



Exploitation and conservation of coastal and marine fisheries in Bangladesh: Do the fishery laws matter?



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ABSTRACT

The present study analysed the major features of two important acts and an ordinance in Bangladesh that govern coastal and marine fishery exploitation and conservation. The problems with the implementation of these regulations were identified, and the level of compliance among fishers and reasons for their noncompliance were assessed. Based on two case studies on coastal and marine ecosystems, the findings revealed that the level of noncompliance is highly prevalent, particularly in hilsa sanctuaries in the Meghna River estuary. The study identified coastal poverty, the inadequate and improper distribution of incentives, insufficient logistic support, limited alternative occupations, political interference and a lack of awareness regarding fishery regulations as the major limitations in the implementation. The drawbacks of proper implementation and the noncompliance of fishery regulations lead to fishery degradation, directly affect the sustainability of the coastal and marine ecosystem of Bangladesh and may be barriers to achieving Goal 14 of the Sustainable Development Goals (SDGs). Establishing a co-management mechanism for sanctuary management, creating economic opportunities outside of fishery sectors, declaring more protected areas in the coastal and marine ecosystem, enhancing logistic support to the enforcing agencies and building awareness are critical to improving the compliance level among fishers. Finally, the study submits that understanding the fishers' reasons for compliance and noncompliance of the regulations is important for devising fishery policies through the consultation and engagement of stakeholders at all levels.

1. Introduction

The coastal and marine fishery ecosystem of Bangladesh is a part of the Bay of Bengal Large Marine Ecosystem, which is one of the world's 64 Large Marine Ecosystems (LMEs) [1,2]. The coastal and marine fisheries of Bangladesh exploit a complex and multi-species resource of commercial importance. The fishery sector contributes 2.06% to the total export earnings, 3.69% to the gross domestic product (GDP) [3], approximately 23% of the total agricultural production and 60% of the total animal protein intake of the country [4]. More than 17 million people (about 11% of the total population), including approximately 1.4 million women, depend on the fishery sector for their livelihoods by fishing, farming, fish handling and processing [3,4]. Of the total production of 3,684,245 MT (in 2014–2015), approximately 16.28% come from coastal and marine fisheries [3]. The recent trend of fishery production shows that inland fishery production is decreasing, while

marine production is increasing [5].

The country has a coastal belt that is approximately 710 km long [6], and the Exclusive Economic Zone (EEZ) of Bangladesh extends from the baseline to 200 nautical miles seaward [7]. After the recent decision of the International Tribunal for Law of the Sea (ITLOS) regarding the Bangladesh–Myanmar maritime boundary and the decision of the Arbitral Tribunal constituted under Annex VII of the United Nations Convention on the Law of the Sea UNCLOS on the India–Bangladesh maritime boundary, Bangladesh permanently achieved vast areas of the EEZ. The total area of the maritime province is 121,110 km² where Bangladesh has sovereign rights over the marine living and nonliving resources [8]. In the context of the recent development in the maritime boundary, “blue economy” recently became a buzzword for sustainable development, particularly in drafting the post-2015 development goals for Bangladesh. The Bangladesh Government emphasised that a blue economy based on

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Table 1
Major constraints for coastal and marine fishery resources in Bangladesh.

Constraints	Description
Overexploitation	Except for some mollusc species, major commercial species in coastal and marine waters are overexploited[15]
Conflicts between artisanal and industrial fisheries	Industrial fishing trawlers that are supposed to fish in waters beyond 40 m in depth often fish much closer to the shore where only artisanal fishers are allowed[16].
Pollution	Coastal aquaculture, pollutants from seaports and pollution from ship-breaking activities in the Chittagong coast negatively affect coastal fisheries[10,15,17].
Widespread poverty	The majority of the small-scale fishers are poor, socially excluded and politically disempowered[11,15,16].
Extreme weather conditions	Rough seas, as well as frequent cyclones, often force coastal fishers to stay home or to abandon their incomplete fishing trips. Yet, due to very limited options for survival, many fishers defy warnings and continue fishing, resulting in many fatalities every year[11].
Inappropriate knowledge on fish stock	Since 1984, there have been no comprehensive fishery surveys in the Bay of Bengal. Hence, the standing stock and maximum sustainable yield values are unknown to policymakers[15]
Destructive fishing methods	The use of fine-meshed fishing gear (e.g., monofilament gillnets and estuarine set bag nets [ESBNs]) are widespread in coastal regions[11,15]
Overcapitalisation	The coastal population of Bangladesh has doubled since the 1980s. The fishing profession is the “last resort activity” for many members of the environmentally displaced population, High population density of fishing population, new entrants as both fishers and investors into the fisheries[15,18].
Middleman in fish chain	Due to limited access to formal credit, most fishers are entrapped into long-term debt bondage with a middleman, who often forces fishers to resort to destructive fishing for more profit[11,16]
Subjective insecurity due to illegal fishing and sea piracy	Piracy on fishing vessels is on the rise. Fishermen lose their valuable fish catch, but they may also lose their lives. Illegal foreign fishers also attack Bangladeshi fishers[11].
Climate change and variability	The single most important hilsa stock has been gradually shifted from inland to marine water. It is predicted that the impacts of climate change, under greenhouse emissions scenario A1B, are likely to reduce the potential fish production in the Bangladesh Exclusive Economic Zone (EEZ) by 10%[18].

marine resources should act as a driver for sustainable development, denoting development not only for today but also for the future [2,9].

However, there are several challenges ahead for unlocking the potential of a blue economy in Bangladesh [2]. The degradation of coastal and marine resources is one of the major challenges (Table 1). Particularly, the catch per unit fishing effort in coastal fisheries is falling, and several species of shrimp and fish stocks are in decline [10] due to overfishing, the indiscriminate killing of juveniles, pollution, disease defectives, insufficient fish conservation laws and inadequate knowledge [7,11,12]. Noncompliance with fishery regulations and the attempts of fishers to maintain their livelihoods by any means possible result in an increase in fishing pressure, the use of destructive fishing methods and gears and a tendency to fish whatever is available, including brood, larvae and juveniles. This could eventually lead to overexploitation of the coastal fishery resources and creates conflict between fishers and other resource users [10,12–13]. An understanding of how the fishery laws are being enforced, as well as the fishers' reasons for compliance and noncompliance of these laws, is necessary to plan for their effective dissemination and implementation and the increasing participation of stakeholders in resource management [14].

For the fishery management of Bangladesh, a number of laws and regulations are in place (Table 2), but the implementation of these laws and rules are often met with conflicts, as well as noncompliance by the stakeholders. These laws and policies are passed for the purpose of developing and conserving fisheries, utilising fishery resources as optimally as possible, protecting resource users' lawful rights and boosting fishery production. However, many of the rules and ordinances were enacted during the British colonial period. Most of these laws have been amended to meet the requirements of changing context. The Bangladesh Government has been taking some important initiatives, such as the enactment of laws and the formulation of new policies and action plans. Still, there are several shortcomings in the implementation of the legal framework, as noncompliance is rampant. The coastal and marine fisheries of Bangladesh are not well managed; one of the reasons for this is because the laws are not properly implemented [15]. The present study analysed the major features of two important acts and an ordinance that govern coastal and marine fishery exploitation and conservation. Based on two case studies, this study further investigates the implementation realities of the legal framework and assesses the level of noncompliance among fishers and the reasons for their noncompliance. Finally, the study provides suggestions for policy

implications.

2. Overview of coastal and marine fisheries in Bangladesh

The fishery sector in Bangladesh is divided broadly into the following three subsectors: inland capture, inland culture and coastal and marine fisheries [4]. A coastal and marine fishery is formed with two types of habitats, such as artisanal and industrial fisheries, based on the depth of the fishing operation. Artisanal fishers operate fishing up to 40 m in depth, and industrial fisheries operate beyond 40 m in depth [15].

Of the exploited species, hilsa (*Tenualosa ilisha*) constitutes the largest production (about 11% of the country's total production), contributes employments for 0.5 million fishers directly and another 2 million people indirectly, and about 1% to GDP [19,20]. As an anadromous species, hilsa is harvested from rivers, estuaries and coastal and marine waters of Bangladesh, with the Meghna River estuary contributing the largest amount. In terms of total production, the Meghna River estuary constitutes the largest estuarine fishery in the world [21]. Under the “Protection and Conservation of Fish Act, 1950,” the Bangladesh Government declared five hilsa sanctuaries in the rivers of Padma and Meghna and inshore waters to cope with the decrease in hilsa shad catches. Fishers in the sanctuaries use different types of gillnets with mechanized and nonmechanised boats for hilsa fishing. To exploit multi-species fisheries in inshore and offshore waters, a wide range of fishing gear is used in the coastal and marine waters of Bangladesh. Among this gear, the Estuarine Set Bag Net (ESBN) is widely used in the coastal fisheries in Bangladesh. The ESBN catches a wide variety of species, including Bombay duck (*Harpodon neherious*) and Acetes shrimp (*Acetes indicus*), which are the major species. Another type of ESBN is widely used to collect prawn and shrimp fingerlings along the coastal waters of Bangladesh [11,15].

In the offshore waters, major commercially exploited species are Hilsa, Bombay duck, Indian salmon, Pomfret, Jewfish, Catfish and Sharks [15]. In Bangladesh marine water, fish resources are extracted in the following three tiers: (1) up to 40m in depth from the coastline where normal fishing boats operate, (2) from 40 m to 200m in depth where mid-water trawlers operate and (3) from 200 m in depth to the end of the EEZ where long-liner trawlers run. In the first tier, around 68,000 vessels, both with and without engines, operate; however, no trawler is allowed in this zone. The 241 vessels licensed by the

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