Status of Marine Fisheries in Bangladesh: Resource Utilization, Production Pattern, Performance and Prediction

Sanjoy Baul

Abstract
The fisheries sector is one of the most prolific and dynamic industries in Bangladesh's agricultural economy, with enormous potential for future development. The goal of this paper is to provide a current status of the Bangladesh marine fisheries industry in terms of resource utilization, production patterns, and performance using liner regression model on the basis of secondary data. Both fish output and productivity have increased in the culture, capture, and marine fisheries sectors during the last three and a half decades, but aquaculture has achieved substantial gains. The marine fisheries are discussed in terms of constraints, potential solutions, and future prospects. This paper emphasizes the relevance of marine fish production for Bangladesh's economy and food security. Focusing on marine fishing may help Bangladesh's economic growth and to reduce unemployment rate. The summary of the article may help Bangladeshi policymakers' create future fisheries policies, as well as other nations.

Keywords: Marine fisheries, custom, production patterns, performs, status, significance, prediction

1. INTRODUCTION

Fishery is a rapidly growing sector that provides food, job, income, and export revenue, particularly in developing nations. Bangladesh has a diverse range of fisheries resources, which may be divided into two categories: inland fisheries and marine fisheries. Through a ruling in the International Arbitration Court (IAC) on March 14, 2012, Bangladesh gained a total of about 1,18,813 km^2 sea area in a case with Myanmar and India for the Island of St. Martin, 12 nautical miles of state-owned sea area, up to 200 nautical miles of Bangladesh-Myanmar's bilateral monopoly economic zone borders, and the right to the continental shelf Bangladesh (M. M. Islam & Shamsuddoha, 2018, p. 45). The continental drift slope is approximately 100,000 km^2. The coastal region is generally shallow, with the 10 m depth zone extending between 24,000 km^2, the 0-40 m depth zone 37,000 km^2, and the 40-100 m depth zone 20,700 km^2 from the beach base line. The projection area of 150 m depth appears to be horizontal, with a few trawling issues below, and the continental authority occurs between 160 and 180 m. Because of the steep continental slope, trawling appears to be impossible in waters deeper than 180 meters. Bangladesh's full projection area (up to 200 m depth contour) is roughly 70,000 km^2 (Hoq et al., 2013, p. 13).

** Assistant Professor, Economics, OSD (Deputation), DSHE, Dhaka and PhD Fellow, IBS, University of Rajshahi. Reg. No: 2013183501, E-mail: sanjoy29bcs@gmail.com*

In Bangladesh's fiscal year 2019-20, the fishing industry contributed more than 3.52% to national GDP and one-fourth (26.37%) to agricultural GDP. More than 12% of Bangladesh's 170 million people rely on fisheries and aquaculture activities for their lives, both full-time and part-time (DoF, 2020, p. 2). In the fiscal year 2019-20, Bangladesh's marine fishing production rose by 0.80% over the previous year. Marine fisheries are divided into two types: industrial and artisanal. Between fiscal years 2017-18 and 2018-19, industrial marine fish production declined by 10.70%, while artisanal marine fish catch climbed by 3.38% (DoF, 2019, p. 16). Marine and coastal capture is 17.74% of total catch. Industrial catches based on trawl fishing make up just 12.7% of coastal and marine catches, whereas artisanal catches make up 87.3%. According to the Food and Agricultural Organization (FAO) report, fishery production in Bangladesh ranks 3rd for inland open water catch and 5th for aquaculture. Additionally, Bangladesh ranks first in the world for hilsa shad, illish, and tilapia capture in the globe, and third in Asia for Tilapia catch. As a result of continuous expansion in the fishing sector, overall fish output reached 4.503 million MT in 2019-20, which is close to the 4.552 million MT objective for 2020-21(DoF, 2020, p. 2).

Fishers' involvement has boosted marine and coastal fish output in the last decade, placing Bangladesh in the 12th place globally (FAO, 2020, p. 20). However, over-exploitation of marine fisheries poses a significant danger to biodiversity and ecological integrity (Md Nahiduzzaman et al., 2018, p. 67). To reverse the deteriorating trends of fish and crustacean species, the Bangladeshi government established a 65-day ban on commercial trawler fishing from 20 May to 23 July each year since 2015 (Md Nahiduzzaman et al., 2018, p. 70). All sorts of fishing vessels engaged in fishing on the Bay of Bengal have been banned from 2019. This fishing ban causes stress among fishermen since the majority of them are impoverished, have few alternative livelihood options, and are victims of insufficient and incorrect incentive distribution during the ban time (Mredul & Uddin, 2020, p. 757). The embargo adds to the stress of these fishermen, as many of them are jobless for the duration of the ban and rely primarily on high-interest loans from local money lenders (Md Nahiduzzaman et al., 2018, p. 71). Despite this, the fish market lacks sufficient size, cleanliness, drainage, and administration to be considered functional. Many factors, including a lack of finance, technology,

extension services, correct policy, laws, and regulations, are to blame for the restricted development and under-utilization of fishery areas. The maritime sub-sector is examined in this paper in terms of restrictions, potential solutions, and opportunities for the future.

2. Materials and methods

The data for this study came from a variety of secondary sources. This study makes use of both qualitative and quantitative data. The data have gathered by searching the accessible internet database with the terms 'Fisheries resources,' 'Inland and Marine fisheries,' and 'Legal problems.' Additional data have gathered by visiting various relevant institutions, such as the Bangladesh Fisheries Development Corporation, the Bangladesh Government's Directorate of Fisheries, the Ministry of Fisheries and Livestock (MoFL) and Department of Fisheries (DoF), the Bangladesh Bureau of Statistics (BBS), and the Food and Agricultural Organization (FAO). MS Excel has been used to analyze the data by using linear regression model. All of the information obtained has examined, aggregated, and pertinent data have used.

3. Food Fish Production in the World versus Bangladesh

Global fish output was estimated to have got 179 million tonnes in 2018, with a total first-sale value of USD 401 billion, with 82 million tonnes worth USD 250 billion coming from aquaculture (FAO, 2020, p. 2). Human consumption accounted for 156 million tonnes of the total, or to an annual supply of 20.5 kg per capita. The enduring 22 million tonnes were allocated for non-food applications, mostly fishmeal and fish oil production. Aquaculture was responsible for 46% of overall output and 52% of fish for human consumption. China remained a large fish producer in 2018, accounting for 35% of world fish production (FAO, 2020, p. 2). A substantial percentage of output in 2018 came from Asia (34%) excluding China, followed by the Americas (14%), Europe (10%), Africa (7%), and Oceania (1%). In the last few decades, total fish production has nearly doubled in Africa and Asia, with the exception of Europe (which has seen a gradual decline since the late 1980s, but has recovered slightly in recent years) and the Americas (which has seen nearly ups and downs since the top of the mid-1990s, mainly due to fluctuations in anchoveta catches) (FAO, 2020, p. 2). Bangladesh also contributes a substantial amount of fish to global output. The world's and Bangladesh's fish output scenarios are shown in Table 1. Bangladesh generated 1.26 % of world output in 1995, up to 3.94 % in 2015. Bangladesh supplies 6.2 % of global inland (catch and culture) output, but only 0.5 % of global marine production, which is growing year by year.

Table1: World versus Bangladesh Fish Production (in million tonnes)

World fisheries production						
Capture	1986-1995	1996-2005	2006-2015	2016	2017	2018
Inland	6.4	8.3	10.6	11.4	11.9	12.0
Marine	80.5	83.0	79.3	78.3	81.2	84.4
Total capture	**86.9**	**91.4**	**89.8**	**89.6**	**93.1**	**96.4**
Bangladesh fisheries production						
Inland	0.84	1.65	2.95	3.25	3.49	3.6
Marine	0.25	0.45	0.59	0.62	0.63	0.65
Total capture	**1.09**	**2.1**	**3.54**	**3.87**	**4.12**	**4.25**
Bangladesh share %						
Inland	0.97	1.8	3.29 (11.06)	3.62	3.74	3.73 (10.53)
Marine	0.29	0.49	0.65	0.69	0.67	0.67
Total	**1.26**	**2.19**	**3.94**	**4.31**	**4.41**	**4. 40**

Source: FAO, 2020. The State of World Fisheries and Aquaculture.

In 2018, Bangladesh was the world's third-largest inland capture fish producer after China and accounted for 10% of the world's total catch. There was a total 1.36 million-tonne rise in global inland capture output from 1990 to 2000, which reached 10.64 million tonnes in 2018 (FAO, 2020, p. 20). Bangladeshi marine fish output climbed from 0.45 million tonnes in 2005 to 0.65 million tonnes in 2018. Figure. 1 depicts the world's top ten inland-caught fish-producing nations as of 2018.

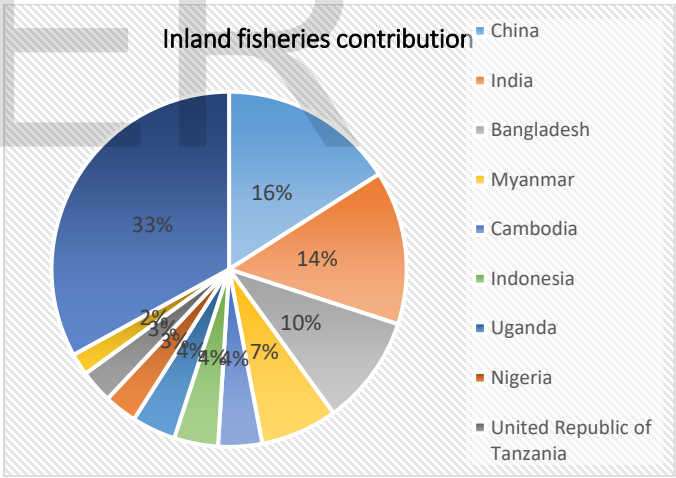


Figure. 1 The world's top ten inland-caught fish-producing nations, 2018.
Source: FAO, 2020. The State of World Fisheries and Aquaculture.

4. Significance of Fisheries in Bangladesh

Bangladesh, which is blessed with abundant water resources, is one of the world's main fish producers, producing 4.503 million MT in FY 2019-20, with aquaculture accounting for 57.38% of total fish output. Over the previous 12 years, average fisheries growth has been 4.82%, while average aquaculture growth has been roughly 8.59%. Bangladesh has now become a self-sufficient fish-producing country, supplementing almost 60% of the total daily animal protein consumption of her people (with a per capita of 62.58 g/day against a target of 60 g/day). Exporting fish, shrimps,

and other fisheries goods, Bangladesh earns a significant amount of foreign currency, accounting for 1.39% of total national export revenues. The exporting of about 0.071 million MT of fish and fisheries products brought in BDT 39851.50 million in 2019-20 (DoF, 2020, p. 2).

Fisheries are Bangladesh's second most important agricultural commodity, providing lives and jobs to millions of people. It provides 3.52% to our national GDP and more than a quarter of our agricultural GDP (26.37%) (DoF, 2020, p. 2). As a result, fish culture and consumption have significant effects for national wealth and food security. "Mache Bhate Bangali," or "Fish and rice make a Bengali," is a famous nickname for Bangladeshis. It means that a Bengali is the person who is in the habit of eating rice with fish-curry. Bangladesh's fishing industry has both opportunities and problems. The fishing industry, which is one of the most productive and dynamic one, has played an increasingly important role in the economy in recent decades. Since gaining independence in 1971, Bangladesh has made significant development in the fisheries industry. This industry plays a critical part in Bangladesh's socio-economic development and has great potential for future growth in the rural economy.

Bangladesh's overall fish production has expanded roughly six times in the previous three decades (0.754 million MT in 1983-84 to 4.503 million MT in 2019-20). Inland culture, inland capture, and marine capture are the three sub-groups of the country's immense fishing resources. Pond/ditch, ox-bow Lake (baor), shrimp/prawn farm, seasonal cultured water-body, pen and cage culture, and other inland culture fisheries span an area of roughly 0.837 million hector and generate 2.584 million MT in 2019-20, accounting for around 57.38% of total fish output. Aquaculture output has expanded from 1.063 million MT in 2008-09 to 2.584 million MT in 2019-20, demonstrating sustained increase (DoF, 2020, p. 2). Inland capture fisheries, which include rivers and estuaries, Sundarbans water resources in the beels, Kaptai Lake, forest, and floodplains, are exceedingly diverse, with almost 260 freshwater fish species, and have historically dominated Bangladesh's fish output. However, owing to overexploitation, degradation and loss of fish habitations, siltation of water bodies, and water pollution caused by industry and agro-chemicals, the contribution of inland capture fisheries to total fish output has steadily decreased from 62.59% in 1983-84 to 27.72% in 2019-20 (DoF, 2020, p. 3).

The fishing industry may directly contribute to pro-poor aims by providing employment (as fishermen and other associated trades) and a source of income. For their livelihoods, more than 12% of nearly 170 million of Bangladesh's entire population is employed in this industry as both full-time and part-time employees. Approximately 1.4 million women rely on the fishing, farming, and fish handling and processing industries for their livelihoods (Bangladesh Foreign Trade Institute, 2016, p. 3). This industry also has a lot of promise in terms of the country's economic development. Agriculture development and economic development are inextricably linked (Mohsin et al., 2015, p. 2). Countries that ignore agricultural growth will not be able to boost their economies. When the agricultural sector improves, the country's exports will increase naturally. As a result, revenue starts to climb, bolstering the country's economic progress.

Within the next four years, Bangladesh is predicted to emerge from its status as a least developed country (LDC) and acquire the status of a middle-income country (M. R. Islam & Haque, 2018, p. 63). Exports of fish and fish products can help in this situation, and Bangladesh is currently one of the few LDCs that has been permitted to export fish products to the EU (Golub & Varma, 2014, p. 29). Bangladesh harvests and exports a wide range of fish species. The European Union (EU), the United States of America (USA) and Japan are the primary export nations of Bangladeshi fish and fisheries products (Syed Robayet Ferdous & Syed Delowar Hossain, 2015, p. 10). More commerce leads to increased foreign exchange, which permits for the import of capital goods, hence expanding output potential. As production grows, the technical improvement of production accelerates, establishing a connection between exports and output growth (Shamsuzzaman et al., 2020, p. 175). That is why Bangladesh's government and many other organizations are working to improve the economy through increasing foreign commerce. There are several recreational fishing options in Bangladesh, which may be beneficial to the country and serve as an important instrument for long-term human development, such as poverty reduction, job creation, and rural development (Mozumder et al., 2018, p. 2). As a result, the Bangladesh government can take efforts to investigate into this field to boost Bangladesh's economic contribution from fish and fish commerce (Shamsuzzaman et al., 2020, p. 181).

5. Status of Fisheries Sub-Sectors for Prediction of Future Trend

Bangladesh fisheries sector is broadly divided into two sectors; (i) Inland fisheries and (ii) Marine fisheries. Inland fisheries have two sub-sectors; (i) Inland capture and (ii) Inland culture, and Marine fisheries have two sub-sectors; (i) Artisanal marine fisheries and (ii) Industrial marine

fisheries. Now this paper shows the prediction of future trend of two fisheries sectors on the basis of past status and present situation are estimated below the table 2.

Table 2: Fish Production Trend (1983-84 to 2043-44) (Million Tonnes)

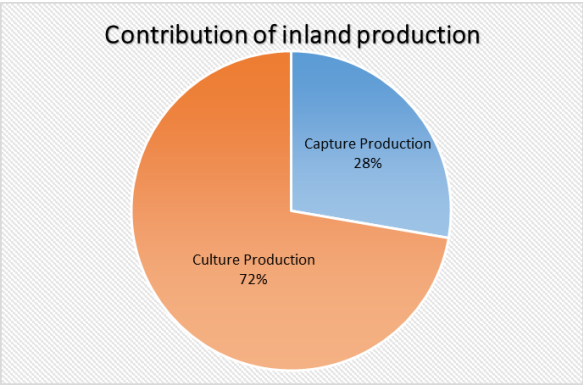
Year	Inland Fisheries Trend $Y_C=a+b_1x_1$	Marine Fisheries Trend $Y_C=a+b_2x_2$
1983-84	0.312	0.15
1993-94	1.104	0.30
2003-04	1.896	0.45
2013-14	2.688	0.60
2023-24	3.480	0.74
2033-34	4.272	0.89
2043-44	5.064	1.04

Source: (DoF), Yearbook of Fisheries Statistics of Bangladesh 2019-20

Above the table shows the positive trend both inland and marine fisheries sectors in Bangladesh up to 2043-44. By using linear regression model $Y_c = a + bX$; Where Y_c = year trend, X = fish production; X_1 = inland fish production; X_2 = marine fish production; a = constant; slope $b_1 = 0.396 < 1$; and slop $b_2 = 0.074 < 1$; to see the future trend of inland fish production will be rapidly growth than marine fish production. Because most of fishermen in Bangladesh are less skill to catch marine fish in the Ocean. The equipment (such as; trawler, ship, gear, net, skipper) of marine fish production are not sufficient in Bangladesh.

5.1 Status of Inland Capture Fisheries

Rivers and estuaries, Sundarbans, beels, Kaptai Lake, and floodplain make up the inland capture fisheries, which encompass 4.03 million hectares and account for 86.5% of the overall inland fisheries area. In actuality, around 87 percent of the capture fisheries area generates 27.72% (1.248 million MT) of total inland fish, with the remaining 72.28% coming from only 13% of the culture fish area (figure 2). Inland capture and inland culture fisheries had growth rates of 1.03 and 3.83%, respectively. Capture fish output accounted for 55.7% of overall fish production in 1983-84, but it fell to 27.72% in 2019-20 (DoF, 2020, p. 18).



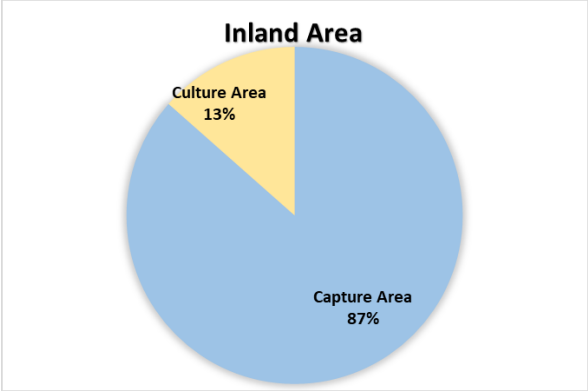


Fig 2: Share of total inland capture and culture area & production in Bangladesh
Source: (DoF), Yearbook of Fisheries Statistics of Bangladesh 2019-20

From 1984 to 2004, yearly growth in capture fish production was 3.5%, whereas fish productivity in rivers and estuaries decreased by 1.03% (Madan M. Dey et al., 2008, p. 22). Following that, great success was made in production as a result of the implementation of management systems in floodplain regions, and the production growth rate of capture fisheries increased to 4.45% during 2005 to 2020 (Figure 3).

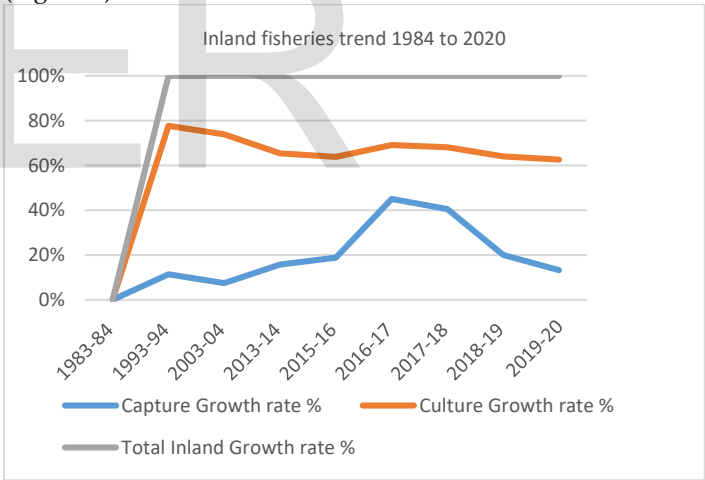


Figure 3: Inland fish production trend in Bangladesh
Source: (DoF), Yearbook of Fisheries Statistics of Bangladesh 1983-84; 1993-94; 2003-04; 2013-14; 2015-16; 2016-17; 2017-18; 2018-19; 2019-20.

Only the floodplain and beel account for 73% of total capture area. Historically, the government has privatized fishing privileges in open access areas (floodplain and *beel*) and often leased them out to a relatively privileged non-fisher class that may gain exclusive rights to a water body through the use of social influence (Toufique, 1997, p. 460). This leasing scheme was a significant contributor to the poor growth rate of captured fish. Barriers to poor fishers' access to open fisheries resources, along with over-exploitation by wealthy leaseholders, have decreased livelihood options for fishery-dependent communities and exacerbated economic disparity within fisheries

communities (Hossain et al., 2006, p. 279). Additionally, fishers employ contemporary equipment to capture all types of fish, putting biodiversity and sustainability at risk. To address these issues, the Bangladesh government has executed a number of projects funded by the Ford Foundation and the United Kingdom's Department for International Development (DFID) to promote the sustainable use of fishery resources and equitable distribution of benefits through community participation. Numerous research studies demonstrate that after adopting a co-management system, fishers' income, income distribution among different communities, and access to various assets such as social, human, physical, financial, and natural resources all improved (G. Md. N. Islam et al., 2011, p. 173; Sultana & Thompson, 2007, p. 528). From 2000 to 2020, the floodplain's production growth rate was 7.8% annually while yield increased from 175 kg/hectare to 310 kg/hectare.

5.2 Status of Inland Culture Fisheries

Ponds are the most important source of aquaculture output, accounting for 79.19% of culture and 45.43% of total fish production (FY 2019-20) (DoF, 2020, p. 86). Governments of Bangladesh and several non-government organizations have adopted various steps to improve pond fish production in order to fulfill the domestic fish demand for the expanding population. These measures aided in the growth of aquaculture land and increased output. Farmers in some regions of Bangladesh, on the other hand, are more interested in cultivating fish due to the overall high profitability of fish farming compared to rice cultivation. For freshwater fish ponds, the process of transforming rice fields into ponds began at least one and a half decades ago, and for shrimp farming, it took more than two decades. The pond area, on the other hand, has seen the most growth. This trend has gained traction and consequently become noticeable. There is no rice within a kilometer of the Dhaka-Mymensingh, Dhaka-Khulna, Dhaka-Cumilla, or Dhaka-Jashore highways on both sides. The area under freshwater ponds was 125 thousand hectares in 1984-85, but it rose quickly to 405 thousand hectares in 2019-20, with a 6.4% annual growth rate (DoF, 2020, p. 48). In most ponds, farmers grow ruhi, catla, mrigel, silver carp, miror carp, grass carp, bighead, gonia, and other species. Monoculture of pangus, tilapia, and Thai kai fish has grown quickly in the northern and southern region of Bangladesh during the last 15 years.

5.3 Status of Marine Fisheries

Bangladesh's coastal and marine zone is one of the world's biggest ecosystems, with higher production and distinct mangrove impacts. Marine fisheries resources play an important part in the country's economy, accounting for around 14.9% of overall fisheries production (DoF, 2020, p. 24). Over the previous 19 years, the whole fish group in marine fisheries has demonstrated a major change in productivity, with sea catfish, jewfish, Indian salmon, shark, and other marine fish showing a progressive reduction. If compared to other pomfret (*Pampus argenteus*), Indian salmon (*Eleutheronematetra dactylum*), jewfish, and catfish, the largest yield from marine fish harvest was Bombay duck (*Harpodon neherius*) (Shamsuzzaman et al., 2020, p. 176). While inland culture fish output is on the rise, the marine fishery is very slowly expanding (4.03% annually during 1984 to 2004) (Khan, 2012, p. 139). From 2005 to 2020, the production of marine fish increased by only 1.7%. In 1984, the entire marine capture was 0.164 million metric tonnes, and by 2020, it increased to 0.671 million metric tonnes. Bangladesh's maritime fisheries is characterized by artisanal rather than industrial fishing, with a variety of gear types and fish species. Artisanal fishing accounts for 83% of overall marine fish output, whereas industrial fishing accounts for just 17% (DoF, 2020, p. 86). Only 30 shrimp trawlers and 190 fish trawlers operate in the huge deep sea region of the Exclusive Economic Zone (EEZ) which is reliant on trawling. In the inshore area, however, about 32.859 million mechanized and 34.810 million non-mechanized boats operate. The major artisanal fishing equipment in Bangladesh are gillnets (drift and fixed totaling 0.118 million), set bag nets (estuarine and marine totaling 0.042 million), and long line nets (totaling 0.027 million). Gillnets account for the majority of artisanal fish landings (68%) (DoF, 2020, p. 73). The principal marine species include hilsha, Bambay duck, shrimp, pomfret, and jewfish. The most significant aquatic resource of the marine fisheries is hilsha, which accounts for 45.38% of total marine captures (DoF, 2020, p. 74).

Table 3: Number of trawler, boat and gear

Trawler		Boat		Gear	
Type	**Number**	**Type**	**Number**	**Type**	**Number**
Shrimp Trawler	30	**MB** *(Mechanized Boat)*	32859	Gill Net	118353
Fish Trawler	190	**NMB** *(Non-Mechanized Boat)*	34810	Set Bag Net	42429
				Long Line	11863
				Trammel Net	422
				Other Gear	15640
Total	**220**		**67669**		**188707**

Source: (DoF), Yearbook of Fisheries Statistics of Bangladesh 2019-20

Bangladesh's national fish is the hilsa (*Ilish*). Hilsa (*Tenualosa ilisha*) is Bangladesh's greatest single-species fishery, contributing the most to the country's overall fish production. Hilsa accounts for around 12.22% of the country's overall fish production. As a consequence, hilsa output grew from 2.79 million metric tonnes in 2005-06 to 5.50 million metric tonnes in 2019-20 (DoF, 2020, p. 85). The output of hilsa is increasing at a rate of 4.91 percent each year. It's worth noting that ilsa has been designated as a Bangladesh Geographical Indicator (GI) product. In 2002-03, total annual hilsa output fell sharply, but from 2005, due to the introduction of Hilsa Fishery Management Action Plan (HFMAP), hilsa fisheries production increased at a pace of 3.5% per year until 2014-15. The annual grows total hilsa production increased from 3.5% to 9.0% after 2015 as a result of the synergistic impact of the government's general management activities and Payment for Ecosystem Service (PES), the environmental management approach, resulting in annual total hilsa production of 0.550 million MT in 2019-20. Hilsa output in Bangladesh has nearly quadrupled in the last 12 years as a result of the government's initiatives, which include a restriction on collecting brood fish and fry, the installation of a *jatka* conservation program, maintenance of a fish sanctuary, and hilsa spawning protection operations. This fishery accounts for around 12.22% of the country's overall fish production (DoF, 2020, p. 22). The hilsa production trends are constantly increasing year after year, as is seen in Table 4.

Table 4: Species-wise annual marine fish production (2006-07 to 2019-20)

Sl.	Species/Group	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
1	Hilsa	279189	290000	298921	313753	339845	346512	351223	385140	387211	394951	496417	517198	532795	550428
2	Shrimp/Prawn	221131	223095	244972	186418	239460	252523	228769	223788	230244	234188	246774	247304	239855	241281
3	Crab	-	-	-	-	-	-	-	-	-	13160	14421	11787	12084	12562
4	Sardine	-	-	-	-	-	20187	29636	27590	32835	44386	48704	41486	28256	16814
5	Bombay Duck	36009	36980	58263	58464	60750	62817	71745	51673	53950	58545	69230	75085	68101	70749
6	Indian Salmon	969	1040	7733	7733	4521	3030	2445	1960	1020	895	775	487	295	177
7	Pomfret	13061	16728	46643	50245	40478	39537	29693	23355	11437	10593	10686	11899	11004	10023
8	Jew Fish	35214	33803	38414	35514	36639	37929	30600	36170	31826	31894	33768	35427	41600	41943
9	Sea Cat Fish	18131	20534	16515	16722	17193	19700	8594	9719	9476	8695	8424	9455	11455	13610
10	Shark/ Skate /Ray	4790	4767	3933	4794	4205	3865	5017	5648	5093	4622	4495	3974	4274	3373
11	Other Marine Fish	130651	130415	87975	92644	100233	101858	112115	133976	156661	165120	132827	143527	161861	167033
	Total	**2440011**	**2563296**	**2701370**	**2899198**	**3061687**	**3261782**	**3410254**	**3548115**	**3684245**	**3878324**	**4134434**	**4276640**	**4384221**	**4503371**

Source: (DoF), Yearbook of Fisheries Statistics of Bangladesh 2019-20

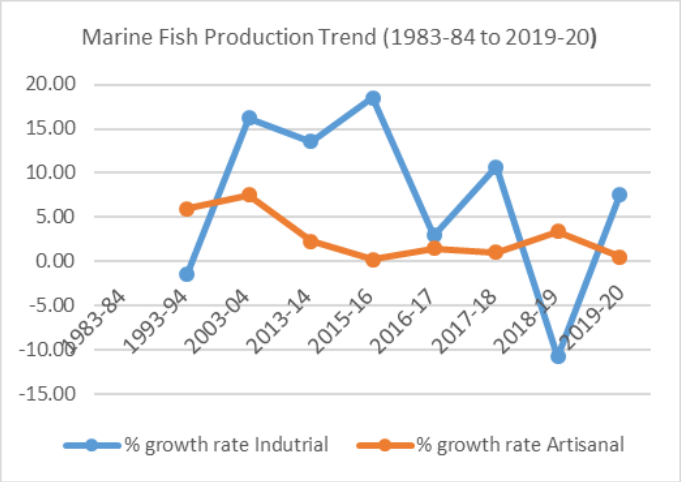
Exporting fish, shrimp, and other fishery products earns Bangladesh a significant amount of foreign currency. Bangladesh exported fish and shrimp at 7.92% growth rate from 1990 to 2016 (M. R. Islam & Haque, 2018, p. 66). The amount of exports has significantly expanded since then. From fiscal years 2000–2001 to 2016–2017, the export trend was not straight up. Regardless, there have been ups and downs from the beginning to the present (Shamsuzzaman et al., 2020, p. 177). In addition, from 2000–01 to 2019–20, there was an upward tendency in the export of fish and fish products.

One of Bangladesh's most popular exports is shrimp. From 1.60 million tons in 2002-03 to 2.41 million tons in 2019-2020, the total output of shrimp and prawns has grown by 0.59%. In the previous 18 years, the overall output of shrimp and prawns has grown due to the growth of coastal aquaculture which includes shrimp, prawns, and finfish farming. Bangladesh is a significant exporter of fish and fisheries goods. For the most part, the country's exports consist of galda (sea bass), bagda (shrimp), harina (shrimp), chucia (crab), and various types of shrimp. There is also a wide range of seafood products that are exported from the country. Fishery goods from Bangladesh are exported to over 50 countries, including the European Union (EU), United States (USA), Japan and Russia (Khan, 2012, p. 41). Bangladesh's fish and fisheries products are mostly imported by EU nations. Bangladesh made 39851.5 million taka in the fiscal year 2019-20 by selling 70945.39 MT of fish and fisheries goods (DoF, 2020, p. 23).

5.4 Industrial and Artisanal Marine Fisheries Trend in Bangladesh

From 1984 to 2016, industrial marine production growth rate increased gradually but after 2016, its growth rate smoothly decreased in 2018 (Figure 4). On the other hand, artisanal

marine fish production growth rate was increasing slowly during 1984 to 2020. Figure-4 shows that the contribution of both artisanal and industrial marine fisheries to the total fishing sector was decreasing day by day.



Source: (DoF), Yearbook of Fisheries Statistics of Bangladesh 2019-20

6. Marine fisheries

6.1 Constraints

Despite the fact that marine fisheries account for a large portion of Bangladesh's total production, this sub-sector has been a low-priority area in the country's overall fisheries development program. Marine fisheries have received barely 3% of the entire fisheries development expenditure during the previous three decades (Mazid 2003). As a result, the management of the marine fisheries is far from ideal. The fact is that statistics on gear, boat, vessel, and productivity does not reflect the reality. Numerous constraints have been recognized for the marine fisheries sector, including (i) a lack of capital, (ii) artisanal fishermen congested in inshore waters, (iii) insufficient knowledge and information on fish stocks, (iv) inadequate landing facilities, (v) a lack of modern landing technology/equipment, and (vi) the fishermen's risk of death during the monsoon season (Alam & Thomson, 2001, p. 303). One of the key limits is that there has been no recent resource/stock assessment survey on maritime fisheries. The majority of the studies were conducted in the 1960s and 1970s. As a result, there is no information on resource utilization both inshore and offshore. Even there has not been a survey of pelagic and demersal fish beyond 40 meters. For the creation of resource development policy for the maritime sector, information on productivity, breeding, migratory patterns, hydrobiology, and oceanography is not accessible (Alam & Thomson, 2001, p. 307). Marine fisheries are over-exploited. However, the rise of marine fish production patterns suggest that deep-sea fishing has not been fully exploited yet. The 30 shrimp trawlers and 190 fish trawlers operating in the enormous deep-sea area of the EEZ indicate the sub-capital sector's restrictions (DoF, 2020, p. 73). The budget for marine fisheries research is insufficient. Inadequate marine fisheries research is thus another major stumbling block to the sector's growth. In recent years, marine contamination has grown at an alarming rate. Apart from oil spills, there is ship washing/breaking as well as foreign boats discharging harmful and even radioactive trash.

6.2 Prospects

Marine fish output may be increased with the necessary investment in effective evaluation and exploitation of high sea pelagic and demersal fish-stocks; there is the potential to enhance marine fish output even further. It is, however, vital to evaluate whether or not marine fisheries are indeed over-exploited. This sub-sector must be regulated through the regulation of fishing vessels, the prohibition of dangerous fishing techniques and gears, the imposition of a limited fishing season, and other regulatory measures. The possibilities for utilizing deeper waters have still to be investigated. Otherwise, the marine fisheries will not be able to realize its full potential. The purpose of the artisanal fisheries in Bangladesh might be to reduce the number of vessels. In such instance, policymakers should be more concerned with equity, which means that efficiency and equity must be balanced. The decommissioning of boats is anticipated to be a tough and time-consuming process. Because the majority of artisanal gillnetters who work mostly at the sea's edge are subsistence fishermen; their livelihoods are dependent on their work. Furthermore, this approach would result in job losses; for fisherman in the coastal area, it is a matter of life and death. As a result, the government must implement policies that are both socially and economically acceptable.

7. Concluding Remarks

This article examines Bangladesh's fisheries resources, productivity and yield trends, fish export status, market structure, and current restrictions as well as future potential. Bangladesh contributes significantly to global fish output. Fisheries has been one of Bangladesh's most productive and active industries through the last two and a half decades. Small-scale catch fisheries dominated this sector in the early 1970s. Aquaculture has grown dramatically in terms of output and yield since then, thanks to research, innovation, and the spread of new technologies. Furthermore, brackish water shrimp farming has grown significantly in Bangladesh, and it is now the country's second-largest export earner. Inland capture fish output and yield, on the other hand, have progressively increased as a result of changes in floodplain lease policy and management, and Bangladesh has risen to become the world's third leading inland capture fish producer. In the Bay of Bengal, there are many more boats and vessels than the department of

fisheries recognizes, resulting in surplus volume in the marine fishery industry. Although the fisheries sector has experienced remarkable growth and development, further development and long-term benefit to current and future generations can be ensured by keeping fisheries incomes, allocating more budget, reforming fisheries institutions, inspiring private entrepreneurs, establishing private-public partnerships, and implementing appropriate policies in all sub-sectors of the fisheries sector. If correctly handled, the capture, cultural, and marine sub-sectors have immense potential. To enhance the fisheries industry, both long-term and short-term actions are required.

8. Reference:

[1] Alam, Md. F., & Thomson, K. J. (2001). Current constraints and future possibilities for Bangladesh fisheries. *Food Policy*, *26*(3), 297–313. https://doi.org/10.1016/S0306-9192(01)00005-7

[2] Bangladesh Foreign Trade Institute. (2016). *A Study on Sector-Based Need Assessment: Fisheries Products*. Dhaka. http://www.bfti.org.bd/pdf/Fishery.pdf

[3] DoF. (2019). *Yearbook of Fisheries Statistics of Bangladesh, 2018-19* (Fisheries Resources Survey System (FRSS), No. 36). Department of Fisheries.

[4] DoF. (2020). *Year Book of Fisheries Statistics of Bangladesh 2019-20* (Fisheries Resources Survey System (FRSS), No. 37; p. 141). Ministry of Fisheries and Livestock.

[5] FAO. (2020). *The State of World Fisheries and Aquaculture 2020, Sustainability in action* (p. 224) [Statistical Year Book]. Food and Agriculture Organization of the United Nations,. https://doi.org/10.4060/ca9229en

[6] Golub, S., & Varma, A. (2014). Fishing Exports and Economic Development of Least Developed Countries: Bangladesh, Cambodia, Comoros, Sierra Leone and Uganda Paper Prepared for UNCTAD. *Swarthmore College*, 75.

[7] Hoq, M. E., Haroon, A. K. Y., & Chakraborty, S. C. (2013). *Marine fisheries of Bangladesh: Prospect and potentialities*. Support to Sustainable Management of the BOBLME Project, Bangladesh Fisheries Research Institute.

[8] Hossain, Md. M., Islam, Md. A., Ridgway, S., & Matsuishi, T. (2006). Management of inland open water fisheries resources of Bangladesh: Issues and options. *Fisheries Research*, *77*(3), 275–284. https://doi.org/10.1016/j.fishres.2005.11.010

[9] Islam, G. Md. N., Yew, T. S., Abdullah, N. M. R., & Viswanathan, K. K. (2011). Social capital, community based management, and fishers' livelihood in Bangladesh. *Ocean & Coastal Management*, *54*(2), 173–180. https://doi.org/10.1016/j.ocecoaman.2010.10.026

[10] Islam, M. M., & Shamsuddoha, M. (2018). Coastal and marine conservation strategy for Bangladesh in the context of achieving blue growth and sustainable development goals (SDGs). *Environmental Science & Policy*, *87*, 45–54. https://doi.org/10.1016/j.envsci.2018.05.014

[11] Islam, M. R., & Haque, M. (2018). The Trends of Export and Its Consequences to the GDP of Bangladesh. *Journal of Social Sciences and Humanities*, *Vol. 1, No. 1*, 6.

[12] Khan, A. (2012). *Efficiency, Risk and Management of Fisheries Sector in Bangladesh* [Norwegian University of Life Sciences]. https://nmbu.brage.unit.no/nmbu-xmlui/bitstream/handle/11250/2497507/2012-62

[13] Madan M. Dey, Manik L. Bose, & Md. Ferdous Alam (Eds.). (2008). *Country case study: Development and status of freshwater aquaculture in [name of country]: recommendation domains for pond aquaculture*. WorldFish Center.

[14] Md Nahiduzzaman, Md Monirul Islam, & Md Abdul Wahab. (2018). *Conserving llish, securing livelihoods: Bangladesh-India perspectives*. Academic Foundation in association with The International Water Association.

[15] Mohsin, M., Yongtong, M., Hussain, K., Mahmood, A., Zhaoqun, S., Nazir, K., & Wei, W. (2015). Contribution of Fish Production and Trade to the Economy of Pakistan. *International Journal of Marine Science*. https://doi.org/10.5376/ijms.2015.05.0018

[16] Mozumder, M., Uddin, M., Schneider, P., Islam, M., & Shamsuzzaman, Md. (2018). Fisheries-Based Ecotourism in Bangladesh: Potentials and Challenges. *Resources*, *7*(4), 61. https://doi.org/10.3390/resources7040061

[17] Mredul, M. H., & Uddin, E. (2020). Food aid programme during restricted hilsa fishing period: Effectiveness and management perspective. *Journal of Fisheries*, *8(1)*, 10.

[18] Shamsuzzaman, Md. M., Hoque Mozumder, M. M., Mitu, S. J., Ahamad, A. F., & Bhyuian, Md. S. (2020). The economic contribution of fish and fish trade in Bangladesh. *Aquaculture and Fisheries*, *5*(4), 174–181. https://doi.org/10.1016/j.aaf.2020.01.001

[19] Sultana, P., & Thompson, P. M. (2007). Community Based Fisheries Management and Fisher Livelihoods: Bangladesh Case Studies. *Human Ecology*, *35*(5), 527–546. https://doi.org/10.1007/s10745-006-9092-3

[20] Syed Robayet Ferdous & Syed Delowar Hossain. (2015). Prospectand Challenge of Bangladesh Frozen Food A Way to Overcome. *Online International Interdisciplinary Research Journal*, *V*(Special).

[21] Toufique, K. A. (1997). Some observations on power and property rights in the inland fisheries of Bangladesh. *World Development*, *25*(3), 457–467. https://doi.org/10.1016/S0305-750X(96)00108-8