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Fish culture and production of fish and fisheries species of Rajshahi and Khulna division

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Abstract
Fisheries resource of Rajshahi and Khulna Divisions of Bangladesh was assessed and a taxonomic account of biodiversity has been presented. There are about 143 (65%) ponds out of 219 observations were cultured. During the investigation there were 39 (18%) out of 219 non-and semi culture ponds were about 37 (17%) ponds out of 219 observations. The culture and semi-culture practices of the ponds are described. The annual production of Inland Water fishes of Rajshahi Division was 402,140 and 369,951mt during year 2007-2008 and 2006-2007 respectively. The total production of river, beel, flood plain and pond was 7192, 13362, 153125 and 228461 mt during 2007-2008; and 7278, 12889, 150473 and 199302 mt during 2006-2007 in Rajshahi Division. In Khulna division the annual production of Inland Water fishes was 300765 and 289118 mt during year 2007-2008 and 2006-2007 respectively. The total production of river, Sundarbans, beel, flood plain, pond and boar was 5692, 18151, 2275, 63958, 102065 and 4107 mt during 2007-2008; and 6103, 17751, 2544, 63804, 95370 and 4017 mt during 2006-2007 in Khulna Division. The shrimp farm production was 104517 and 99538 mt during the mentioned years respectively.

Keywords: fish production, fish distribution, fish culture, Rajshahi division, Khulna division

1. Introduction
Fish is the main source of protein for the common people in Bangladesh. Rivers, canals, haors, tanks etc. offer unique opportunities to develop inland fisheries. On the other hand, marine potential has opened up new vistas for augmenting total fish production and exploitation. Despite this, our planned development efforts could not make much headway in increasing production in the past.

Much will have to be done in the areas of coordination, water resources development programs, and production and distribution of fingerlings and fish fry.

Average per capita fish consumption in Bangladesh for.

THE period 1984-86 was estimated at 7.4 kg/year (FAO 1989) [2]. Fish ranks second to milk as a source of animal protein and is vastly more important than other sources

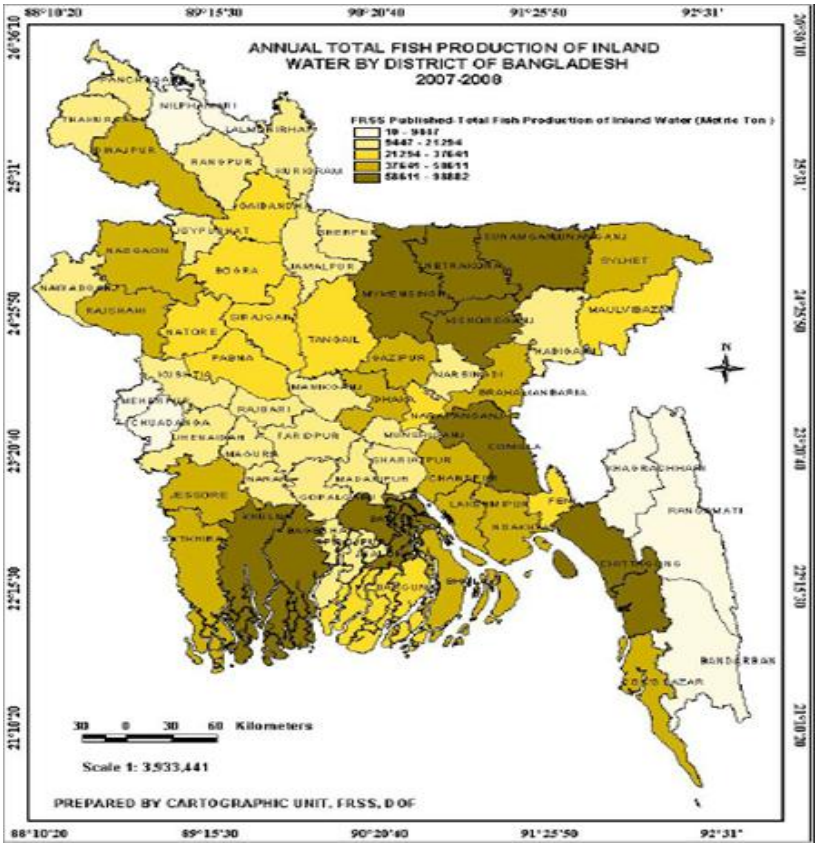

Fig 1: Annual total fish production of inland water in different district of Bangladesh 2007-2008

Poultry, mutton, eggs, or beef (FAO, 1985) [3]. Freshwater fish is a particularly preferred item in the cuisine of Bangladesh. It is deemed desirable to consume fish at least once daily, together with rice. In the interior rural areas, fish is of a major dietary importance and may be consumed with all meals (FAO 1997). Mainly due to population growth there is a growing gap between supply and demand for fish and fish products in Bangladesh. Fisheries production in Bangladesh, as in other exploited floodplain fisheries around the world, is strongly related to flood sequence. Floodplains inundated during monsoons are nutrient rich and play a significant role as nurseries for many larvae and juvenile fish species (Welcomme, 1985 [9]; Bayley, 1988 [6]; Junk *et al*., 1989) [6]. Coastal communities, in particular, are considered to lose out in the marketing chain and to suffer from lack of access to credit sources. Some of the poorest people in Bangladesh live in coastal fishing communities, which are culturally and economically marginalised, and have often little or no voice in local government bodies such as upazillas. To some degree, this is due to the fact that some of these communities consist of minority groups. Compared to small-scale farmers, poor fisherfolk often require larger loans (ie: for the purchase of boats or fishing gear) and are considered a high risk by lending institutions, including Government, banks, and NGOs. As a consequence, they are more likely to depend on informal, possibly exploitative, credit sources, whereby fish buyers also act as money lenders (ie: dadondar system). Coastal fishing in Bangladesh is highly seasonal, with the main hilsa season taking place between June and September. During this part of the year the fishing communities, are crowded with buyers, boat repairers, salesmen, and tinkers. Income levels are only at a fraction during the remainder of the year, thereby increasing the population's economic vulnerability.In the present study the fish production in different districts of the north-western areas of Bangladesh were studied.

2. Materials and Methods

The investigation of study areas was on physical characters of ponds, pond preparation, stocking ratio, density, Post stocking management and maintains, harvesting, culture methods, production and distribution of fisheries species. Interview was taken direct from the Pond owner, Growers, Fishermen, Fisheries Officer. The study was carried out for the year 2006-2007 and 2007-2008.

3. Results

The study was carried out to evaluate the present fishery status of the study area. Culture, Non-culture and cultural Pond, Rivers, Baors, Flooded areas and Gher areas were surveyed. Water area shape, water depth and production, etc are recorded by direct inspection and observation.

3.1 Pond Culture

There are about 143 (65%) ponds out of 219 observations were culture. Those ponds were near or inside the village. The dikes of those ponds were high so the floodwater cannot enter. Fish culture properly practiced all the year around. Non-culture ponds were near the villages or in the flood plain areas. During the month of December the flood plain areas were completely dried up except some small marshy deep depression. There were some canals near the irrigated rice fields and some small ponds near the village. Those were non-culture open water fish resource.

During the investigation there were 39 (18%) out of 219 non-culturing fish resources in the study area. In the month of October, branches of trees were put into those fish resources. Generally supplementary feed such as oilcake, rice bran were supplied in those fish resource. Semi culture ponds were about 37 (17%) Ponds out of 219 observations. Most of the semi culture ponds were near the village and some were into the beel. These pond were man made. Dike of those ponds were not so high. So those ponds some times over flooded during high flood. Most of the ponds has "moan" of one side. (Moan is a way to enter or pass out water into the pond) Most of the semi culture ponds were used for kata culture. During the month of September/October branches of trees were put down. Some aquatic weeds were also placed into these ponds. Sometime supplementary feed were added in order to attract the fishes. In the month of November/December the flood plain are dries up except these ponds.

3.2 Fish culture method in semi culture ponds:

Water area

The minimum water area of these ponds is 0.10 acre and maximum 3 acre.

Water depth: It was observed that the average depths of water of the sampling ponds (N=100) were recorded as minimum 1.43 meter and maximum 2.9 meter with a mean of 1.934 ± 0.3971 meter.

3.3 Production

The annual production of Inland Water fishes of Rajshahi Division was 402,140 and 369,951mt during year 2007-2008 and 2006-2007 respectively. It was the highest production of 46832 and 45827 mt at Dinajpur district and the lowest production of 7636 and 6284 mt in Lalmonirhat district during year 2007-2008 and 2006-2007 respectively. The total production of river, beel, flood plain and pond was 7192, 13362, 153125 and 228461 mt during 2007-2008; and 7278, 12889, 150473 and 199302 mt during 2006-2007 in Rajshahi Division. The detailed fish production in different districts of Rajshahi division is presented in Table 2.

In Khulna division the annual production of Inland Water fishes was 300765 and 289118 mt during year 2007-2008 and 2006-2007 respectively. It was the highest production of 69105 mt in Khulna in 2007-2008 and 70175 mt at Bagerhat district in 2006-2007; and the lowest production of 4760 and 5333 mt in Meherpur district during year 2007-2008 and 2006-2007 respectively. The total production of river, Sundarbans, beel, flood plain, pond and boar was 5692, 18151, 2275, 63958, 102065 and 4107 mt during 2007-2008; and 6103, 17751, 2544, 63804, 95370 and 4017 mt during 2006-2007 in Khulna Division. The shrimp farm production was 104517 and 99538 mt during the mentioned years respectively. The detailed fish production in different districts of Khulna division is presented in Table 3.

4. Discussion

The total demand for fish might well exceed 1.5 million mt, assuming that prices will remain relatively stable and the growth rate of the human population remains at 2.3% or below. The projected increase in demand for marketable fish for direct human consumption of an additional 0.8 million mt. by the end of the century might be attained through better fisheries management, higher production (about 0.5-0.7 million mt.) and improved utilization of the country's existing aquatic resources (Nuruzaman, 1993).

Between 1970 and 1990, over two million ha of floodplain became unavailable for inland fisheries production because of the construction of levees (Siddiqui, 1990) [8]. To control water entering the floodplains, 7 000 regulators have been constructed in Bangladesh to allow the smooth movement of adult fishes (local migrants) and drifting larvae. These fish passes and fish friendly regulators were built, under the Fourth Fisheries Project, to facilitate and maintain natural fish migration, reduce larval mortality rates significantly, maintain smooth connectivity between the river and floodplains, reduce turbulence, provide enough flow and depth to attract fish to and fro between river and floodplain and provide an exit and entrance velocity within the swimming speed of fish. There are four examples of such installations in Bangladesh. Sariakandi fish pass is located at the western part of the Bolai canal under Sariakandi Upazila, Bogra. Among all the fish passes Sariakandi fish pass is the largest and newest fish pass in Bangladesh allowing fish movement between the Jamuna and Bangali River. Kasimpur regulator and fish pass is on the Manu River, at the western end of Korakadi canal, located between Kushiyara River and Kawadighi Haor at Moulovibazer and Jugini regulator and fish pass is at the east bank of the river Jamuna at Tangail, located on the Lohajong River in Jugni village. Moricherdana fish pass is at the confluence with the Mohanonda River, Chapai-Nawabganj district (Hossain, 2010) [5].

The Jalmahal (commonly owned closed/open water bodies) leasing system has long been the subject of wide criticisms. Collection of revenues has become the main concern in recent years Policy-makers now realize that the twin objectives of increased revenues and higher fish production must be pursued.

Table 1: Name and origin of the stocked fish species.

English name	Scientific name	Food habit	Local name	Origin
Silver Carp	*Hypophthalmichthys molitrix* (Valenciennes 1844)	Surface feeder	Silver carp	Exotic
Bighead Carp	*Aristichthys nobilis* (Hamilton 1822)	Surface feeder	Bighead	Exotic
Rohu	*Labeo rohita* (Hamilton 1822)	Column bottom feeder	Rui	Native
Mrigal	*Cirrhinus mrigala* (Hamilton 1822)	Bottom feeder	Mrigal	Native
Catla	*Catla catla* (Hamilton 1822)	Surface feeder	Catla, Catol	Native
Common Carp	*Cyprinus carpio* (Linnaeus)	Omnivorous	Japani rui	Exotic
Rajpunti	*Puntius gonionotus*	Weed feeder	Raj Puti	Exotic
Grass Carp	*Ctenopharyngodon idellus* (Valenciennes 1844)	Weed feeder	Gass carp	Exotic
Kalbaush	*Labeo calbasu*	Bottom feeder	Kalbaush	Native
Bata	*Labeo bata*	Bottom feeder	Bata/Bhangon	Native
Mirror carp	*Cyprinus carpio*	Omnivorous	Mirror carp	Exotic
Nilontica	*Oreochromis nilotica*	Bottom feeder	Nilontica	Exotic
Tilapia	*Oreochromis mossumbicus*	Bottom feeder	Tilapia	Exotic
Pungas	*Pungasius sutchi*	Omnivorous	Pungas	Exotic
Chitol	*Notopteress chitala*	Carnivorous	Chitol	Native
Hybrid	Rui × Catla	Surface feeder	-	Native
Hybrid	Rui × Kalbaush	Bottom feeder	-	Native
Hybrid	Rui × Mrigal	Bottom feeder	-	Native

Table 2: Annual catch of Inland fisheries in met. Ton. In different districts of Rajshahi division

District	Year	River	Beel	Flood Plain	Pond	Total
Bogra	2007-08	191	890	6,989	25,808	33,878
	2006-07	163	1,320	12,789	24,064	38,336
Dinajpur	2007-08	45	89	14,044	32,654	46,832
	2006-07	22	164	13,773	31,868	45,827
Gaibandha	2007-08	769	347	22,619	5,655	29,390
	2006-07	403	442	9,788	4,381	15,014
Joypurhat	2007-08	33	80	6,948	9,117	16,178
	2006-07	14	56	5,978	7,341	13,398
Kurirgam	2007-08	840	684	8,888	5,088	15,500
	2006-07	800	623	9,108	4,828	15,359
Lalmonirhat	2007-08	56	150	3,780	3,650	7,636
	2006-07	90	145	3,582	2,467	6,284
Naogaon	2007-08	513	3,154	12,630	24,069	40,366
	2006-07	415	2,882	10,166	23,709	37,172
Natore	2007-08	190	462	13,198	13,571	27,421
	2006-07	266	491	12,332	12,752	25,841
Nawabganj	2007-08	823	2,051	2,222	12,450	17,546
	2006-07	887	1,854	2,555	8,868	14,164
Nilphamari	2007-08	59	91	3,781	3,824	7,755
	2006-07	76	85	4,463	2,826	7,450
Pabna	2007-08	2,517	882	10,969	19,217	33,585
	2006-07	2,950	645	26,621	18,688	48,904
Panchagarh	2007-08	16	21	4,452	10,179	14,668
	2006-07	8	22	3,104	9,458	12,592
Rajshahi	2007-08	714	3,136	12,070	25,576	41,496
	2006-07	536	1,977	9,761	21,647	33,921

Rangpur	2007-08	41	732	7,877	5,246	13,896
	2006-07	105	1,502	6,375	4,139	12,121
Serajganj	2007-08	357	557	18,837	16,265	36,016
	2006-07	518	612	16,176	10,218	27,524
Thakurgaon	2007-08	28	36	3,821	16,092	19,877
	2006-07	25	69	3,902	12,048	16,044
Total	2007-08	7,192	13,362	153,125	228,461	402,140
	2006-07	7,278	12,889	150,473	199,302	369,951

Table 3: District-wise Annual total production (metric ton) of inland water in Khulna division

District	Year	River	Sundarbans	Beel	Flood Plain	Pond	Baor	Shrimp Farm	Total
Chuadanga	2007-08	35		424	2,869	3,891	973		8,192
	2006-07	30		441	2,351	3,728	907		7,457
Jessore	2007-08	592		694	12,416	23,301	1,096	3,736	41,836
	2006-07	578		921	12,461	22,691	980	3,738	41,361
Jhenidah	2007-08	53		386	2,130	15,127	591	2	18,289
	2006-07	40		407	4,551	13,906	597	2	19,503
Bagerhat	2007-08	3,358	8,878	11	8,985	8,879		38,982	69,093
	2006-07	3,397	10,120	12	9,945	8,432		38,269	70,175
Khulna	2007-08	351	5,549	79	11,442	18,131	116	33,437	69,105
	2006-07	390	4,566	76	12,154	15,600	152	30,478	63,416
Kushtia	2007-08	251		214	10,862	4,978	327		16,632
	2006-07	274		220	9,528	3,932	340		14,294
Magura	2007-08	619		116	2,842	8,408	435	17	12,437
	2006-07	981		113	3,067	8,255	428	17	12,861
Meherpur	2007-08	24		123	1,924	2,399	290		4,760
	2006-07	88		130	2,492	2,289	334		5,333
Satkhira	2007-08	112	3,724	16	7,925	8,697	76	27,802	48,352
	2006-07	104	3,065	17	5,682	8,344	75	26,493	43,780
Narail	2007-08	297		212	2,563	8,254	203	540	12,069
	2006-07	221		207	1,573	8,193	204	541	10,938
Total	2007-08	5,692	18,151	2,275	63,958	102,065	4,107	104,517	300,765
	2006-07	6,103	17,751	2,544	63,804	95,370	4,017	99,538	289,118

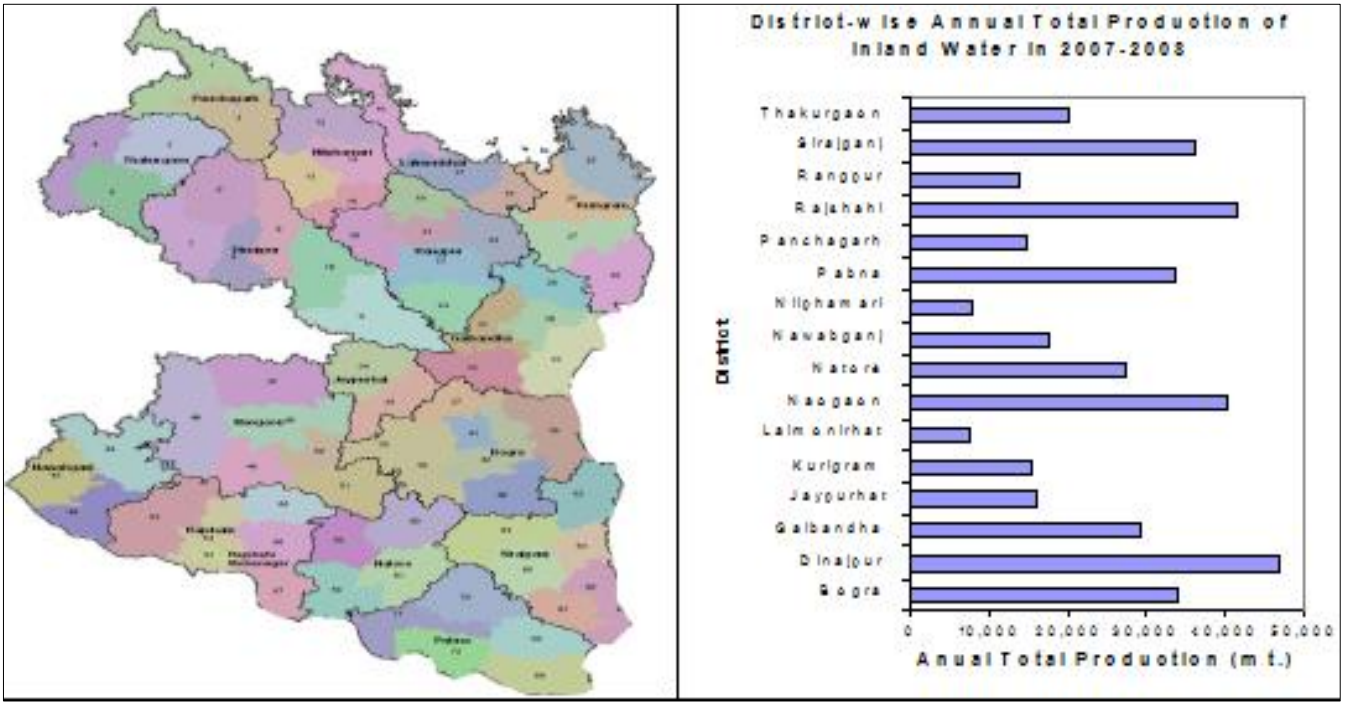

Fig 2: Annual total production of fishes in different districts of Rajshahi division

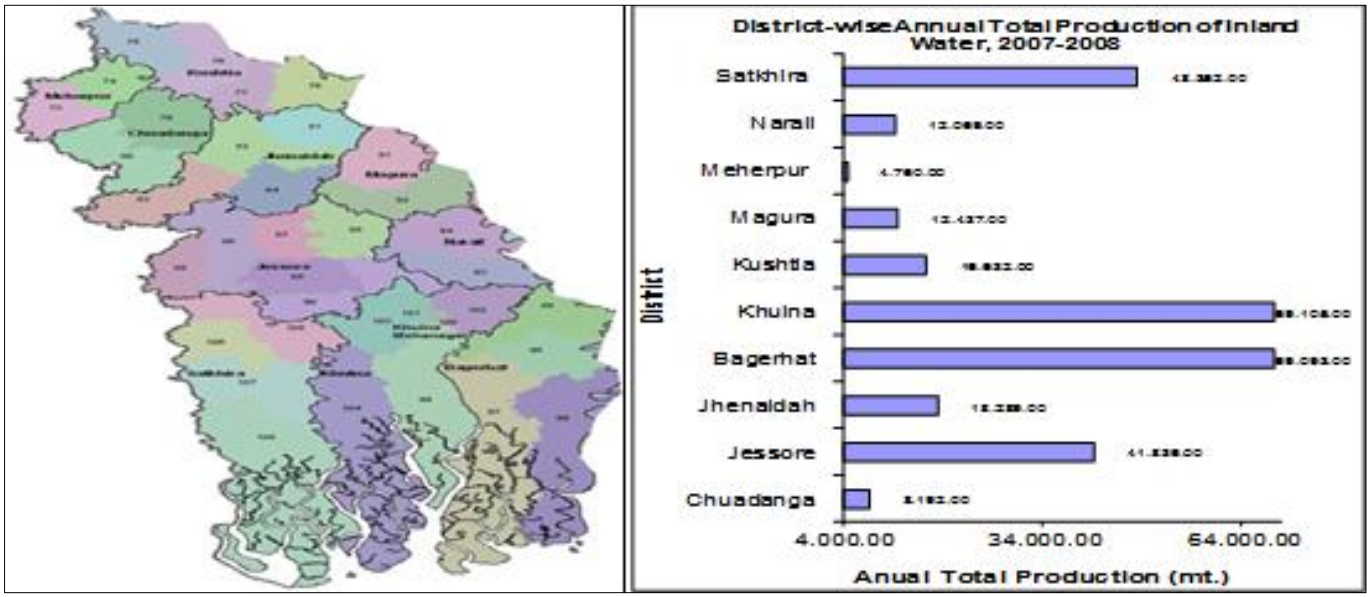

Fig 3: District-wise Annual Total Production of Inland Water of Khulna Division.

5. Conclusion

Bangladesh is one of the world's most densely populated countries. Approximately half of its 138 million population is considered to be poor and very vulnerable to climate change. Rajshahi and Khulna has extensive water bodies that have a high potential for fisheries production. But fisheries are generally undervalued in terms of their contribution to food security, income generation and ecosystem functioning. Conventional economic approaches aim to provide detailed quantification using a cost-benefit framework, which may not sufficiently value the role and function of pond, beel and riverine fisheries. The taxonomic account of fish biodiversity in the present study comprises 160 species, 97 genera, 44 families, 12 orders. There were 130 species of fishes found in Rajshahi division and 126 species in Khulna division. Ninety six species are common in both divisions. The endemic species of Rajshahi division is 34 and Khulna division is 30 species. Systematic studies of the fresh water fish fauna of the study area with reference to ecology and distribution, seasonal availability, feeding habits and breeding season need more research.

6. Acknowledgement

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