that the average annual yield was 2593.5 kg/hac/yr. [20] reported that the average annual yield of fish was estimated at 2609 kg/hac/yr. This study has more similarity with the present study. [21]. reported in his study that the production of the pond fish was 2,890 kg/hac/yr, this result was not related to the present study.

Across the study, the annual income of 65% fish farmers was estimated at (up to 40000) Tk/hac/yr, and only 14%, 4%, and 10% of fish farmers were estimated at (50001-150000) Tk/hac/yr, (150001-250000) Tk/hac/yr, and (250001-350000) Tk/hac/yr, respectively [18]. stated that the highest percentage (34%) fish farmers earned BDT 75,000 to 1, 00,000 per year in Shahrasti upazila of Chandpur district. It was found that the average annual income of fish farmers in the study area was 58306 Tk/hac/yr. Saha (2004) reported in his study that the annual income of fish farmers was estimated at 220 000 Tk/hac /yr which was very high than the present study [22]. Stated that the annual income of fish farmers were 1, 24,908.9 Tk/hac/yr in Sreemongal upazila of Moulvibazar district. From the survey, it was found that high production.

3.6 Constraints of fish Production

A number of constraints and risks were reported by the farmers but 90% of the farmer reported that their main problem is water scarcity other problems which were inadequate technical knowledge, theft, poisoning, lack of money, poor quality of fish seed etc. From the study, it was found that, lack of technical knowledge, lack of quality seed, high price of feed, lack of money etc. were the main constraints of fish production in the surveyed area [23]. stated that the major constraints of carp farming were lack of money and higher production cost. The problems encountered by the fish farmers in the surveyed

area are almost similar to those recorded by [24,25]. Found that the lack of extension work for fisheries improvements caused the highest difficulty in pond fish culture.

4. CONCLUSIONS

Considering the different observations during the present study it is concluded that more extension, training and motivation works are needed to utilize all types of seasonal water bodies. More research is needed to increasing water capacity level and adoption of short cycle fish species in seasonal water bodies. By establishing more hatcheries, arranging training at farm level, providing interest free or at lower interest loan to the farmers the existing fish production could be increased.

ACKNOWLEDGEMENT

Thankful acknowledgement to Bangladesh Fisheries Research Institute, for the financial assistance and fish farmer of Nilphamari districts who were actively participate and coordinate for conducting the study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Do F. National Fish Week Compendium (in Bangla). Department of Fisheries, Ministry of Fisheries and Livestock, Bangladesh. 2015;148.
2. Khatun S, Adhikary RK, Rahman M, Sikder MNA, Belal Hossain M. Socioeconomic status of pond fish farmers of Charbata, Noakhali, Bangladesh. *Int. J. Lifesc. Bt & Pharm.* 2013;2(1):356-365.
3. FAO. State of World Aquaculture-2010. Fisheries Department. FAO Fisheries Technical Paper. 2010;500:21-26.
4. Ahmed MNU. Fisheries sector in Bangladesh. Economy and Development of livelihood. *Fish Fortnight Compendium*, Department of Fisheries, Bangladesh. 2003;86.
5. BBS. Fisheries Statistical Year book of Bangladesh. Fisheries Resources Survey System, Department of Fisheries, Bangladesh, Dhaka. 2011;41.
6. BBS (Bangladesh Bureau of Statistics). Bangladesh Bureau of Statistics. Statistics Division. Ministry of planning, Government of the People's Republic of Bangladesh, Dhaka. 2004;673.
7. Ali H, Azad MAK, Anisuzzaman M, Chowdhury MMR, Hoque M. Sharful MI, et al. Livelihood status of the fish farmers in some selected areas of Tarakanda Upazila of Mymensingh District. *J. Agro. Environ.* 2009;3(2):85-89.
8. Reza S, Hossain MS, Hossain U, Zafar MA. Socio-economic and livelihood status of fishermen around the Atrai and Kankra Rivers of Chirirbandar Upazila under Dinajpur District. *Inter. J. Fish. and Aqua. Stu.* 2015;2(6):402-408.
9. BBS. Fisheries Statistical Year book of Bangladesh. Fisheries Resources Survey System, Department of Fisheries, Bangladesh, Dhaka. 2011;41.
10. Reza S, Hossain MS, Hossain U, Zafar MA. Socio-economic and livelihood status of fishermen around the Atrai and Kankra Rivers of Chirirbandar Upazila under Dinajpur District. *Inter. J. Fish. and Aqua. Stu.* 2015;2(6):402-408.
11. Sarker C. Socio-economic aspects of pond fish cultured women in some selected areas of Habigonj District. An M.S. Thesis, Department of Fisheries Management, Bangladesh Agricultural University, Mymensingh; 2004.
12. Bangladesh Bureau of Statistics (BBS); 2000. Available:<http://www.bbs.gov.bd/home.aspx>
13. Ali MH, Rahman MI. An investigation on some socioeconomic and technical problems in pond fish culture in two districts of Bangladesh. *Bangladesh Journal of Aquaculture.* 1986;8:47-51.
14. Mollah AR, Chowdhury NSI, Habib MAB. Input output relation in fish production under various pond sizes, ownership patterns and constraints. *Bangladesh Journal of Training and Development.* 1990;3:87-101.
15. Hossain MA, Khan MAR, Mannan MA. Present status of pond fishery in Dhamaihat upazila, Naogoan. *University Journal of Zoology Rajshahi University.* 2002;21:79-80.
16. Pravakar P, Sarker BS, Rahman M, Hossain BM. Present status of fish farming and livelihood of fish farmers in Shahrasti Upazila of Chandpur District, Bangladesh.

- American-Eurasian Journal of Agricultural and Environmental Science. 2013;13(3): 391-397.
17. Alam G. Status of fish farming and livelihoods. of fish farmers in some selected areas of Mithapuqur Upazila in Rangpur District, an MS Thesis, Department of Fisheries Management, Bangladesh Agriculture University, Mymensingh. 2006;59.
 18. Sheheli S, Fatema K, Haque SM. Exiting status and practices of fish farming in Trishal Upazila of Mymensingh District. Progressive Agriculture. 2013;24:191-201.
 19. Saha SK. Socio-economic aspects of aquaculture in Tangail sadar upazila, MS Thesis, Department of Aquaculture, Bangladesh Agricultural University, Mymensingh. 2004;45.
 20. Islam MS. Socio-economic status of fish farming income selected areas of Dinajpur District, MS Thesis, Department of Fisheries Management, Bangladesh Agricultural University, Mymensingh. 2005;46.
 21. Khan MS. Socio-economic aspects of fish farmers in in some selected areas of Sreemongal Upazila under Moulvibazar District, MS Thesis, Department of Aquaculture, Bangladesh Agricultural University, Mymensingh. 2012;57.
 22. Rahman MM. Socio-economic aspects of carp culture development in Gazipur, Bangladesh. An M. S. thesis submitted to the Department of Fisheries Management, Bangladesh Agricultural University, and Mymensingh. 2003;72.
 23. Ali MA. An investment on some socio-economic and technical problems in pond fish culture in two districts of Bangladesh. Bangladesh J. Aquaculture. 1991;8(1):47-51.
 24. Biswas SS, Hossain MI, Mazumder MS, Akteruzzaman M. An economic analysis of pond fish culture of BRAC in some selected areas of Mymensingh district. Progress Agricult. 2000;11(1-2):243-249.
 25. Khan MS. Socio-economic factors in the development of fisheries. Bangladesh J. Agril. Econ. 1986;10(2):43-47.

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Peer-review history:
The peer review history for this paper can be accessed here:
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