Bangladesh Fisheries, SDGs and COVID-19

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Fisheries and the aquaculture sector can play a significant role in the achievement of several of the goals of the 2030 Sustainable Development agenda. However, the current COVID-19 situation can negatively impact the fisheries sector, impeding the pace of the achievement of development goals. Therefore, this paper highlighted the performance and challenges of the fisheries sector in Bangladesh, emphasizing the impact of COVID-19 and the significance of this sector for achieving the Sustainable Development Goals (SDGs), through primary fieldwork and secondary data. The total fish production in the country has increased more than six times over the last three decades (7.54 to 43.84 lakh MT) with improved culture techniques and extension services. Inland closed water contributions have increased to 16%, while inland open water has declined to 10%, and marine fisheries have dropped to 6% over the past 18 financial years (2000–2001 to 2018–2019). COVID-19, a significant health crisis, has also affected various issues associated with aquatic resources and communities. Transportation obstacles and complexity in the food supply, difficulty in starting production, labour crisis, sudden illness, insufficient consumer demand, commodity price hikes, creditor's pressure, and reduced income were identified as COVID-19 drivers affecting the fisheries sector. The combined effect of these drivers poses a significant threat to a number of the SDGs, such as income (SDG1), nutrition (SDG2), and food security (SDG3 and SDG12), which require immediate and comprehensive action. Several recommendations were discussed, the implementation of which are important to the achievement of the SDGs and the improved management of the aquatic sector (SDG14—life below, and SDG16—life above water).

fisheries aquaculture food security COVID-19 SDGs Bangladesh

1. Introduction

Bangladesh, a nation blessed with diverse aquatic resources, is located in Southeast Asia, between 20°′34′ to 26° ′38′ N latitude and 88°′01′ to 92°′42′ E longitude, and has an area of 147,570 km^2 [1]. It is one of the top fish-producing countries globally, with its vast inland, coastal, and marine water resources [2]. The fisheries sector in Bangladesh is one of the most productive and dynamic sectors, which has played an increasingly significant role in the economy for the last few decades [3][4]. Since its independence in 1971, Bangladesh has achieved tremendous progress in the fisheries sector, contributing significantly to the promotion of the dependent community's food security and socioeconomic status [5][6], which are crucially highlighted in the UN's Sustainable Development Goals (SDGs). There are different types of interactions between SDGs and aquatic food production systems and the well-being of the dependent community. Fish from capture fisheries and aquaculture help marginalised people maintain their food supply and livelihoods in terms of nutritional security, good health and well-being, poverty alleviation, and reduced inequalities. Around 12% of the total population of Bangladesh is involved in the fisheries sector directly

and indirectly [7], contributing 3.50% to the national GDP, 25.72% to the agricultural GDP [7][8] and providing a significant share of animal proteins.

The diversified fisheries resources of Bangladesh are mainly divided into two groups: inland and marine fisheries [3][9]. Inland fisheries have two sub-sectors, inland capture and inland culture fisheries, covering 3.89 and 0.82 million ha, respectively (**Table 1**). The inland open water habitats include rivers and estuaries (853,863 ha), the Sundarbans (177,700 ha), beels (114,161 ha), Kaptai Lake (68,800 ha), and floodplains (2,675,758 ha) (**Figure 1**). On the other hand, inland closed water habitats include ponds (397,775 ha), seasonal cultured water bodies (144,217 ha), Baor (5671 ha), shrimp/prawn farms (258,553 ha), crab farms (9377 ha), pen culture (6330 ha), and 1.76 lakh m^3 for cage culture [7]. In 2018–2019, the inland capture, inland culture, and marine fisheries contributed approximately 28.19%, 56.76%, and 15.05% of the country's total fisheries production, respectively [7] (**Table 1**). Over the last three decades, the total fish production increased more than six times from 7.54 MT in 1983–1984 to BDT 43.84 lakh MT in 2018–2019. In 2018–2019, the country earned BDT 425,031.00 by exporting almost 73.17 thousand MT of fish and fishery products [7].

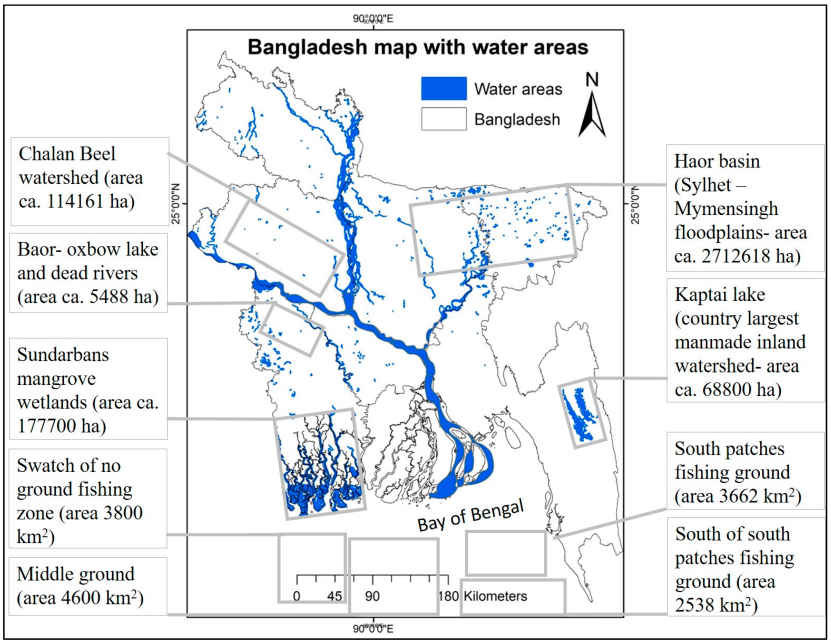

Figure 1. Aquatic resources and focal natural waters in Bangladesh, including major fishing grounds in the Bay of Bengal. This map illustrates the tentative location of major water areas of Bangladesh and does not necessarily reflect any precise administrative and or political boundary line with neighbouring countries.

Table 1. Sector-wise fish production and water areas of Bangladesh in 2018–2019.

Fisheries Types	Fisheries Sector	Water Area (ha)	Production (MT)	Production (%)
Inland Fisheries	Inland open water (capture) rivers, estuaries, Sundarbans, beels, Kaptai Lake, floodplains	3,890,282	1,235,709	28.19

Fisheries Types	Fisheries Sector	Water Area (ha)	Production (MT)	Production (%)
	Inland closed water (culture) pond, seasonal cultured water body, Baor, shrimp/prawn farm, pen culture, cage culture	821,923	2,488,601	56.76
Total (Inland)		4,712,205	3,724,310	84.95
Marine Fisheries	Industrial (trawl) fishing		107,236	2.45
	Artisanal fishing		552,675	12.61
Total (Marine)			659,911	15.05
Total production (Inland + Marine)			4,384,221	100

Data source: Department of Fisheries (DoF) [7].

Although inland capture fisheries are an important source of total fish production, they have reduced remarkably due to several anthropogenic interventions and natural causes, e.g., pollution, over-exploitation, destructive fishing, and habitat degradation [10]. In 1983–1984, the total production of inland capture and culture fisheries was 62.59% and 15.53%, respectively, whereas, in 2018–2019, inland capture fisheries sharply dropped to 28.19%, and inland culture fisheries increased to 56.76% [7]. However, in recent years, several socio-eco-friendly programs were implemented to increase the productivity of inland open waters, such as a community-based fisheries management program, the establishment of fish sanctuaries, beel nursery management, the stocking of fingerlings in water bodies, the restoration of the aquatic habitats, and an increase in water area under cage and pen farming [11]. Bangladesh also has a huge potential for marine fisheries, comprising artisanal (fishing below 40 m depth) and industrial (trawl fishing above 40 m depth) fisheries and coastal sub-sectors. Despite having a long coastline (ca. 710 km) and a large marine water area, the marine fisheries sector is underdeveloped compared to other business sectors in Bangladesh [12]. Nonetheless, the recently settled maritime boundary with Myanmar and India, up to 200 nautical miles from the coastline, comprising 118,813 km^2 of maritime water, represent a huge blue economy development prospect. The potentiality and challenges of Bangladesh's fisheries and aquaculture sector were reviewed by Ghose (2014) [2] up to 2012 and Shamsuzzaman et al. (2017) [3] up to 2015. The impact of the COVID-19 pandemic on that sector is yet to be explored.

This aquaculture and fisheries nexus requires observation through the lens of the COVID-19 pandemic because it is likely to impact the aquatic food system and the resilience of the dependent communities in Bangladesh. Bangladesh is struggling to cope with the adverse effects of COVID-19 due to its resource constraints. As of 1 August 2021, the country has confirmed 1,264,328 COVID-19 positive cases, 1,093,266 recovered cases, and a total death toll of 20,916. Bangladesh has adopted so-called preventive measures, such as social distancing, lockdowns, local and international travel restrictions, and work from home. These initiatives reduce the household income mainly for the wage earners and, as a result, people are facing difficulties managing their living expenses.

Indirectly, COVID-19 has affected aquatic food production as well. The restrictions in movement, difficulty in fish and input transportation, low consumer demand, unsold mature fish, low market prices, disruption in the new farming cycle, the labour crisis, limited attendance of the service provider, debt cycle, ban period, and disease susceptibility have all impacted the livelihood of fish farmers, fishers, and associated stakeholders.

1.1. Development-relevance and linkage of fisheries and aquaculture sectors in achieving SDGs in Bangladesh:

Bangladesh achieved a prestigious global position due to its outstanding productio **Development-relevance and linkage of fisheries and aquaculture sectors in achieving SDGs in Bangladesh:** n of inland open water capture fisheries (third) and culture fisheries (fifth) [7]. The fisheries and aquaculture sectors are inextricably linked to achieving several SDGs and have development relevance (e.g., economic, social, and environmental) in Bangladesh. Among the 17 SDGs, these sectors directly or indirectly contribute to achieving several SDGs, such as eliminating poverty (SDG 1), reducing hunger (SDG 2), promoting good health and well-being (SDG 3), establishing decent work and economic growth (SDG 8), influencing responsible consumption and production (SDG 12), organising climate action (SDG 13), developing life below water (SDG 14), and advancing life on land or life above water (SDG 15) (Table 2).

Table 2. Prospective linkage of fisheries and aquaculture sectors with achieving the SDGs in the context of Bangladesh[1]

The United Nations Sustainable Development Goals SDGs (1–17)	Direct or Indirect Linkage with Fisheries and Aquaculture Sub-Sectors			Linked with the Dimensions of Sustainable Development
	Inland Closed Water (Culture)	Inland Open Water (Capture)	Marine Water (Capture)	
Eliminate poverty	High	High	Medium	1, 2
Erase hunger	High	High	High	1, 2
Establish good health and promote well-being	High	Medium	Medium	1, 2

Provide inclusive and equitable quality education	Low	Low	Low	1, 2
Gender equality and women empowerment	Low	Low	Low	2
Ensure clean water and sanitation	Low	Low	Low	3
Affordable, reliable, and modern clean energy	Low	Low	Low	3
Create decent work and promote economic growth	Medium	Medium	Low	1, 2
Increase industry, innovation, and infrastructure	Medium	Medium	Medium	1, 3
Influence reduction of inequalities	Low	Low	Low	2
Mobilise sustainable cities and communities	Low	Low	Low	2
Ensure responsible consumption and production	High	High	High	1, 2
Climate action to combat climate change impacts	Low	Low	Low	3
Develop life below water or conserve and sustainable resource utilisation	Very high	Very high	Very high	1, 2, 3

Advance life above water or life on land	Low	Low	Low	3
Assurance peace, justice, and strong institutions	Low	Low	Low	2
Build and strengthen global partnerships for the sustainable development	Low	Low	Low	1, 2

[1]Criteria and scores are based on the authors' critical qualitative evaluations of field observations and experiences. Low (too little, scant or negligible linkage, score: 0–25); Medium (moderate or mild linkage exists but not well-defined, score: 26–50); High (good linkage, nevertheless, still needs to be defined clearly, score: 51–75); Very high (direct linkage with clear definition, score: 76–100) The idea of contextualising and generating this table benefited from de Bisthoven et al. (2020) [13] and Wang et al. (2020) [21]. Potentially linked with dimensions of sustainable development indicates 1) economic growth, 2) social inclusion, and 3) environmental protection.

Table 3. Perceptions of the respondents on the influence of COVID-19 on the fisheries sector of Bangladesh.

Questions Related to Impact COVID-19: COVID-19 Has	Responses (%)				
	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Negatively influenced fish production	59.00	22.00	19.00	0.00	0.00
Negatively influenced fishing	55.70	33.30	7.70	0.00	0.00
Negatively impacted household food consumption	27.90	47.20	15.40	5.20	4.30
Negatively influenced income	59.80	25.90	14.30	0.00	0.0
Increased conflicts	3.50	21.50	40.90	24.10	10.00
Increased hygiene practice	0.00	11.00	51.00	23.00	15.00
Increased stress	2.90	9.10	45.20	32.80	10.00

Data source: Field survey, 2021.

3. Challenges of Fisheries and COVID-19 Nexus to Achieve SGDs and Recovery Plans

Short-term and long-term recovery plans can potentially tackle the COVID-19 crisis in terms of addressing the immediate need and durable requirements for the sustainable recovery of the fisheries sector. Some recovery

plans elicited from community perception and the authors' suggestions are discussed below.

3.1. Need for Emergency Financial and Non-Financial Support

The overall income of fish farmers, fishers, and relevant stakeholders was severely affected, influencing the violation of fisheries rules. Immediate financial support, such as a rationing system as well as psychological counselling, could be effective. An urgent management strategy needs to be developed and implemented to save the livelihoods of fishers, hatcheries, feed industries, and other stakeholders [13].

3.2. Building Resilient Fisheries and Aquaculture Sector

During the COVID-19 lockdown and imposed restrictions, many fishers and fish labourers lost their income. In order to make the fisheries and aquaculture sector resilient, emphasis should be given to increase the capacity of the stakeholders by providing subsidies, incentives, interest-free loans, and alternating income-generating options.

3.3. Addressing Potential Threats in Aquatic Biodiversity

The degradation of aquatic biodiversity is one of the primary concerns in Bangladesh. IUCN assessments show that 64 out of 253 fish species are threatened, 9 are critically endangered, 30 are endangered, and 25 are vulnerable [14][15]. Excessive use of surgical face masks, disinfectants, hand sanitiser, and other pharmaceutical chemicals may also induce threats and water pollution. The return of the unemployed in the fishing sectors may increase overfishing and impose threats to biodiversity. A comprehensive management strategy including, but are not limited to, an awareness program is required for biodiversity conservation and COVID-19 risk mitigation.

3.4. Integrating Climate Change Risks with the Responses of COVID-19

Bangladesh is highly sensitive to climate change due to its geography and experiences frequent floods and cyclones (SDG 13: climate action) [16][17]. The current pandemic affects the coping strategy of fishers and the domestic food supply [18][19][20]. Developing appropriate technology and management strategies for resilient inland and marine fisheries is a mandate for Bangladesh, integrating climate change and COVID-19.

3.5. Initiatives to Address the Risk of Orders Cancellation by Foreign Buyers

During the lockdown, foreign shellfish buyers cancelled their orders due to border travel restrictions, which was an alarming issue for the shrimp industry. Minimising the risk of such cancellations requires more initiatives by fisheries and transport sectors for the smooth and safe transport of fish products.

3.6. Developing Long-Term Strategies

A long-term management strategy is essential for the sustainable development of the fisheries sector and for tackling the COVID-19 pandemic threats. The human resources and budget allocation (0.56% of the national

budget) for the fisheries sector should be increased. A package of development and extension projects need to be implemented at the marginal level to provide financial, technical, and moral support to the fish farmers and fishers.

4. Conclusions and Recommendations

Fisheries are crucial in the national macroeconomic, food and nutrition security perspectives (SDG 1: no poverty; SDG 2: zero hunger; SDG 14: life below water). The COVID-19 pandemic adversely affected the fisheries and aquaculture sectors in many ways. Therefore, efficient and sustainable management of aquatic resources is essential for the continued and significant contribution to the country's health and economic sector. Despite the enormous prospects and potential, several reasons, such as climate change, onshore coal-based power plant installation, a lack of scientific information, skilled human resources, and poor implementation of acts and rules related to marine fisheries, limit the fisheries resources, production, and performance. However, the supply of good quality seed, feed, and extension services could increase fisheries production in inland water bodies. To have a resilient coastal and marine aquaculture development, adopting appropriate technology is a prerequisite for Bangladesh. The development of communication and transportation systems for rapid access to information, coordination with the regional and international networks for updated technology, value chain, and proper utilisation of the marine resources is required to boost the total fisheries production of Bangladesh.

Policymakers should be more aware of their well-planned efforts to meet the SDGs that can also ensure precise and prompt functioning of the fisheries sector. Interdisciplinary coordination for enhancing investment, research infrastructure, environmental policies, and the introduction of modern storage and marketing facilities could rapidly improve the situation. Perceptions of small-scale fishers should be considered during the policymaking process. Particular strategies and emphasis are required to assess their vulnerability and sustainability. Attention should also be paid to the environmental abnormalities and constraints, such as frequent climatic disasters (SDG 13: climate action), a declining aquatic biodiversity trend (SDG 14: life below water), and increased water and air pollution trends, in connection with the success of the fisheries sector.

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