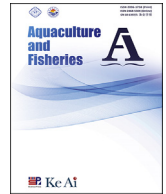




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Fisheries resources of Bangladesh: Present status and future direction

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ABSTRACT

Bangladesh is considered one of the most suitable regions for fisheries in the world, with the world's largest flooded wetland and the third largest aquatic biodiversity in Asia after China and India. This paper reviews the performance of fisheries in Bangladesh using data collected from the Bangladesh Department of Fisheries, and related un-published grey literatures. The findings within describe recent growth within Bangladeshi inland fisheries, primarily in the inland aquaculture sector (2014–2015). This increase in the aquaculture production has been made possible with the implementation of scientific and technological modernization. From 2000 and 2016, aquaculture production increased from 712,640 and 2,060,408 metric t, a much larger quantity than wild capture production (1.023 million t) in 2016. There has also been a recent increase in the value of fishery exports, with more than US \$34.08 billion in 2010 rising to more than US \$46.60 billion in 2015. However, fisheries production is well below production targets despite the large gains seen in the aquaculture sector.

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1. Introduction

Bangladesh, with its rich inland waters and river systems, has significant capture fishery and aquaculture potential. The favorable geographic position of Bangladesh comes with a large number of aquatic species and provides plenty of resources to support fisheries potential. Fish is a popular complement to rice in the national diet, giving rise to the adage *Maache-Bhate Bangali* (“a Bengali is made of fish and rice”) (Ghose, 2014). The fisheries can broadly be classified into three categories: inland capture fisheries, inland aquaculture and marine fisheries, of which the inland aquaculture sector is contributing more than 55% of the total production (DoF, 2016). The fisheries sector plays a very important role in the national economy, contributing 3.69% to the Gross Domestic Product (GDP) of the country and 22.60% to the agricultural GDP (FRSS, 2016). Over the last 10 years (2004-05 to 2013-14 FY), the fisheries growth was fairly steady and at an average of 5.38% per year (FRSS, 2015). This sector experienced more or less consistent growth rate, ranging from 7.32% growth in 2009-2010 to 4.04%

growth in 2013-2014 (Bangladesh Economic Review, 2014). More than 2% of Bangladeshi export value comes from the inland fisheries sector. Given proper government support, the fisheries sector has ample potential in creating various types of ancillary industries in rural areas that often have a high rate of economic return. These employment opportunities for poor rural citizens would also stem their migration to urban areas. Fish supplements about 60% of Bangladeshi people's daily animal protein intake (DoF, 2016). More than 17 million people including about 1.4 million women depend on fisheries sector for their livelihoods through fishing, farming, fish handling, and processing (BFTI, 2016, p. 1215). A different surveys revealed that more than 80% of laborers engaged in the fish processing industries were women (DoF, 2015).

Bangladeshi has one of the biggest and most active deltas, fed by three mighty rivers: the Padma, the Meghna and the Jamuna. This contributes to a high potential for fresh and brackish water capture and culture fisheries, in addition to the vast marine resources. Despite Bangladesh's long coastline and large freshwater and marine water bodies, fisheries are underdeveloped compared to other industry sectors. Inland fisheries production has escalated over the years, but the productivity per hectare water area is not yet attained at its optimum. In recent years, the bulk of the production has been obtained from marine (16.78%) and freshwater (83.22%) wild capture fisheries. In 2015–2016, Bangladesh was the 5th in world

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aquaculture production, which accounted for half of the country's total fish production (55.15%) (DoF, 2016). In 2014–2015, total fishery production of Bangladesh was 3,684,245 metric tons, of which 1,023,991 metric tons was obtained from inland capture fisheries, 2,060,408 metric tons from inland aquaculture and 599,846 metric tons from marine water production (FRSS, 2016) (see Table 1). There have been few reviews of the development and potential of fisheries and aquaculture in many parts of Bangladesh published and no studies have been published on the present status of fisheries in Bangladesh.

2. Production

2.1. Inland open water (capture) fishery

The fisheries sector in Bangladesh is broadly divided into three sub-sectors: inland capture, inland culture and marine fisheries (DoF, 2016). The inland fishery is further divided into two sub-sectors: the inland capture fishery and inland culture fishery. The inland capture fishery has five types of habitat containing approximately 853,863 ha of river and estuary, 177,700 ha of Sundarbans, 114,161 ha of beel, 68,800 ha of Kaptai lake, and 2,695,529 ha floodplain (haor); and the inland culture fishery, which has six types of habitat containing an area of 371,309 ha of pond, seasonal 130,488 ha of cultured water body, 5,488 ha of baor, 275,274 ha of shrimp/prawn farm, pen culture 6,775 ha, and 7 ha of cage culture (FRSS, 2016). An analysis of time series data for 2003–2014 reveals the declining trend of capture fishery habitat area (a decrease of 0.16 million ha), while the trend of culture fishery habitat area is increasing (by 0.35 million ha). Fig. 1 shows the district-wise magnitude of capture fish production for 2015.

Total fish production in Bangladesh in 2014–2015 was reported to be 3,684,245 MT, of which 1,023,991 MT (27.79%) were from inland open waters, 2,060,408 MT (55.93%) from inland closed waters and 599,846 MT (16.28%) from marine fisheries (Table 1 and Fig. 2). The yearly increasing rate of overall fish production increase in Bangladesh went from was 7.20% to 3.84% during the years 2000–2001 to 2014–2015 which included a decreasing yearly increase since a peak in 2009–2010 at 7.32% (Table 2).

As indicated in the Fig. 2, inland open water fisheries are still a major source of the total fish production, but their share has been declined, from 38.68% in 2000–2001 to only 27.79% in 2014–2015. Conversely, inland closed water fisheries contributions have been increasing, from 40.01% in 2000–2001 to 55.93% in 2014–2015. The contribution of marine fisheries over the same period has dropped from 21.30% to 16.28% (Fig. 3). The average yield (annual fish har-

vest per hectare in metric tons) in open inland waters declined throughout 2000–2001, but improved sharply afterward. Pen and cage culture are two new approaches to fish culture in Bangladesh and contributed 0.35% and 0.05% in the total fish production in 2014–2015, respectively (Table 2). These new methods have the potentiality to greatly increase fish production in Bangladesh.

A total of 260 fish and 24 prawn species are known to inhabit in the freshwaters of Bangladesh with 12 exotic fish species have been recorded in the Bangladesh (IUCN, 2000, pp. 1–116; Rahman, 1989, pp. 1–352). At present, major carps species such as *Catla catla*, *Labeo rohita*, *Cirrhinus mrigala* and *Labeo calbasu* along with exotic carp, such as silver carp (*Hypophthalmichthys molitrix*); grass carp (*Ctenopharyngodon idellus*); and common carp (*Cyprinus carpio*) are the available carp species in the market. There are about 40–50 small indigenous fish species which grow to a maximum length of 25 cm (Felts, Rajts, & Akhteruzzaman, 1996, pp. 1–41). Some more commonly found species of this variety include *Puntius ticto*, *Amblypharyngodon mola*, *Colisalalius*, *Anabas testudineus* and *Glossogobius giuris*. The IUCN (2000) reported that many of the small indigenous fish are now endangered or critically endangered. Among them, only carps species contribute 33.57% in total annual production (freshwater and marine water) followed by pangas (11.404%), and tilapia (8.44%) (FRSS, 2016). However, the inland water resources of Bangladesh offer major potential for the development of freshwater capture and culture fisheries (Hossain, 2014). The catch from the inland capture fishery is noteworthy, especially for rural areas in terms of fish supply and employment. Fishery products that are harvested from inland waters in minor amounts are other catfish (Boal, Air, Silon, Rita), snakehead (Shol, Gazar, Taki), other carp (Kalibaus, Bata, Ghania), and live fish (Koi, Singhi, Magur). Species-wise annual fish production in inland and marine fisheries for 2014–2015 are presented in Fig. 4.

2.2. Inland closed water (culture) fishery

Aquaculture is the farming of fish and other aquatic organisms, with 'farming' implying some form of intervention to increase productions, and some form of private rights of the stock under intervention (Beveridge and Little, 2002). The entire area of inland closed (culture) water fisheries bodies is 0.29 million ha with littoral shrimp farms (National Fisheries Policy, 1998). In Bangladesh, the overall pond area is 1,46,890 ha and ox-bow lakes (baors) are 5,488 ha (DoF, 2015). Among various segments of the fisheries sub-sector, the inland aquaculture has generally experienced the fastest growth, with the establishment of new technologies, species, and intensification and improvement of farming,

Table 1
Marine and freshwater fish production and area in Bangladesh (taken from DoF, 2016).

Types of fisheries	Fisheries sector	Water Area (Hectare)	Production (Metric Tons)
Inland Fisheries	Inland open water (capture): Rivers, Estuary, Sundarbans, Beel, Kaptai Lake, Floodplain	3,906,434	1,023,991
	Inland closed water (culture): Pond, Seasonal cultured water body, Baor, Shrimp/Prawn, Farm, Pen Culture, Cage Culture	794,361	2,060,408
	Total	4,700,795	3,084,399
Marine Fisheries	Industrial (Trawl) fishing	12,111,000	84,846
	Artisanal fishing		515,000
	Total		599,846
Total production			3,684,245

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