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The Confluence of Policy and Practice: Marine Fisheries of Bangladesh as a Catalyst for SDG Achievement

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Abstract: This study critically examines the strategic role of marine capture fisheries in advancing Bangladesh's Blue Economy and evaluates their contribution to the United Nations Sustainable Development Goals (SDGs), with a primary focus on SDG 14 (Life Below Water). Utilizing a qualitative synthesis of secondary data—including government reports, national policy frameworks, and international development benchmarks—the research analyzes the economic, socio-economic, and environmental dimensions of the sector. The findings reveal that marine fisheries are a cornerstone of the national economy, significantly bolstering GDP, export earnings, and food security. Despite the opportunities presented by expanded maritime jurisdictions and recent policy reforms, the sector faces systemic structural constraints, including the overexploitation of near-shore artisanal zones, technological deficiencies in deep-sea harvesting, and the persistent threat of illegal, unreported, and unregulated (IUU) fishing. A central contribution of this paper is the evaluation of how modern financial architectures can bridge the gap between policy intent and sustainable practice. It argues that the integration of Green Banking initiatives and strategic Debt Finance is essential for transitioning from traditional extractive methods to climate-resilient, science-based management. Furthermore, the study explores how optimizing Financial Leverage and expanding Financial Inclusion for small-scale fishing communities can mitigate socio-economic vulnerability and enhance compliance with conservation mandates. The analysis concludes that although existing frameworks show increasing commitment to ecosystem-based management and Marine Protected Areas (MPAs), achieving SDG 14 targets requires a synergistic approach integrating ecological conservation, innovative financing, and inclusive governance to ensure Bangladesh's marine resources support sustainable prosperity and long-term environmental resilience.

Keywords: *Blue Economy, SDG 14, Marine Capture Fisheries, Maritime Governance, Artisanal Fisheries.*

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I. INTRODUCTION

Bangladesh's marine fisheries constitute a vital pillar of the national Blue Economy, operating within an Exclusive Economic Zone (EEZ) of approximately 118,813 square kilometers in the Bay of Bengal (Failler et al., 2021). Although aquaculture has experienced rapid expansion in recent decades, the marine capture sector continues to underpin coastal livelihoods and remains the principal source of high-value species such as Hilsa (Tenualosa ilisha) and marine shrimp. In the 2023–24 fiscal year, Bangladesh recorded a historic total fish production of 5.02 million metric

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tons, of which marine capture fisheries contributed about 12.53 percent, equivalent to roughly 6.29 lakh metric tons (Haque & Mahmud, 2025). The broader fisheries sector plays a notable macroeconomic role, contributing approximately 2.53 percent to national GDP and more than 22 percent to agricultural GDP (Shamsuzzaman et al., 2020). Fisheries exports—dominated by shrimp and frozen fish—accounted for nearly 0.91 percent of total export earnings, generating around BDT 4,531.86 crore (over USD 410 million) in FY 2023–24 (Islam et al., 2024). Beyond its economic contribution, the marine fisheries sector holds substantial socioeconomic significance. Nearly 12 percent of the population, or around 20 million people, are directly or indirectly dependent on fisheries for their livelihoods (Islam et al., 2021). Within the marine subsector, artisanal and industrial fleets employ hundreds of thousands of fishers, with mechanized vessels typically operating with an average crew size of about 20 members. From a food security and nutrition perspective, fish supplies approximately 60 percent of the country's animal protein intake, while coastal populations rely heavily on marine fish as a primary source of essential micronutrients such as calcium, iodine, and vitamin A, which are critical for physical growth and cognitive development (Mondal et al., 2024). The Hilsa fishery is particularly significant, contributing about 12 percent of total national fish production and supporting the livelihoods of nearly half a million professional fishers, making it both an economic and cultural cornerstone of Bangladesh (Rahman et al., 2020). Environmentally, Bangladesh's marine domain is embedded within one of the world's most productive oceanic systems, largely due to nutrient-rich discharges from the Ganges–Brahmaputra–Meghna river system into the Bay of Bengal (Patil et al., 2018). This productivity supports diverse marine life, including globally important habitats such as the Swatch-of-No-Ground, a vast submarine canyon recognized as a biodiversity hotspot and a critical refuge for endangered cetaceans, including Irrawaddy dolphins and fin whales (Buhiyan et al., 2025). To conserve these ecosystems, the government has designated Marine Protected Areas (MPAs), notably the Swatch-of-No-Ground MPA covering 1,738 square kilometers, as well as the Nijhum Dwip MPA (Sumaila et al., 2021). Complementing offshore ecosystems, coastal habitats—particularly the Sundarbans mangrove forest, the largest in the world—serve as vital nursery grounds for marine species and provide essential ecosystem services, including carbon sequestration, shoreline protection, and climate change mitigation (Renaldo et al., 2024). Despite its considerable potential, Bangladesh's marine fisheries sector faces mounting sustainability challenges during 2024–2025. Although estimates suggest that only about 30 percent of marine resources are effectively utilized, localized overexploitation has led to symptoms of "fishing down the food chain," where declining stocks of high-value species are increasingly replaced by smaller, lower-value fish (Alam et al., 2021). Climate change further exacerbates these pressures through sea-level rise, salinity intrusion, and the increasing frequency and intensity of cyclones, all of which disrupt breeding grounds and heighten the vulnerability of coastal fishing communities (Islam et al., 2024). In addition, concerns have grown over unregulated and technologically intensive fishing practices, particularly the use of advanced sonar systems by industrial trawlers, which may accelerate resource depletion (Zhu et al., 2025). In response, the government is in the process of updating the National Fisheries Policy (2025), with an emphasis on stricter regulation of fishing gear, effort control, and seasonal bans to ensure long-term sustainability of marine resources (Islam et al., 2024).

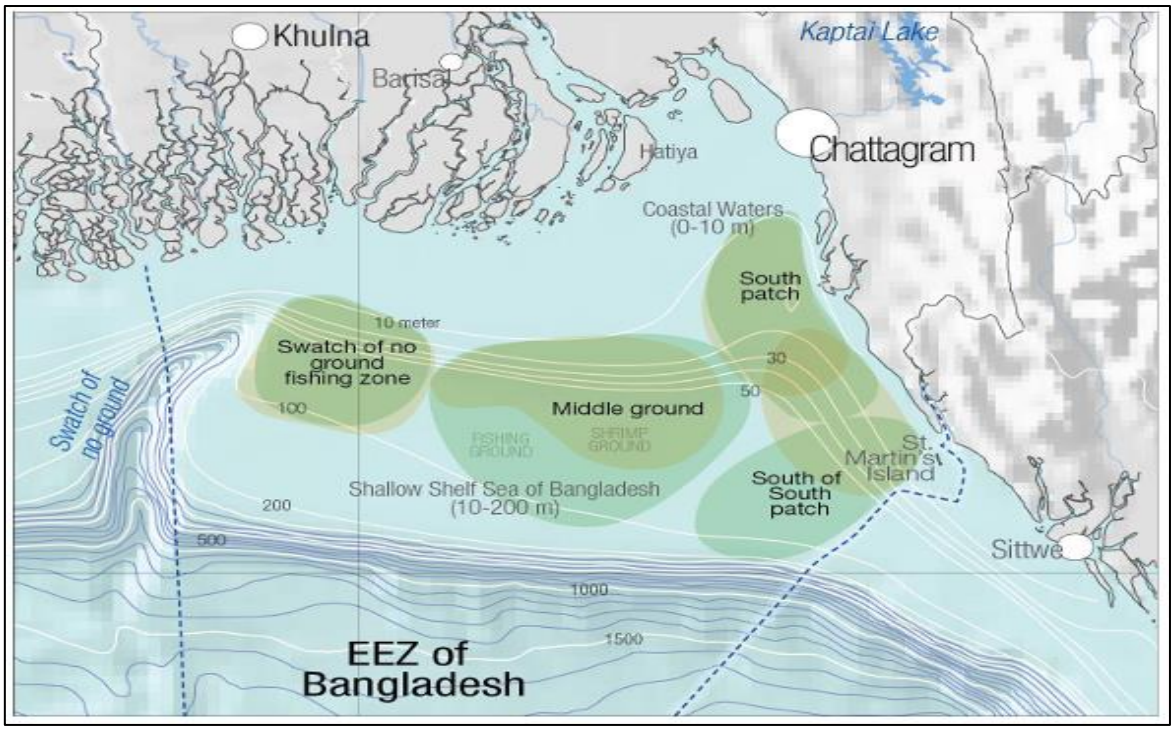

Fig 1 Named Fishing Grounds on the Bangladesh Continental Shelf.

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Bangladesh's marine fisheries play a strategic role in achieving the United Nations Sustainable Development Goals (SDGs), extending far beyond their contribution to food supply. SDG 14 (Life Below Water) acts as the core framework for Bangladesh's Blue Economy, while closely supporting poverty reduction, food security, and economic resilience (Chakrobortty et al., 2025). The objective of SDG 14—to conserve and sustainably use marine resources—is reflected in key national interventions. Under Target 14.4, Bangladesh enforces a 65-day annual marine fishing ban (20 May–23 July) to protect spawning stocks and curb overfishing (Islam et al., 2024; Islam et al., 2021). In line with Target 14.5, over 3,000 square kilometers of the Bay of Bengal have been declared Marine Protected Areas, including the Swatch-of-No-Ground, to conserve marine biodiversity (Buhiyan et al., 2025). Furthermore, Target 14.b prioritizes the rights and livelihoods of nearly 0.5 million artisanal fishers, ensuring their access to marine resources and markets (Spalding, 2016). Together, these measures highlight how sustainable marine fisheries management underpins both environmental conservation and inclusive socioeconomic development in Bangladesh (Chakrobortty et al., 2025).

This paper analyzes the role of marine capture fisheries in Bangladesh within the Blue Economy framework and assesses their contribution to the United Nations Sustainable Development Goals (SDGs), with a particular focus on SDG 14 (Life Below Water). The analysis is confined to fisheries operating within Bangladesh's Exclusive Economic Zone (EEZ) in the Bay of Bengal, excluding inland and freshwater aquaculture. Drawing on secondary data from government sources, international organizations, and peer-reviewed studies, the paper examines production dynamics, economic and socioeconomic contributions, environmental significance, and key sustainability challenges of the marine fisheries sector.

➢ *Relevance of the Research*

This study offers an integrated assessment of Bangladesh's marine fisheries within the frameworks of the Blue Economy and the Sustainable Development Goals (SDGs). It addresses the critical gap between resource potential and sustainable utilization by linking production, socioeconomic outcomes, environmental conservation, and policy interventions. The analysis demonstrates how marine fisheries contribute to SDG 14, while reinforcing food security, poverty reduction, and economic resilience. The findings provide evidence-based insights valuable for policymakers, development practitioners, and researchers in advancing sustainable fisheries governance, evaluating national SDG progress, and promoting climate-resilient, inclusive marine resource management in Bangladesh.

➢ *Research Aim*

The aim of this study is to examine the role of marine capture fisheries in Bangladesh's Blue Economy and to evaluate their contribution to achieving the United Nations Sustainable Development Goals, with particular emphasis on SDG 14 (Life Below Water), by analyzing their economic, socioeconomic, environmental, and sustainability dimensions using secondary data.

➢ *Research Queries*

This study is guided by the following research question:

- How do marine capture fisheries in Bangladesh contribute to the Blue Economy and the achievement of Sustainable Development Goal 14 (Life Below Water), and what economic, socioeconomic, environmental, and governance factors shape their sustainability?

➢ *Research Gap*

While Bangladesh's fisheries sector has been widely studied, existing scholarship predominantly emphasizes inland aquaculture, species-specific analyses, or isolated environmental concerns. Marine capture fisheries remain underexplored within integrated Blue Economy and SDG frameworks. Empirical studies that concurrently address their economic, social, and environmental dimensions—particularly in relation to SDG 14—are limited. Furthermore, systematic analyses linking national policy instruments, sustainability challenges, and SDG targets are lacking, constraining evidence-based policymaking and a holistic understanding of the sector's role in sustainable and inclusive development.

II. LITERATURE REVIEW

Marine fisheries are popularly recognized as critical to economic development, food security, and ecosystem sustainability in coastal nations. In Bangladesh, marine capture fisheries play a comparatively smaller role in total fish production than aquaculture (Hasan et al., 2021). Yet they remain strategically significant due to their contribution to high-value species, coastal livelihoods, biodiversity conservation, and the emerging Blue Economy framework (Islam et al., 2024). Existing scholarship can be categorized into five broad areas: (1) Blue Economy discourse, (2) economic contribution of marine fisheries, (3) livelihood and poverty linkages, (4) environmental sustainability and climate vulnerability, and (5) governance and SDG alignment. In the context of Bangladesh, scholarly attention has predominantly centered on inland aquaculture, freshwater capture fisheries, and species-specific analyses such as Hilsa management (Haque et al., 2025; Chakma et al., 2025). However, growing global emphasis on the Blue Economy and the Sustainable Development Goals (SDGs) has renewed interest in marine capture fisheries as multidimensional systems that integrate ecological sustainability, economic productivity, and social equity.

The concept of the Blue Economy emerged as an extension of sustainable development principles applied to ocean resources (Lee et al., 2020). According to the World Bank (2017), the Blue Economy promotes the sustainable use of ocean resources for economic growth, improved livelihoods, and ocean ecosystem health. Marine fisheries are frequently identified as a foundational pillar of the Blue Economy, particularly in coastal developing states where fisheries support employment, export earnings, and food security (Pauly, 2018; Geetha, 2025). In Bangladesh, marine fisheries are increasingly framed within this Blue Economy discourse following the peaceful resolution of maritime

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boundary disputes with Myanmar (2012) and India (2014), which expanded the country's Exclusive Economic Zone (EEZ). Scholars argue that the EEZ expansion created new opportunities for offshore fishing, deep-sea exploration, and marine resource diversification (Patil, et al., 2018; Gopal & Wuwung, 2025; Kalam, 2018). However, research also indicates that Bangladesh's marine fisheries remain underexploited relative to their estimated potential, while simultaneously experiencing localized overexploitation in nearshore zones. This paradox underutilization at the macro level and overfishing at the micro level highlights structural inefficiencies and governance constraints. Several studies emphasize that the Blue Economy must balance economic expansion with ecosystem integrity (Ahmed, 2024; Spalding, 2016). Overcapitalization of fishing fleets, weak enforcement of regulations, and limited scientific stock assessments undermine sustainable marine resource governance. Thus, literature increasingly calls for ecosystem-based fisheries management (EBFM) as a prerequisite for operationalizing Blue Economy principles in Bangladesh.

Existing literature consistently recognizes the fisheries sector as a significant contributor to Bangladesh's national economy (Shamsuzzaman et al., 2020; Islam et al., 2024). While aquaculture dominates total production, marine capture fisheries are economically important due to high-value species such as hilsa and shrimp. Empirical studies show that marine fisheries contribute substantially to GDP, agricultural GDP, and export revenues, particularly through frozen shrimp and fish exports to European and Asian markets. Hilsa, in particular, has received extensive scholarly attention due to its economic and cultural value. Research highlights that Bangladesh accounts for the majority of global hilsa production, making it a flagship species for national fisheries policy (Porras et al., 2017; Mahmud, 2020; Azad & Azad, 2022). Economic analyses demonstrate that hilsa management interventions, such as seasonal bans and sanctuary establishment have increased production over the past decade. However, scholars caution that these gains are unevenly distributed and may impose short-term livelihood costs on small-scale fishers. Export-oriented shrimp fisheries have also been widely studied, particularly regarding value chain integration, compliance with international sanitary standards, and market volatility. While shrimp exports generate significant foreign exchange, literature documents vulnerabilities related to global price fluctuations, quality control requirements, and environmental impacts in coastal ecosystems (Mandal, & Singh, 2025; Hossain et al., 2013; de Souza et al., 2021). Despite these contributions, several researchers argue that marine fisheries' economic importance is often underestimated because official GDP calculations do not fully capture informal employment, post-harvest activities, and ecosystem services. Thus, a broader economic valuation framework is needed to assess the true contribution of marine capture fisheries to Bangladesh's Blue Economy.

A considerable body of research analyzes marine fisheries in Bangladesh through the lens of livelihoods and poverty reduction. Coastal communities are characterized by high economic vulnerability, limited asset ownership, and frequent exposure to climatic hazards such as cyclones, storm surges, and salinity intrusion (Hossain et al., 2021; Rokonuzzaman & Hattori, 2021; Islam et al., 2021). Within this context, marine capture fisheries serve as both primary and supplementary sources of income for millions of people, including full-time fishers, seasonal laborers, processors, traders, and transport workers. The sector thus plays a central role in sustaining coastal economies where alternative employment opportunities are often scarce. Studies applying the Sustainable Livelihoods Framework (SLF) demonstrate that fishing households depend predominantly on natural capital namely marine fish stocks while possessing comparatively weak financial, physical, and institutional capital. This imbalance heightens vulnerability to income fluctuations, indebtedness, and exploitative relationships with intermediaries such as aratdars and informal lenders. Empirical evidence from districts like Cox's Bazar, Bhola, and Patuakhali indicates that seasonal fishing bans, though beneficial for stock regeneration, can temporarily intensify food insecurity and debt burdens if not supported by adequate compensation and social protection measures (Islam et al., 2021; Kamal et al., 2022; Das et al., 2025). Gender-focused research further reveals that women contribute significantly to post-harvest activities, including drying, sorting, packaging, and marketing, yet their roles remain largely informal and undervalued in policy frameworks. Enhancing women's access to finance, training, and market opportunities is therefore essential for inclusive Blue Economy growth (Rahaman et al., 2024; Williams, 2023; Nurain & Raiyan, 2025). Overall, marine fisheries function as a crucial safety net during agricultural lean periods and climate shocks, directly supporting poverty alleviation (SDG 1) and food security (SDG 2).

Environmental literature on Bangladesh's marine fisheries identifies overfishing, habitat degradation, and climate change as major sustainability threats. Evidence suggests declining catch per unit effort (CPUE) in certain coastal areas, indicating localized stock depletion. Marine biodiversity studies emphasize the ecological importance of the Bay of Bengal, particularly the Swatch-of-No-Ground submarine canyon and the Sundarbans mangrove ecosystem. These habitats function as spawning and nursery grounds for commercially important species. Degradation of mangroves, pollution from plastic and agricultural runoff, and destructive fishing practices threaten ecosystem resilience (Biswas et al., 2021; Akram et al., 2023; Alam et al., 2025). Climate change adds another layer of complexity. Rising sea surface temperatures, ocean acidification, and increased cyclone intensity alter fish migration patterns and breeding cycles Mondal, & Lee, 2025). Salinity intrusion in coastal waters affects estuarine species composition. Scholars warn that climate impacts disproportionately affect small-scale fishers who lack adaptive capacity.

Governance-related research underscores the importance of institutional coordination in marine fisheries management. Bangladesh has enacted updated legislation, including the Marine Fisheries Act 2020 and revised rules, to address illegal, unreported, and unregulated (IUU) fishing. Vessel Monitoring Systems (VMS) and seasonal closures are key policy instruments aligned with SDG 14 targets

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(Mozumder et al., 2023; Aboul-Dahab, 2022). Target 14.4 (ending overfishing) and Target 14.5 (marine conservation) are particularly relevant to Bangladesh's marine fisheries. Studies evaluating seasonal fishing bans indicate positive biological outcomes, including increased hilsa production and improved spawning success. However, researchers emphasize the need for integrated monitoring systems and robust stock assessments to measure sustainability accurately. Regional cooperation in the Bay of Bengal is also highlighted in the literature. Collaborative initiatives under FAO and regional fisheries bodies aim to address shared challenges such as trans-boundary fish stocks and IUU fishing. Scholars argue that achieving SDG 14 requires both national reforms and regional governance mechanisms. Nevertheless, significant research gaps remain. Few studies adopt a comprehensive framework linking marine fisheries simultaneously to economic, social, environmental, and governance dimensions within the SDG architecture.

➢ *Theoretical Background*

The theoretical foundation of this study is grounded in four interrelated frameworks: the Blue Economy paradigm, Sustainable Development Theory, Ecosystem-Based Fisheries Management (EBFM), and the Sustainable Livelihoods Framework (SLF). Together, these frameworks provide a multidimensional lens for analyzing marine capture fisheries in Bangladesh.

The Blue Economy framework conceptualizes oceans as engines of economic growth while emphasizing sustainability and ecological resilience (Yuan & Failler, 2025). Unlike traditional resource-extractive models, the Blue Economy advocates balanced integration of economic development, social inclusion, and environmental protection. In the context of Bangladesh, marine fisheries represent a core Blue Economy sector, contributing to GDP, exports, employment, and food security. The theory posits that long-term economic benefits depend on maintaining healthy marine ecosystems. Overexploitation undermines future productivity, creating a resource curse dynamic. Therefore, sustainable harvesting, regulatory enforcement, and marine spatial planning are fundamental principles of Blue Economy governance (Maruthi & Taskeen, 2024; Sutisna et al., 2025).

- *Sustainable Development Theory and SDG Framework*

Sustainable Development Theory, popularized by the Brundtland Commission (1987), emphasizes meeting present needs without compromising future generations' ability to meet theirs (Baum, 2021; Reiser, 2023). . The United Nations SDGs operationalize this theory through measurable targets. Marine fisheries intersect directly with SDG 14 (Life Below Water) and indirectly with SDGs 1, 2, 8, 12, and 13. The inter-linkage principle suggests that ecological sustainability, poverty reduction, and economic growth are mutually reinforcing rather than isolated objectives. This theoretical lens enables evaluation of marine fisheries not merely as economic commodities but as instruments of sustainable development.

- *Ecosystem-Based Fisheries Management (EBFM)*

EBFM expands traditional single-species management to consider ecological interactions, habitat protection, and biodiversity conservation. It recognizes that fisheries operate within complex marine ecosystems influenced by environmental variability and human pressures (Lidström & Johnson, 2020; Holsman ET AL., 2020). In Bangladesh, implementation of MPAs, seasonal bans, and gear regulations reflects movement toward EBFM principles. The theory underscores precautionary approaches, adaptive management, and science-based stock assessments. It also emphasizes participatory governance involving stakeholders in decision-making processes.

- *Sustainable Livelihoods Framework (SLF)*

The SLF explains how households utilize various forms of capital natural, financial, human, physical, and social to sustain livelihoods. For marine fishing communities, natural capital (fish stocks) is central, while financial and institutional capital are often limited. This framework highlights vulnerability contexts such as climate shocks, policy changes, and market fluctuations. It also emphasizes diversification and resilience-building strategies (Natarajan et al., 2022; Okafor-Yarwood et al., 2020). Applying SLF helps explain how fisheries contribute to poverty reduction (SDG 1) and food security (SDG 2), while also revealing the socioeconomic trade-offs of conservation policies.

Combining these theoretical perspectives allows for a holistic understanding of Bangladesh's marine fisheries. The Blue Economy provides the macroeconomic lens. Sustainable Development Theory aligns fisheries with global goals. EBFM addresses ecological sustainability. Finally, SLF captures household-level impacts. This integrated theoretical foundation supports the study's central inquiry is the way marine capture fisheries contribute to SDG 14 and broader sustainable development outcomes, while navigating economic, ecological, and governance challenges.

III. OVERVIEW OF MARINE FISHERIES IN BANGLADESH

Bangladesh's marine fisheries constitute a cornerstone of the national economy and food system, underpinning food security, employment generation, and the conservation of marine biodiversity. Strategically located along a 710-kilometer coastline on the Bay of Bengal, the country commands approximately 47,201 square kilometers of territorial marine waters and an Exclusive Economic Zone (EEZ) extending over 118,813 square kilometers (Mondal et al., 2024). These maritime zones harbor abundant pelagic and demersal fish stocks. Cox's Bazar and Chattogram function as principal centers for trawl and artisanal fisheries, whereas shrimp-dominated estuarine fisheries are concentrated mainly in Khulna and Satkhira.

Fishing activities in Bangladesh's marine domain are markedly seasonal, shaped by monsoonal dynamics and riverine nutrient discharge. The period from October to March represents the peak fishing season, when enhanced nutrient inflows stimulate primary productivity and support

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higher fish abundance (AftabUddin et al., 2021). From a biological perspective, the marine ecosystem sustains more than 475 fish species, including economically and culturally significant species such as hilsa (Tenualosa ilisha), shrimp, pomfret, and tuna. Hilsa alone accounts for roughly 12 percent of total national fish production, positioning Bangladesh as the world's leading producer of this iconic species (Azad & Azad, 2022). Shrimp and prawn fisheries further strengthen the sector's economic relevance, contributing close to 0.90 percent of total export earnings.

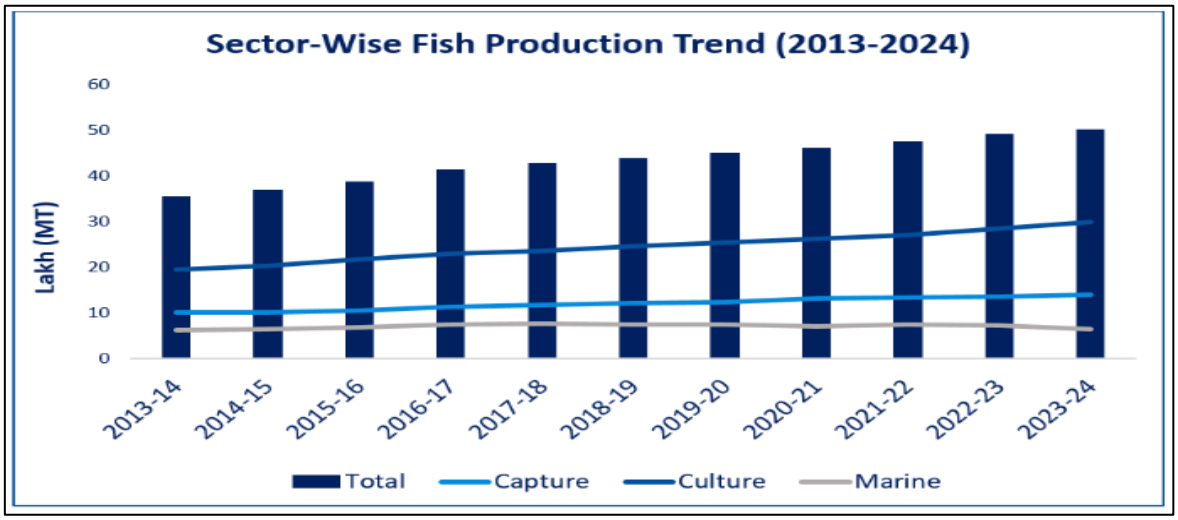


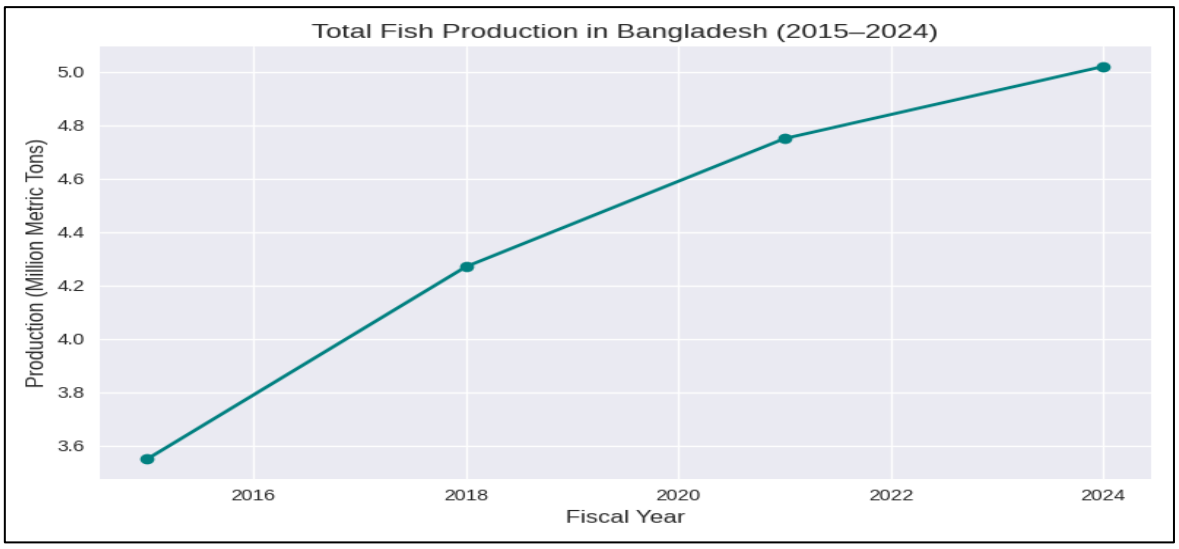
Fig 2 Sector-Wise Production Trend
Source: Yearbook of Fisheries Statistics of Bangladesh (2023-24)

Table 1 The Export Quantities and Values for Fish and Fishery Products in the Fiscal Year 2023-24

Product	Quantity (MT)	Export Value (Crore Taka)	(%) of Total Export Value
Shrimp/Prawn	19,131.35	2,117.67	46.70%
Other Fish & Products	57,276.59	2,414.19	53.30%
Total	77,407.94	4,531.86	100%

Source: Yearbook of Fisheries Statistics of Bangladesh (2023-24)

According to recent statistics from the Department of Fisheries (DoF), Bangladesh's total fish production reached 5.02 million metric tons in FY 2023–24, exceeding the national target of 4.89 million metric tons. Marine capture fisheries supplied approximately 0.65 million metric tons, while the rapid expansion of aquaculture has elevated the fisheries sector's contribution to about 2.53 percent of GDP and ensured nearly 60 percent of the country's animal protein intake. Notwithstanding these achievements, the sector faces mounting pressures from overexploitation, climate-induced changes, habitat degradation, and illegal, unreported, and unregulated fishing (Alam et al., 2022). At the same time, significant prospects remain in the promotion of environmentally responsible aquaculture, the strengthening of marine protected areas, and the integration of blue economy principles, all of which offer viable pathways toward long-term sustainability and resilient marine resource governance.



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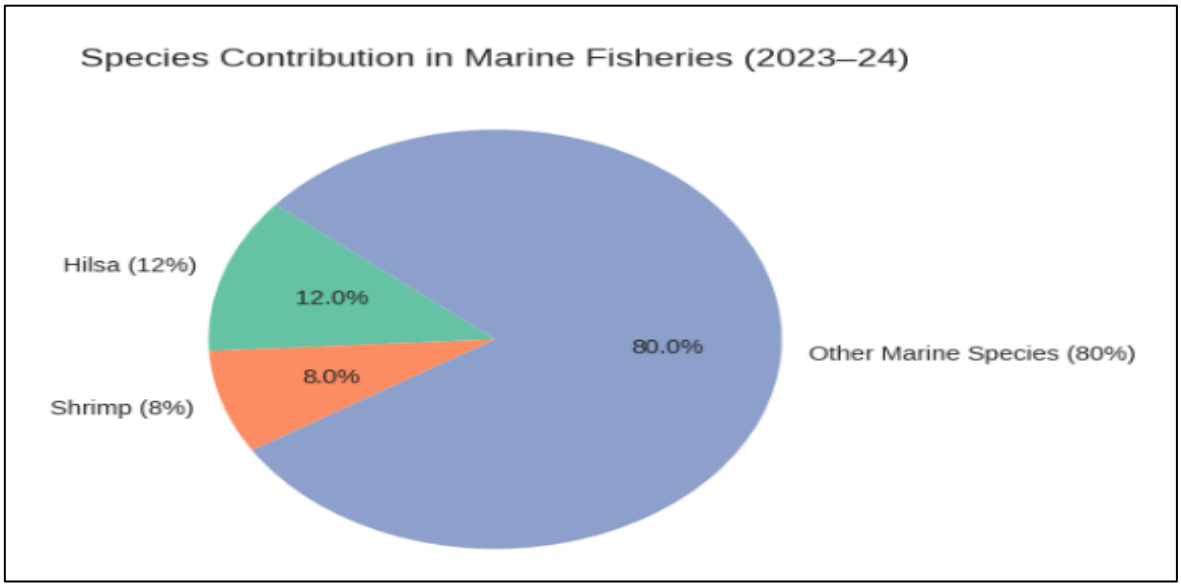

Fig 3 Total Fish Production in Bangladesh (2015-2024)

Bangladesh's marine fishing fleet is characterized by a dualistic structure that combines capital-intensive industrial operations with a large and diverse artisanal sector. The industrial segment comprises approximately 250–270 trawlers, primarily based in Chattogram and Cox's Bazar, which conduct mechanized and deep-sea fishing activities. These vessels mainly target high-value resources such as shrimp, hilsa, and demersal species, utilizing modern fishing gear and technologies suited to offshore exploitation. In contrast, small-scale artisanal fisheries form the backbone of the marine capture sector, contributing more than 90 percent of total marine landings (Failler et al., 2019; Rahman et al., 2020). An estimated 67,000 artisanal vessels—predominantly wooden boats that are either non-mechanized or equipped with small engines—operate largely within near shore and coastal waters. These fishers rely on traditional fishing methods, including gill nets, set bag nets, and long lines, with a particular emphasis on hilsa and other pelagic species that are vital for both subsistence and local markets. In recent years, regulatory efforts have been strengthened through the gradual introduction of Vessel Monitoring Systems (VMS) and Automatic Identification Systems (AIS), aimed at improving fleet oversight and curbing illegal, unreported, and unregulated fishing activities (Buhiyan et al., 2025; S. Alam et al., 2021). Nevertheless, the sector continues to face structural and governance challenges. Overcapacity within the artisanal fleet, frequent gear conflicts between industrial trawlers and small-scale fishers, and growing concerns over resource sustainability underscore the complexity of marine fisheries management in Bangladesh. The coexistence of industrial and artisanal fishing systems thus calls for an integrated and participatory management approach—one that harmonizes economic livelihoods with ecological conservation and ensures the long-term sustainability of marine fishery resources (Lubchenco & Haugan, 2023; Failler et al., 2019).

Table 2 Numbers of Bangladesh Industrial Trawlers by Gear Type

Trawler Type	Active	Inactive	Total
Shrimp trawler	30	7	37
Fish Trawler (Demersal)	46	13	59
Fish Trawler (Mid-Water)	122	0	122
Other (Demersal)	22	17	39
Total	220	37	257

Source: MFO, 2021

Table 3 Construction Characteristics of Bangladesh Industrial Trawlers

Construction	Preservation	Gross Tonnage	Length Overall (M)	Horsepower	Max. Trip Length
Wooden	Ice	56 – 148	18.5 – 26.5	420 – 600	14 Days
Steel	Freezer	251 – 668	34 - 54	716 - 1850	30 Days

Source: Ministry of Fisheries, Bangladesh.

Table 4 Number of Vessels Operating in the IOTC Area of Competence, by Gear Type and Size

Fishing Type	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
a) Shrimp Trawler	32	30	32	37	37	30	27	32	33
b) Fish Trawler	175	174	169	216	218	190	184	199	199

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Sub-Total	207	204	201	253	255	220	211	231	232
a) Mechanized Boat (MB)	33859	32859	32859	32859	32859	32859	32859	32859	29358
b) Non-Mechanized Boat (NMB)	33810	34810	34810	34810	34810	34810	34810	34810	-
Sub-Total	67669	67699	67699	67699	67699	67699	67699	67669	29358
a) Gill Net	115028	119958	118353	118353	37190	37190	37190	37190	25992
b) Set Bag Net (SBN)	40824	40824	42429	42429	20750	20750	20750	20750	2932
c) Long line (Hooks & Lines)	11863	11863	11863	11863	3225	3225	3225	3225	93
d) Trammel Net	422	422	422	422	131	131	131	131	-
e) Other Gear	15640	15640	15640	15640	6373	6373	6373	6373	341
Sub-Total	183777	188707	188707	188707	67669	67669	67669	67669	29358

Source: Ministry of Fisheries, Bangladesh.

Bangladesh's marine fisheries are gaining increasing attention for their combined ecological significance and economic value, as recent assessments have identified more than 540 marine species encompassing finfish, crustaceans, mollusks, and other invertebrates (Haque & Mahmud, 2025). The expansion in documented marine biodiversity—from about 475 species in 2010 to over 540 by 2025—reflects both improved scientific exploration and the inherently dynamic character of the Bay of Bengal ecosystem. Economically and ecologically important species such as hilsa (Tenualosa ilisha), shrimp, tuna, and pomfret contribute substantially to national food supplies and export revenues, while simultaneously performing critical functions within marine food webs. This rich biodiversity underpins essential ecosystem processes, including trophic regulation, nutrient cycling, and the resilience of coastal environments. Mangrove-dominated estuaries and shallow coastal waters, in particular, act as key spawning, breeding, and nursery habitats, sustaining the replenishment of marine stocks (Islam, 2003). Beyond ecological functions, marine biodiversity forms the foundation of livelihoods for millions of artisanal fishers, reinforcing Bangladesh's standing as a major contributor to global marine fisheries production (Haque & Mahmud, 2025). Despite these strengths, mounting pressures from overexploitation, climate variability, and habitat degradation pose serious risks to this natural capital. These challenges underscore the pressing need for science-based management, effective conservation measures, and ecosystem-oriented governance to ensure the long-term sustainability and productivity of Bangladesh's marine fisheries.

Table 5 Fish Production 2017-18 to 2022-23

Year	Marine production (MT)	No of Trawlers	Industrial (MT)	No of Boats	Artisanal (MT)
2017-18	654687	253	120087	M 32859, NM 34810	534600
2018-19	659911	255	107236	M 32859, NM 34810	552675
2019-20	671104	220	115354	M 32859, NM 34810	555750
2020-21	681239	211	119121	M 32859, NM 34810	562118
2021-22	706030	231	137170	M 32859, NM 34810	568860
2022-23	679385	232	146037	M 29358 NM 0	533348

*M-Mechanized, *NM-Non Mechanized
Source: Ministry of Fisheries, Bangladesh.

Table 6 Industrial Fisheries Species Wise Catch (MT)

Species/Group	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
Shrimp	3682	2733	2436	3069	3301	2970
Hilsa	11060	12300	9616	7781	11046	8138
Tuna & tuna –like fish	-	-	-	7893	12102	5597
Sardine	40936	27421	16154	33869	37720	50783
Bombay Duck	6050	2656	6494	6936	2787	1444
Indian Salmon	0	0	0	0	0	0
Pomfret	849	849	1205	1355	1137	1725
Croaker	3862	5020	6271	15385	5080	5665
Cat Fish	2735	3010	5223	5116	4198	4928
Sharks and Rays	549	724	602	5400	3915	294

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Others	50364	52523	67353	32317	55884	64493
Total:	120087	107236	115354	119121	137170	146037

Source: Ministry of Fisheries, Bangladesh.

Table 7 Artisanal Fisheries Species-Wise Catch (MT)

Species/Group	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
Shrimp	45165	40016	40380	43228	44305	43793
Hilsa	273440	278016	294950	305812	310825	291874
Tuna & tuna –like fish	-	-	-	14237	9047	9454
Sardine	550	835	660	650	712	717
Bombay Duck	69035	65445	64255	64986	79873	80498
Indian Salmon	487	295	177	163	199	200
Pomfret	11050	10155	8818	7859	10343	10327
Jew Fish	31565	36580	35672	33280	36276	37089
Cat Fish	6720	8445	8387	7083	10368	10377
Sharks and Rays	3425	3550	2771	2828	3102	3057
Others	93163	109338	99680	81992	63810	45962
Total:	534600	552675	555750	562118	568860	533348

Source: Ministry of Fisheries, Bangladesh.

IV. ECONOMIC AND SOCIAL IMPORTANCE

Marine fisheries form a crucial sector for Bangladesh's blue economy and significantly contribute to its Gross National Income, employment, export revenue, and coastal livelihood (Das, 2023; Ahmed et al., 2023). It has a significant positive impact on the country's overall food security and nutritional status. In addition to this, the social stability and poverty reduction of the coastal areas are assisted by the Marine fisheries. In totality, the economic and food security of Bangladesh is largely dependent on the marine fisheries.

Table 8 Summary of Economic Contribution of Marine Fisheries in Bangladesh

Economic Indicator	**Contribution / Value**
Share of total fish production	Approximately 12–15% of national fish production
Total marine fish catch (FY 2023–24)	Approximately 629,000 metric tons
Contribution to national GDP	Approximately 1% (mainly due to hilsa and high-value marine species)
Contribution of fisheries sector to national GDP	Approximately 2.5%
Share of artisanal fisheries in marine catch	Approximately 81.74%
Share of industrial trawlers in marine catch	Approximately 18.26%
Nutritional contribution	Around 60% of national animal protein supply

Source: Department of Fisheries (DoF), Ministry of Fisheries and Livestock, Government of Bangladesh; Relevant Academic and Policy Reports.

Table 9 Trend of Marine Fish Catch in Bangladesh (1980–2023)

Year	**Marine Fish Catch (Metric Tons)**
1980	165,000
1990	220,000
2000	350,000
2010	480,000
2020	580,000
2023	629,000

Source: Department of Fisheries (DoF), Government of Bangladesh; Compiled from Various Fisheries Statistical Reports.

The mentioned data in the tables demonstrate how crucial role marine fisheries play despite subsidizing a fairly modest share of the total fish production in the economy of Bangladesh. While marine capture fisheries account for only 12–15 per cent of total national fish production, their economic contribution is disproportionately significant due to the predominance of high-value species such as hilsa. This is illustrated by its predictable 1% contribution to the country's GDP through marine fishing (Rahman et al., 2020). Marine fisheries play both crucial and complementary roles within programs of economic development and securitization of food. This is given that marine fisheries provide livelihoods for millions of people residing within the coastal regions and that it is a primary source of protein alongside its macroeconomic significance (Ovchynnykova et al., 2024). These observations indicate that for Bangladesh to gain the greatest benefits of marine resources management, its marine resources must be managed effectively. The results also indicate a gradual increase in the harvest of marine fish over the past four decades, which can be related to improved

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fishing method, fleet development, and increases Bay of Bengal marine resource exploitation.

Marine fisheries contribute substantially to ensuring the sustainability of livelihoods for millions of people in Bangladesh, especially in estuarine areas, as compared to other parts of the country because economic opportunities are very limited. Beneficiaries include those involved in direct or indirect subsistence, as well as other groups like capture fishers, boat crews, fish processors, traders, transportation staff, net manufacturers, ice suppliers, and other unskilled workers. There is therefore more to marine fisheries, as they not only contribute to production, but they also contribute to ensuring subsistence or livelihood. Marine fisheries are a mainstay for communities engaged in small-scale and artisanal fishing. This is because the daily income generated from fishing is essential for consumption, as well as other functions such as funding the educational and healthcare needs of children and repaying debts (Islam et al., 2024; Sultana & Chakrobortty, 2022). This, in turn, makes a direct and tangible impact on the reduction of poverty (SDG 1) and elevation of living standards (Banu et al., 2024). These activities, in addition to fishing, could also include drying, fixing fishing equipment, and other trading activities.

Table 10 Livelihoods Supported by Marine Fisheries in Coastal Bangladesh

Category	Number of People	Description / Role
Full-time marine fishers	550,000	Individuals primarily engaged in artisanal and small-scale marine capture fishing.
Part-time / seasonal fishers	2,500,000	Fishers who engage in marine fishing alongside other occupations or during peak seasons.
Coastal fishery-dependent households	2,500,000	Households in coastal villages depending largely on fishing and fish trade for income.
Supporting workers in marine fisheries	2,000,000	Includes processors, transporters, vendors, boat builders, and other post-harvest workers.
Total direct & indirect employment	7,550,000+	Combined total of full-time and part-time fishers and supporting workforce in coastal regions.

Source: Department of Fisheries (DoF), FAO Reports, ICSF, and Observer Bangladesh (2023–2024).

These numbers demonstrate how vital marine fisheries are to the livelihoods, income, and socioeconomic stability of millions of people living in Bangladesh's coastal regions. The majority of maritime fishing is artisanal and small-scale, highlighting the reliance of communities on marine resources.

Fisheries in marine waters are a significant pathway to poverty reduction in the Bangladesh coastal areas by way of income and employment for millions. A major share of the fishing in marine waters is small-scale and artisanal, directly benefiting households that are poor and with limited livelihood alternatives. Income from marine capture fisheries, trade, processing, and related activities makes substantial contributions to earnings at the household level in marine coastal communities and for many community's accounts for more than half of total household income (Campbell et al., 2021). Consequently, marine capture fisheries act as an important safety net for poor coastal populations and help reduce extreme poverty in fisheries dependent private areas.

Marine capture fisheries play a very important nutritional role in food and nutritional security in Bangladesh. Marine fish are rich sources of reasonably priced animal protein, essential fatty acids, vitamins, and micronutrients not only among the coastal population but also among the general population. Fish consumption provides around 60% of the total animal protein intake of the country, and marine species like hilsa, mackerel, and sardine are crucial for dietary diversity (Campanati et al., 2022; Sunny et al., 2021). In coastal households, easy access to marine fish contributes to better nutritional status, especially for women and children, which improves nutritional deficiencies like protein and micronutrients.

The marine fisheries sector also makes a relevant contribution to the development of rural and coastal areas. This sector helps to build local value chains such as boat making, nets, ice production, fish landing facilities, transport, and marketing. Local development associated with these value chains improves and enhances economic livelihoods and the development of local economies in the coastal regions (Haque & Mahmud, 2025). In addition to this, the marine fisheries sector helps to build landing and storage facilities. This helps in the development of the roads associated with the coastal regions.

Marine fisheries are important in both economic production and social development. This is through improved livelihoods, nutrition, and rural and coastal community development. Its significance in fighting poverty, ensuring food security, and making communities resilient proves that it is very important for sustainable management to focus on such a sector in a country like Bangladesh.

V. SUSTAINABILITY CHALLENGES

Although marine fisheries have made a substantial contribution to ensuring food security, employment, and economic development in Bangladesh, there are several interrelated biophysical, institutional, and governance issues that hobble its potential to act as an accelerator for fulfilled Sustainable Development Goals, including SDG 14 (Life Below Water), as well as SDGs 1, 2, 8, and 13 (Islam et al., 2024; Shamsuzzaman & Islam, 2018).

Overfishing depletion is still one of the most serious issues in the Bangladeshi marine fishery resources. Overfishing, as a result of increased population pressure,

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demand, and lack of alternative means of livelihood, has led to a substantial reduction in fish stocks in the Bay of Bengal (Mondal et al., 2024). Many key species are found to be seriously overfished, which hampers the long-run sustainability of the fishery resources. Scientific analysis reveals a reported decline in the abundance and diversity of species, mostly in the demersal and inshore groups, symbolizing the affected state of the ecosystem (Islam et al., 2024). This is in direct conflict with target 4 of the Sustainable Development Goal 14, which aims at encouraging the recovery of fish stocks to biologically sustainable levels.

One major cause of depletion is associated with Illegal, Unreported, and Unregulated (IUU) fishing activities, including destructive fisheries like trawling in closed areas, the use of fine-meshed nets, and fishing during seasonal closures (Bhuyan et al., 2022; Rahman, 2017). Gear usage and enforcement concerns add fuel to this fire. While rules and regulations exist, for example, monofilament netting bans and seasonal fishing closures, their impacts and effectiveness remain impeded by limited surveillance capacity, competence and cooperation levels amongst relevant authorities, and social-economic dependencies on constant fishing (Narwal et al., 2024). Therefore, policy aspirations do not necessarily mean policy achievements.

There is a complicating factor in the case of the environment. The issue of marine pollution, specifically the proliferation of plastic waste originating from coastal settlements and fishing practices, is arising as a rather serious issue affecting marine biodiversity and the quality of fish (Ahmed, 2025). The runoff of excessive agricultural and urban nutrients is another factor that increases the effects of eutrophication, degrading the quality of coastal and estuarine areas, which are highly important for fish as breeding and nurseries (Elegbede et al., 2023; Shayan et al., 2022). At the same time, the effects of climate change, such as the rise in the temperature of the surface ocean, ocean acidification, the entry of high levels of salt, as well as higher rates of occurrence of hotspots, threaten the distribution, productivity, and habitat integrity of the fish.

Many such challenges have governance and data deficiencies at their root. Issues related to fragmented institutional authority, lack of stakeholder engagement, and lack of links to science inputs belong to this category. More importantly, there are gaps in the indicator data for Goal 14, especially for Target 14.1 (reduction of marine pollution) and Target 14.2 (sustainable management and protection of marine ecosystems). There are gaps in stock assessment and poor data collection and reporting practices that hamper Bangladesh’s efforts to measure progress towards Goal 14.

Whilst there is great potential in the marine fisheries industry of Bangladesh in ensuring sustainable development, some challenges are hampering its proper association with sustainable development goals. The marine fisheries industry in Bangladesh needs to deal with challenges that are causing it to be vulnerable to sustainable development. All these challenges are interrelated.

VI. POLICY FRAMEWORK AND MANAGEMENT

Bangladesh regulates its marine fisheries through the Marine Fisheries Rules, 2023, which authorize the government to oversee fishing activities during vital breeding seasons and promote sustainable resource management (Islam et al., 2024). Bangladesh's maritime fisheries are regulated by extensive national legislation, including the maritime Fisheries Act and its later revisions. The Marine Fisheries Act, 2020, which replaces previous rules, enhances the legal foundation for sustainable marine resource management by establishing licensing requirements, defining fishing zones, and enforcing fines for illicit, unreported, and unregulated (IUU) fishing (Sunny et al., 2021). These regulatory measures correspond with the Sustainable Development Goals (SDGs), including SDG 14, which underscores the conservation and sustainable use of oceans and marine resources. To protect fish populations and facilitate resource replenishment, Bangladesh implements seasonal and spatial fishing restrictions. In 2025, the yearly fishing prohibition in maritime seas was reduced to 58 days, implemented from April 15 to June 11, supplanting the prior 65-day duration. To save juvenile hilsa, Bangladesh implemented an eight-month statewide ban on the capture, transportation, sale, or storage of hilsa measuring less than 25 cm, commencing from November 1, 2025, to June 30, 2026 (DoF, 2026). Offenders are subject to sanctions under the Protection and Conservation of Fish (Amendment) Ordinance 2025, which may include a maximum of two years' imprisonment or fines reaching BDT 500,000 (DoF, 2026). These actions are executed through collaborative efforts by the Department of Fisheries, the Coast Guard, and local authorities. The government has commenced the implementation of vessel monitoring systems (VMS) throughout the marine fishing fleet, acknowledging the significance of efficient surveillance and data-driven governance (Buhiyan et al., 2025). These devices provide real-time monitoring of fishing vessels, hence improving regulatory adherence and maritime safety. Routine marine stock evaluations are performed to guide quota allocations and adaptive management measures, ensuring that harvest levels stay within sustainable ecological limitations. Bangladesh engages in regional and international partnerships to promote sustainable management of marine fisheries. A key program is the Food and Agriculture Organization’s (FAO) Bay of Bengal Marine Fisheries Project, which fosters collaboration among Bay of Bengal nations to address shared concerns including overfishing, habitat degradation, and the effects of climate change (Alam et al., 2022). These collaborations enhance capacity building, knowledge sharing, and the joint development of optimal practices for sustainable fisheries management.

VII. LINKAGES WITH SDG 14 AND OTHER SDGS

Bangladesh has achieved notable progress in executing sustainable fishing techniques, as specified in SDG 14.4. National rules, including the Marine Fisheries Act and the implementation of seasonal prohibitions, are essential for

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mitigating overfishing and safeguarding the sustainability of fish supplies. Routine stock evaluations and the enhancement of vessel monitoring systems bolster resource management and contribute to the preservation of natural equilibrium in the Bay of Bengal. The government has created several marine protected areas (MPAs), such as the Swatch of No Ground Marine Protected Area, to safeguard essential habitats and wildlife. These initiatives correspond with SDG 14.5, which mandates the preservation of a minimum of 10% of coastal and marine regions. Bangladesh's Marine Protected Areas (MPAs) function as crucial sanctuaries for marine species and enhance overall ecosystem resilience. Initiatives in sustainable marine fisheries management are intricately connected to various other Sustainable Development Goals (SDGs):

- SDG 1 (No Poverty): The fisheries sector sustains the lives of approximately 12 million individuals, predominantly from marginalized coastal communities, hence directly facilitating poverty alleviation (World Bank, 2023).
- SDG 2 (Zero Hunger): Fish constitutes an essential protein source, bolstering national food and nutrition security.
- SDG 8 (Decent Work and Economic Growth): Fisheries create employment opportunities and stimulate economic growth via value chain enhancement, processing, and exportation.
- SDG 12 (Responsible Consumption and Production): Sustainable harvesting regulations foster responsible resource utilization and market stability.
- SDG 13 (Climate Action): Ecosystem-based management and habitat preservation bolster resilience against climate impacts, including increasing sea levels and ocean acidification.

Bangladesh has seen quantifiable advancement in certain SDG 14 indicators:

- Indicator 14.4.1 (Proportion of fish stocks within biologically sustainable levels): Despite the persistent issue of overfishing, governmental measures have enhanced stock sustainability for critical species; however, continuous monitoring is essential.
- Indicator 14.5.1 (Coverage of protected areas in respect to marine areas): As of 2023, around 9.4% of Bangladesh's marine and coastal waters are protected, approaching the 10% worldwide objective.
- Bangladesh consistently submits Voluntary National Reviews (VNRs) that outline advancements and obstacles in attaining SDG 14, with the latest report emphasizing ongoing legislative reforms, enhanced monitoring initiatives, and augmented regional collaboration.

VIII. CONCLUSION

In conclusion, the marine fisheries sector of Bangladesh stands as a strategic pillar of the nation’s blue economy and a critical driver for achieving Sustainable Development Goal 14: Life Below Water under the United Nations framework. Although Bangladesh has achieved notable progress in marine production and the peaceful settlement of maritime boundaries—thereby securing sovereign rights over a vast Exclusive Economic Zone (EEZ)—the sector’s full potential remains substantially underutilized. Fishing activities continue to be heavily concentrated within shallow coastal waters, while limited deep-sea harvesting capacity, inadequate technological integration, and insufficient scientific stock assessments constrain sustainable expansion.

A transformative shift is therefore imperative—from conventional, extraction-driven practices toward a sustainability-centered model grounded in Blue Economy principles. Future research should rigorously assess deep-sea fish stocks beyond the 80-meter contour, examine the socio-economic consequences of climate-induced displacement among coastal fishing communities, and evaluate the operational effectiveness of ecosystem-based management (EBM) frameworks in conserving marine biodiversity (Bhuyan et al., 2022). Expanding and scientifically managing Marine Protected Areas (MPAs), coupled with the deployment of real-time digital surveillance technologies such as Vessel Monitoring Systems (VMS), will be essential to combat illegal, unreported, and unregulated (IUU) fishing and to strengthen regulatory compliance. Equally important is the institutionalization of sustainable finance mechanisms to underpin this ecological transition (Chakrobortty & Sultana, 2023). The integration of Green Banking practices can incentivize investment in environmentally responsible fishing gear, energy-efficient cold-chain logistics, and climate-resilient “green” shipbuilding infrastructure (Chakrobortty et al., 2025; Chakrobortty et al., 2025). Strategic deployment of Debt Finance can mobilize the capital required for fleet modernization and deep-sea exploration; however, prudent management of Financial Leverage is necessary to safeguard long-term solvency and prevent structural indebtedness within aquaculture and marine enterprises (Karim et al., 2023; Chakrobortty, 2023). Simultaneously, advancing Financial Inclusion through digital banking platforms and microcredit facilities for artisanal fishers can reduce dependence on informal and exploitative lending arrangements such as Dadandar, thereby empowering marginalized coastal communities to participate more equitably in formal value chains (Miah et al., 2025).

Ultimately, aligning financial instruments with ecological governance frameworks will enable Bangladesh to transition toward a resilient and inclusive maritime economy. By harmonizing environmental sustainability with sound financial architecture, the country can ensure that its marine resources serve not only as engines of food security and economic growth but also as enduring assets for intergenerational equity and long-term ecological stability.

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