

## STATUS AND PROSPECTS OF AQUACULTURE PRACTICES IN BARURA UPAZILA, COMILLA, BANGLADESH

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### Abstract

The present study was carried out in Barura upazila under Comilla district to assess the aquacultures status in 2008 and its future prospects. The upazila has no river but one Jolmohal (Carzon khal) occupying 700 ha, 7494 degghi and pukur (1836.77 ha), 6 khal (490 ha), 625 commercial and khas pukur (428.07 ha), 56 fish farms (92.57 ha) and paddy-cum fish culture (777.62 ha) which altogether formed vast fishery resources. In addition, 16 hatcheries with production capacity of 5350 kg and 56 nurseries with production capacity of 271.15 metric ton support necessary stocking fries and fingerlings for the above resources. In total 35% people are involved with aquaculture in the upazila. Thai Pangus (*Pangasiadon hypophthalmus*) and carp (rui, katla, mrigal etc.) are dominated cultured species in the study area. Semi-intensive culture systems are mostly used in this area. The upazila fulfills its own demand and the surplus fishes are sold to the neighboring districts. Only the Thai Koi (*Anabas testudineus*) was found to be trading overseas.

Keywords: Barura Upazila, Aquaculture resources, Production, Future prospects

### Introduction

Inland waters of Bangladesh is blessed with vast water area in the form of ponds, canals, ditches, flood plain, haors (natural depression), baors (ox-bow lake), rivers, estuaries etc. covering an area of 5.31 million ha in which only ponds and ditches occupy an area of 2.42 lac ha. Fish production from this water body during the year 2009-2010 was 23.8 lac MT whereas, the total country fish production in the same year was 29 lac MT. This is 82.16% of the total fish production (DoF 2011). Only 7.71% ponds all over the country are used for commercial venture and the rest are used for non-commercial practices. Whereas, the production rate from this sector can be raised many folds through proper pond management techniques using the existing carrying capacity of different types of ponds in relation to species stocked and selection of species. In this respect, Barura upazila of Comilla district with an area of 241.69 sq. km. may be a model for such study. The present study was aimed to assess the present status and probable scope to enhance the production of captive fishing and aquaculture at Barura upazila, Comilla.

### Materials and Methods

Barura upazila located under the Comilla district in Bangladesh lies between 90°57'E and 91°08' E longitude and 23°13' N and 23°27' N latitude. Fifteen unions of the upazila

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are potentially rich for aquaculture due to presence of 16 hatchery, 56 nursery and 7494 ponds. Among these aquaculture resources, union like Uttar Shilmuri, Dakshin Shilmuri, Bobhanipur, Choddhaia and Addra usually practiced traditional culture technique and thus production is comparatively poor. On the other hand, rest of the unions practice semi-intensive and improved traditional system and therefore getting higher production, stimulating more and more people and as such most of the hatchery, nursery and production ponds are located in these areas.

The survey was conducted over a period of one year from January to December 2010, based on both primary and secondary data collected from various sources (field observation, questionnaires, key informants, journal, and document and report book). Data were collected using questionnaires and Participatory Rapid Appraisal (PRA) tools including Focus Group Discussion (FGD) with the fishermen and the womenfolk in each union. Questionnaire survey and key informants (KI) interviews were conducted at different levels of fisherman, administrative and sectoral officials namely Upazila Nirbahi Officer (UNO), Upazila Fisheries Officer (UFO) and Upazila Agricultural Officer (UAO). Secondary data such as topographic map, land use data, climate, etc. were collected from annual reports, documentary of relevant agencies, official books, journals and local people.

### **Results and Discussion**

**Production pond:** In Barura upazila there are about 7494 ponds occupying a total area of 1836.77 ha and about 484 paddy-cum fish culture farms occupying area of 777.62 ha. The production capacity is about 20 MT per ha. In spite of that only 7.71% ponds are used for commercial purpose while, large number of commercial fishermen have to depend on lease for fish culture (Table 1).

**Hatcheries:** Hatchery plays an important role in aquaculture production. In the study area there are two Thai koi (*A. testudineus*) hatcheries, one shing (*H. fossilis*), one magur (*C. batrachus*), one monosex tilapia (*O. niloticus*) and eleven carp hatcheries. All of these hatcheries are private owned and the owners usually prefer locally available PG hormone for induced breeding. The production capacity of those hatcheries is 5350 kg/year and that can fulfill the local demands of fry and the excess sells to neighboring upazila. However, six unions are well known for hatchery activities though maximum fry production comes from the Jalam, Phoroshaba and Uttar Khosbas unions and altogether fulfill the demand of the upazila (Table 2).

Table 1. Different phases of aquaculture activities at union level.

Union	No. of commercial ponds	Area of commercial ponds ( ha )	No. of non-commercial ponds	Area of non-commercial ponds ( ha )	No. of professional fisherman	Farmers involved in paddy cum fish culture	Area of paddy cum fish culture ( ha )	No. of total ponds	Area of total ponds ( ha )
Adda	50	55.3	445	65.16	87	40	51.78	495	120.46
Addra	48	49.48	456	70.73	66	41	53.7	504	120.21
Aganagor	21	73.87	486	46.2	46	41	48.68	507	120.07
Babhanipur	27	25.5	444	86.7	36	24	34.86	471	112.2
Choddhaia	28	46.9	326	39.17	38	11	24.52	354	86.07
Dakshin Khoshbas	38	39.72	447	75.88	51	32	40.37	485	115.6
Dakshin Silmuri	11	13.95	449	86.75	15	10	19.58	460	100.7
Dewra	41	48.25	421	61.76	50	26	35.12	462	110.01
Galimpur	78	136.21	631	33.4	91	38	54.33	709	169.61
Jalam	48	117.06	443	27.14	59	28	46.4	491	144.2
Lakhipur	39	63.5	433	47.94	44	28	55.5	472	111.44
Phoroshaba	37	73.87	556	66.24	75	41	48.68	593	140.11
Uttar Khoshbas	72	134.55	491	35.65	93	76	192.3	563	170.2
Uttar Pholilgacha	20	40.9	455	68.54	55	40	56.3	475	109.44
Uttar Shailmuri	20	37.3	423	68.15	22	8	15.5	443	105.45
Total	578	956.36	6906	879.41	828	484	777.62	7484	1835.77

Table 2. Hatchery distribution at union level.

Union	Species	Production capacity/year ( kg )	Number of hatchery
Uttar khosbas	Kai ( <i>A. testudineus</i> )	350	04
	Shing ( <i>H. fossilis</i> )	350	
	Magur ( <i>C. batrachus</i> )	300	
	Carp hatchery	750	
Phoroshaba	Kai ( <i>A. testudineus</i> )	650	03
	Monosex tilapia	700	
	Carp hatchery	200	
Galimpur	Carp hatchery	400	02
Choddhaia	Carp hatchery	700	01
Jalam	Carp hatchery	450	05
Lakhipur	Carp hatchery	500	01
Total		5350	16

Nursery pond: In total, 56 nursery farms and 273 nursery ponds within 92.57 ha of water areas contribute about 271.65 metric ton. An average size of these nursery ponds was found to be 0.339 ha and with the average production capacity of 0.995 lac 21 day's nursing fry/year for sell. Market price of these fry varies as Rui (*Labeo rohita*) Tk.200-250/kg; catla (*Catla catla*) Tk.150-200/kg; Tilapia (*Oreochromis niloticus*) Tk.100-150/kg and Thai koi (*A. testudineus*), shing (*H. fossilis*), magur (*C. batrachus*) fries vary from Tk.350-500/kg. Union level distribution of nursery pond and their production capacity are presented in Table 3.

Table 3. Distribution of nursery pond at union level.

Union	Number of ponds	Ponds area (ha)	Production/year (lac Mt)
Adda	2	0.70	2.50
Addra	27	8.42	21.50
Aganagar	3	0.81	5.00
Bhabanipur	23	10.70	23.00
Choddhaia	21	6.42	13.50
Dakshin Khosbas	7	2.00	8.50
Dakshin Shilmuri	8	3.70	8.65
Deora	37	13.45	41.50
Galimpur	23	8.12	22.00
Jalam	55	16.50	48.50
Lakhipur	13	4.50	15.00
Payalgachha	10	3.50	12.00
Phoroshaba	19	6.05	21.00
Uttar Khosbas	6	2.20	9.50
Uttar Shilmuri	19	5.50	19.00
Total	273	92.57	271.15

Culture species: However, various species of fish were available in the study area but, only few preferred for culture. Only carps were cultured in previous years but at present Thai koi (*A. testudineus*) and Thai pangus (*P. hypophthalmus*) are being cultured in sufficient quantities either as mono-or poly culture with other carps throughout the upazila (Table 4).

Culture system: Fish culture in Barura upazila are characterized by extensive (traditional), improved traditional (semi-intensive) and intensive system. In traditional method of fish culture, fishermen did not stock any fry rather depended on natural fry to entry through the opening section of the embankment along with the flood waters. Thus, the stocked fishes were not specifically selected, predators were not eliminated, ponds were not fertilized and even no supplementary feeds were supplied there in. As a result, the average harvest from these types of ponds was very low and about 10-15% compared to intensive system. Mean while, the fishermen improved the already used traditional culture system in the name of improving traditional (semi-intensive) system. In this

Table 4. Distribution of cultured fish in different union.

Scientific name	Local name	Pond/Paddy field	Culture Area
<i>Anabas testudineus</i>	Koi	Pond	Partial (Uttar & Dakshin Khosbas, Aganagar)
<i>Anabas testudineus</i>	Thai Koi	Pond	All upazila
<i>Aristichthys nobilis</i>	Bighead carp	Pond	Whole upazila
<i>Barbodes gonionotus</i>	Silver barb	Pond, Paddy Field	Partial (galimpur, lakhipur)
<i>Cirrhinus mrigala</i>	Mrigal	Pond	Partial (Jalam, Chidda)
<i>Clarias batrachus</i>	Magur	Pond	Partial (Uttar Khosbas, Aganagar)
<i>Ctenopharyngodon idellus</i>	Grass carp	Pond	Whole upazila
<i>Cyprinus carpio</i>	Common carp	Pond	Whole upazila
<i>Heteropneustes fossilis</i>	Singh	Pond	Partial (Payalgachha, Phoroshaba, Uttar Khosbas )
<i>Hypophthalmichthys molitrix</i>	Silver carp	Pond	Whole upazila
<i>Labeo rohita</i>	Rui	Pond, Paddy Field	Whole upazila
<i>Oreochromis mossambicus</i>	Tilapia	Pond, Paddy Field	Partial (Uttar & Dakshin Khosbas, Aganagar)
<i>Oreochromis niloticus</i>	Tilapia	Pond, Paddy Field	Whole upazila

system, all the ponds were repaired, stock fry along with natural predator and non predator stock, given some supplementary feeds ( not regular ), as well as in necessity water was changed from nearby natural sources. This approach has enhanced about 45-50% production than traditional culture system. In recent years further improvement in pond aquaculture has gained depending on previous self made technique by introducing scientific strategies of pond preparation (liming, repair dam), species selection, stocking density, feed application, fertilizers, water exchange and proper management. In this system, water supply is fully dependent on deep tube-well, healthy fry from hatchery and feed from market with the target of maximum production of fish than other two systems. Yearly production of fish, its demand, deficit and consequent supplies are presented in Fig. 1.

People involved in aquaculture: The population of Barura upazila is about 3,47,222 but only 30-35% people are involved in aquaculture. Uttar Khosbas, Adda, Jalam, Phoroshoba and Galimpur unions are especially dominated area where 35-45% people are involved in aquaculture because most of the hatchery, nursery and production ponds are located in those areas (Table 5). The production capacity is almost 40%.

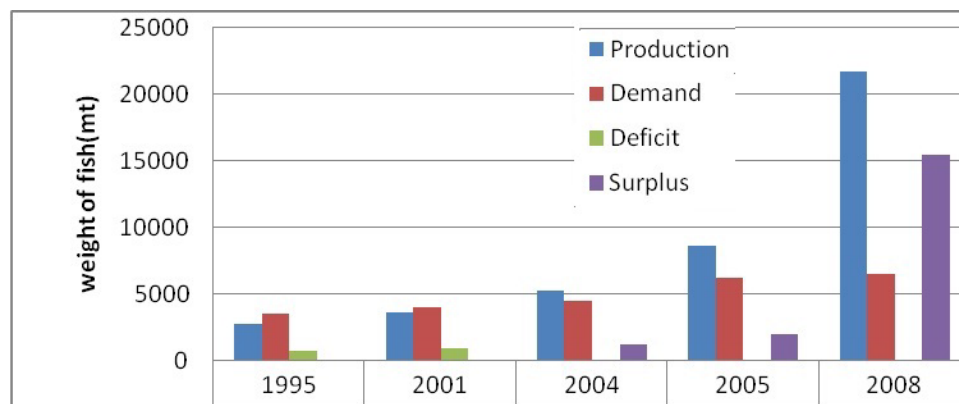


Fig. 1. Yearly production from 1995-2008.

Table 5. No. of people involved in different phases of aquaculture production at union level.

Union	Fish farmer	Hatchery owner	Nursery owner	Production pond owner	Paddy cum fish farmer	Fisherman (jellay )	Transporter	Stockiest	Trader	Seller	Labors	Total	Percentage (%)
Adda	780	-	1	87	40	1800	1225	437	630	675	2275	7950	7.5
Addra	650	-	4	66	41	1685	1150	528	476	650	2000	7250	6.9
Aganagar	480	-	1	46	41	1630	790	492	685	535	1650	6350	6.0
Bhabanipur	450	-	5	36	24	1625	735	315	775	540	1795	6300	6.0
Choddhaia	400	1	3	38	11	1605	720	400	737	550	1835	6300	6.0
Dakshin	450	-	1	51	32	1580	900	453	553	480	2050	6550	6.0
Khosbas													
Dakshin Shilmuri	310	-	2	22	8	1180	700	723	985	395	1275	5600	5.3
Deora	600	-	7	50	26	1650	1005	697	375	625	2015	7050	6.7
Galimpur	800	2	7	91	38	1750	1320	592	650	750	2600	8600	8.1
Jalam	680	5	8	59	28	1695	1145	480	650	635	1865	7250	6.9
Lakhipur	495	1	3	44	28	1550	885	537	487	595	1875	6500	6.2
Payalgachha	360	-	3	55	40	1670	1100	475	622	610	2115	7050	6.7
Phoroshaba	700	4	5	75	41	1850	1275	520	490	690	2350	8000	7.6
Uttar	830	3	2	93	76	2100	1360	526	285	785	2850	8900	8.4
Khosbas													
Uttar Shilmuri	375	-	4	15	10	1630	690	641	750	485	1450	6050	5.7
<b>Total</b>	<b>8360</b>	<b>16</b>	<b>56</b>	<b>828</b>	<b>484</b>	<b>25000</b>	<b>15000</b>	<b>7816</b>	<b>9150</b>	<b>9000</b>	<b>30000</b>	<b>105700</b>	<b>100</b>

Different project activities and credit: Various extension projects and fisheries training program organized by NGO's like Proshika, Jobo Unnyaon, Ansar VDP, BRDB, Babro, Obolombon always help the farmers to improve their culture technique. Besides, the Fisheries department offered financial support incurred from the UNDP, FAO and ADB. Similarly, various NGO's provide small loan along with training. These all made a better

link between the farmers and experienced personnel to enable the application of appropriate technology (Table 6).

Table 6. Development project activities in Barura upazila.

Donor	Project Title	Implementing Agency (IA)	Project Objectives
ADB	Integrated Fisheries activities project (1 <sup>st</sup> & 2 <sup>nd</sup> stage).	MOFL	To remove poverty
FAO	Fourth fisheries project activities:	MOFL	Establishment of an ideal fisheries village.
UNDP	Enterprises development project by National Packaging Activities:	DOF	Give loan and mixed carp culture training. Give loan for pangus culture training.
UNDP		DOF	Fish culture training by establishing village team.
UNDP	Various activities of fisheries training and extension project	DOF	Traditional fish culture training by local NGO in a village level.
UNDP		DOF	To teach the high school level student from class vi-x.
ADB		MOFL(UFO)	Fish culture activities in pond.
ADB		MOFL(UFO)	Fish culture activities in paddy land.
ADB	Fish culture extension project (stage-2) activities at upazila level.	MOFI(UFO)	Fry production and trained business man.
ADB		MOFL(UFO)	Fish culture extension activity in community based water body.
ADB		MOFL(UFO)	Develop Ideal Fishermen and Village Fish Culture extension association
SEAFD EC	Pilot project for semi-intensive culture system.	MOFL	Project operated by RIMP staff to make a model for semi-intensive culture of fish to increase production and thus profitability, and at the same time teach the fish farmers how to conserve the resources.

Credit for investment in aquaculture has traditionally come from non-institutional sources, most commonly from family members, village money lenders, fish brokers, fry/fingerlings suppliers and fish merchants. Pond owners frequently receive fingerling on credit from nursery operators where the cost of credit is high. In the usual banking system, there is also a provision for credit in aquaculture from different Bangladesh Bank nominated Government Banks like Sonali, Janata, Agrani, Rupali, Bangladesh Krishi Bank, etc. About 90% of the pond fish culture credit was granted by Bangladesh Krishi Bank with a recovery rate of 20% (Ahsanullah 1989) and this option usually goes to large-scale farmers. The main constrain of this loan to marginal farmers were the security

or guarantee ensuring and relatively higher administrative costs for smaller loans. Thus, supervised credit is at present the only available alternative to replace the traditional ways of providing security, namely collateral or mortgage (Bhuiyan and Chowdhury 1995). Multi-ownership is another problem for getting institutional credit in fish production. Bank officials are not familiar with all kinds of fisheries activities and not equally trained in identifying credit request. The weekly or fortnightly return of NGO's credit is another problem for collection of these loans from the fish production farms. Whereas, the ultimate goal of this production is to meet the protein demand, solve the employment problems and improve socio-economic condition of fish farmer's community.

In Barura both small scale and large scale aquaculture are being practiced but small scale culture has been getting more popularity day by day because of its low investment and high production rate. The success of such aquaculture largely depends on the extension activities provided by different NGO's and Government agencies. Major parts of these cultured fish production were found in market for domestic consumption while the rest (especially *Anabas testudineus*) for export. Identical to fish production, large number of people were also involved in the fish marketing channel beginning from the farmers then processors, traders, intermediaries, day laborers and transporters. Four categories of market trend were involved in the distribution of fish such as primary market, secondary market, higher secondary market and central fish market.

The techniques and strategies so far followed in the production of fish in all the union of the studied upazila need further upgradation in both above stated sides. In this case, the experiences from 'The National Fresh Water Aquaculture Plan' Bhubaneswar, India would be a guide line (Gopakumar *et al.* 1999). At the same time, several recommendations as suggested in several seminars and symposiums from the end of last century may propose afresh for the uplifting of fish production and other related activities of stated upazila.

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