Chapter 4
Case study: Bangladesh

Overview

The fishery industry in Bangladesh contributes around 4.43 per cent to GDP (Bangladesh Ministry of Fisheries and Livestock, 2012). Fish constitute a significant part of the national diet, accounting for around 60 per cent of animal source food, which is 15 per cent of total protein intake (Bangladesh Bureau of Statistics, 2011a; Belton et al., 2011; Hussain, 2010).

In addition to being a crucial source of nutrients, fish is also a major part of Bangladesh culture. Some 15 million people of a total population of 155 million are estimated to be either directly or indirectly employed in the fishery sector, and 73 per cent of rural households are involved in aquaculture (Alam and Dey, 2011; World Bank, 2017a).

Bangladesh is home to about 320 different species of fish. The heart of the Ganges delta is in Bangladesh and multiple river systems – Padma, Brahmaputra–Jamuna and Meghna – provide large and varied fishery resources. With this rich biodiversity, the country has significant potential and comparative advantages in the fishery industry.

Bangladesh is both the third largest inland captures producer in the world and the sixth largest aquaculture producer (Hussain, 2010; FAO, 2017a). Since 1971, the industry has seen steady growth, with production tripling after 1990 (Alam and Dey, 2011). In 1984–2013, annual average growth in fish production was 5.36 per cent, largely driven by the expansion in inland aquaculture fisheries, which grew at a rate of 10.01 per cent (FAO, 2017a).

Fishery production by sector is shown in table 12. Inland fisheries, which are mostly artisanal, account for the bulk of catches. More than half of inland fisheries involve aquaculture rather than capture fishing. Maritime fishing, accounting for 17.27 per cent of fishing (Bangladesh Ministry of Fisheries and Livestock, 2014) is also mostly artisanal.

Table 12. Bangladesh: Fishery production by sector, 2012–2013

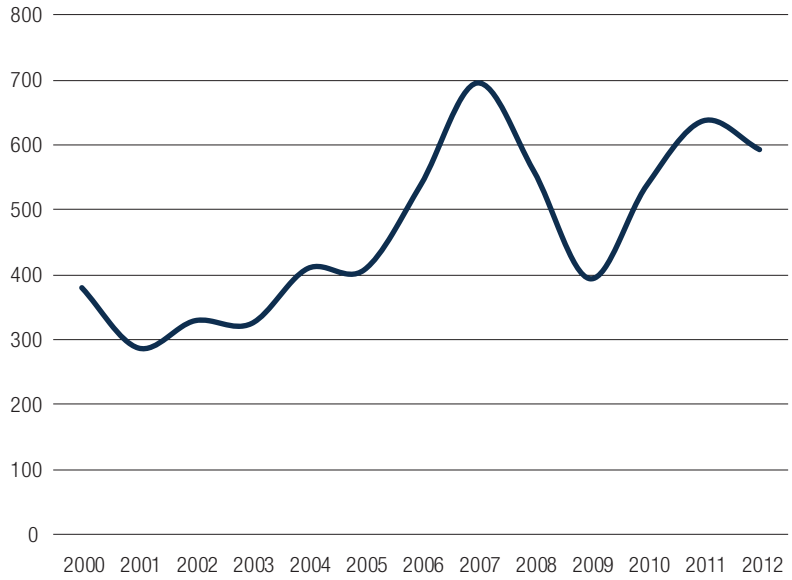
	Water area (Hectares)	Total production (Tons)	Share of total catch (Percentage)	Catch/area (Kg/hectare)
Inland fishery	4 699 387	2 821 266	82.7	600.3
Capture	3 916 828	961 458	28.0	1 126.0
Aquaculture:	782 559	1 859 808	54.5	2 376.6
Marine fishery	..	588 988	17.3	..
Industrial (trawler)	..	73 030	2.1	..
Artisanal	..	515 958	15.1	..
Total	..	3 410 254	100.0	..

Source: Bangladesh Ministry of Fisheries and Livestock, 2014.

The general upward trend of fishery exports by value and volume are shown in figures 1 and 2, respectively.

Figure 1. Bangladesh: Value of fishery exports, 2000–2012

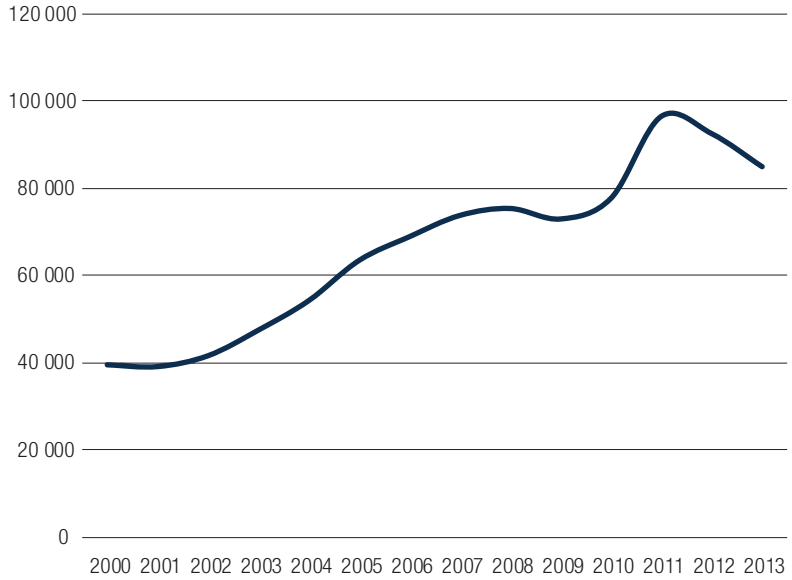
(Millions of dollars)



Sources: COMTRADE, 2017; FAO, 2017a.

Figure 2. Bangladesh: Volume of fishery exports, 2000–2013

(Tons)



Source: Bangladesh Ministry of Fisheries and Livestock, 2014.

Fishery exports: Focus on prawn and shrimp export industry

Although Bangladesh is the seventeenth largest capture producer in the world and the sixth largest aquaculture producer, it is only the thirty-fourth largest fish exporter (COMTRADE, 2017; FAO, 2017a). Exports amounted to a mere 0.04 per cent of world fish production by volume in 2013 (Bangladesh Ministry of Fisheries and Livestock, 2014; FAO, 2017a). While exports increased in value from around $168 million in 1990 to an estimated $592.5 million in 2012, exporters have faced problems meeting international food quality and safety standards (COMTRADE, 2017; FAO, 2012b).

The three major destinations for Bangladesh fishery exports have traditionally been Japan, the United States and the European Union. Exports to the United States and the European Union have grown steadily despite periodic bans, while exports to Japan declined by 2.5 per cent on average annually in 1991–2011 (2011 is the most recent year for which fish export data is categorized by destination; see table 13). It is unclear what prompted the decline in exports to Japan. The share of exports directed to non-LDC developing countries increased from 2 per cent in 1991 to 21 per cent in 2011. Exports to neighbouring China and India together accounted for around 53.9 per cent of the total value of exports to this group.

Table 13. Bangladesh: Fishery export flows to major partners, 1991–2011

		1991	1995	2000*	2003	2007	2011	Average annual growth rate, 1991–2011 (Percentage)
Japan	Millions of dollars	26.6	59.8	28.8	14.5	18.0	15.9	(2.5)
	Percentage	17	19	8	4	3	2.5	
United States	Millions of dollars	42.5	94.5	138.5	81	217.1	66.4	2.3
	Percentage	27	29	36	25	31	10	
European Union	Millions of dollars	76.6	121.5	166.6	210.6	352.4	341.8	7.8
	Percentage	48	38	44	65	51	54	
Non-LDC developing countries	Millions of dollars	2.6	12.7	26.6	6.7	66.6	130.52	21.6
	Percentage	2	4	7	2	10	21	

Source: COMTRADE, 2017.
Note: Data unavailable for 1999.

Fishery exports are largely composed of frozen shrimp and prawn, together accounting for, in 2013, 59.28 per cent by volume and 81 per cent by value of annual fish exports (Bangladesh Ministry of Fisheries and Livestock, 2014). The shrimp industry in effect drives national fishery exports. As in other LDCs, intermittent import bans in developed countries have affected shrimp exporters. For example, in the 1970s, when the seafood processing industry had begun to expand, the Food and Drug Administration of the United States banned seafood imports from Bangladesh due to concerns about quality and safety. The Government began to develop standards, regulations and inspection schemes to upgrade the quality of exports, with the assistance of FAO (Cato and Subasinge, 2003). Together with the establishment of two key laws regulating the capture and conservation of fish, namely the Protection and Conservation of Fish Ordinance, 1982; and the Marine Fisheries Rules, 1983, the Government established the Fish and Fish Products (Inspection and Quality Control) Ordinance, 1983.

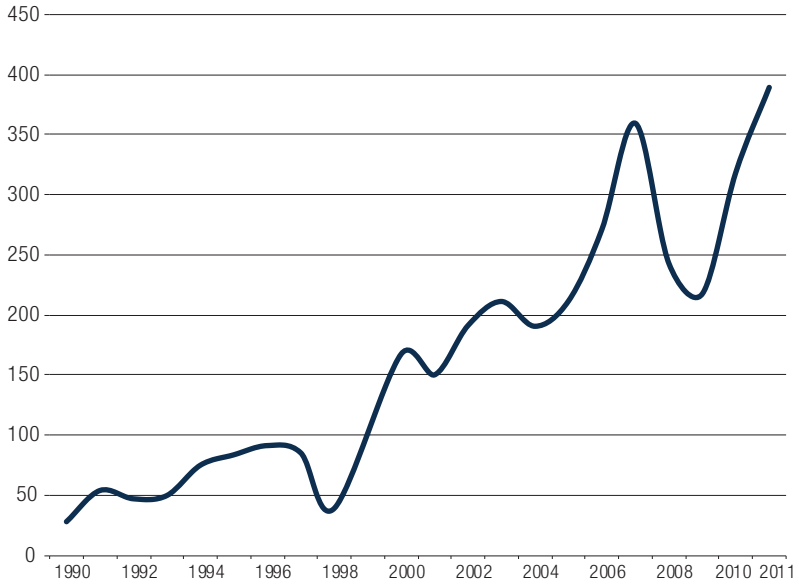
In 1996, FAO initiated a project to assist in preparing a quality and safety control programme for shrimp and fish processing plants based on the HACCP approach adopted by major importers. FAO provided assistance to stakeholders from the public and private sectors, including advising the Government on new requirements in importing countries and training personnel in processing plants. FAO and Info Fish carried out a parallel project that involved industry training and the promotion of export opportunities of value added products. At the time, the value per kg of frozen shrimp from Bangladesh was lower than the average for the Asian region.

In 1997, the European Union banned seafood imports from Bangladesh after inspections revealed deficiencies in infrastructure and hygiene in processing establishments and insufficient guarantees of quality control by government inspectors. The ban served to increase commitment by the Government and industry. Shrimp processors invested $17.6 million to upgrade plant infrastructure, and the Government, together with external donors, invested around $450,000 in employee training and laboratory upgrades in order to meet the requirements of HACCP procedures (Cato and Subasinge, 2003). The Government also amended the Fish and Fish Products Ordinance in order to reflect the provisions of sanitary and phytosanitary standards and the HACCP system (Dey et al., 2010). The European Union ban was lifted in 1998 and some processing plants obtained licences to export to the European Union following upgrading projects. Bangladesh is one of the few LDCs approved to export fish products to the European Union. The ban in 1997 resulted in lost seafood export sales of $15 million, and a 2002 ban by the Food and Drug Administration cost around $30 million.

In 2008 and 2009, shrimp and prawn exports to the European Union were halted after the detection of nitrofuran compounds in some consignments. Shrimp exports resumed in 2010 following the establishment of additional laboratory facilities to detect such contaminants (Belton et al., 2011). Periodic bans have been temporary setbacks to the growth in export flows to the European Union and the United States, as exports to both markets have steadily grown over the last two decades, as shown in figures 3 and 4.

Figure 3. Bangladesh: Fishery exports to the European Union, 1990–2011

(Millions of dollars)

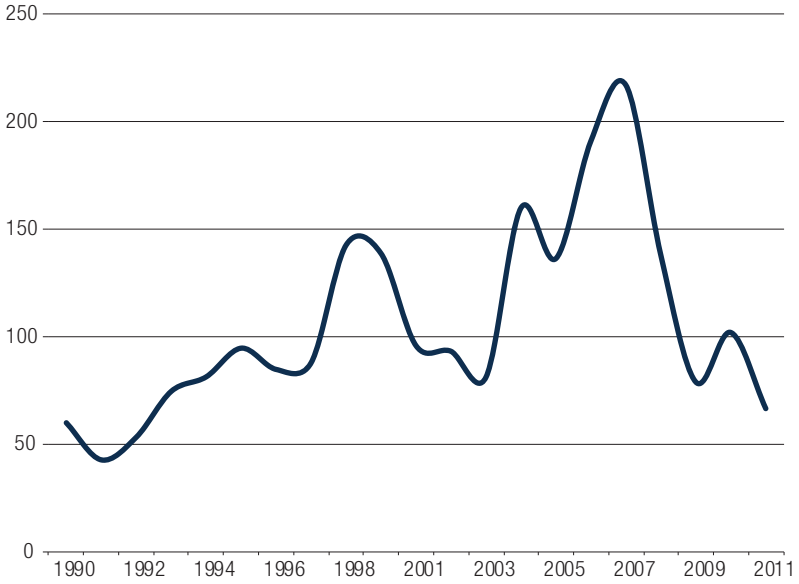


Source: COMTRADE, 2017.

Note: Data unavailable for 1999.

Figure 4. Bangladesh: Fishery exports to the United States, 1990–2013

(Millions of dollars)



Source: COMTRADE, 2017.

Regulations in foreign markets remain obstacles due to insufficient management by local stakeholders in Bangladesh (Dey et al., 2010). Another problem is the excess number of processing factories – there are currently 129 plants that cater to both domestic and international markets and 53 have approval to export to the European Union. Although domestic and foreign demand far outstrip supply, these industrial processing plants only operate at 20–25 per cent of full capacity due to falling harvests of shrimp caused by overfishing (Dey et al., 2010). Since export processors focus mainly on frozen shrimp, they have been constrained by the recent decline in shrimp catches. Shrimp exports reached a peak of 53,361 tons in 2006 but totalled 51,599 tons in 2010 (Bangladesh Bureau of Statistics, 2011b). Declining capture stocks have also dampened the supply of other species, increasing concerns about the sustainability of fish supplies in Bangladesh. There is thus a need for increased diversification and reliance on aquaculture supply sources.

Poor resource management and geographic vulnerabilities

Destructive fishing practices have led to indications of a drastic fall in fish stocks, both in inland and marine fisheries. In 2006, the Ministry of Fisheries and Livestock commissioned the World Fish Centre to carry out a project to measure the change in marine fish stocks over time, which confirmed that stocks were declining and that the rate of decline seemed to be accelerating (Hussain and Hoq, 2010). Slowing growth in the inland capture sector – its contribution to overall production fell from 35.5 per cent in 2002–2003 to 28.2 per cent in 2012–2013 – has compounded concerns of overexploitation (Bangladesh Ministry of Fisheries and Livestock, 2014). The number of freshwater species is decreasing, with 54 of an estimated 320 species in danger of extinction, thus threatening the diversity of fish stocks (Alam and Dey, 2011).

The fall in the country's fish stocks, particularly of the most commercially popular species, is a result of poor resource management – both a lack of legislation and of enforcement of extant rules – and the negative environmental impact of human activities in Bangladesh, as well as in India. Participants in both artisanal and industrial fisheries exploit marine and inland resources without full oversight by public authorities. Most governing legislation is focused on monitoring industrial trawling activity, but the Government faces difficulties in ensuring that industrial operations adopt sustainable fishing practices; while trawlers have officially been restricted from operating in waters deeper than 40 m – in an effort to protect the spawning ground of many commercially exploited shrimp species – they continue to operate in waters as little as 10 m deep, and this excessive fishing of juvenile and immature shrimp has decreased the natural replacement rate, and the catch per unit effort of shrimp – kg/day/shrimp trawler – has steadily decreased by about 50 per cent since the early 1990s (Hussain and Hoq, 2010).

Moreover, government surveillance of fishing practices should be broader in scope; artisanal fisheries are unregulated, although they account for 90 per cent of marine capture and the majority of aquaculture catches. The modernization of the artisanal sector in the last two decades – there are now as many mechanized fishing boats as traditional ones – has also resulted in the transfer of destructive gear and unsustainable practices from the industrial sector, putting even more pressure on fish stocks. As the Government may have difficulty monitoring the operations of artisanal fishers by deploying more patrol units, the formation of village surveillance communities that would work with the authorities to ensure sustainable fishing practices may help in this regard.

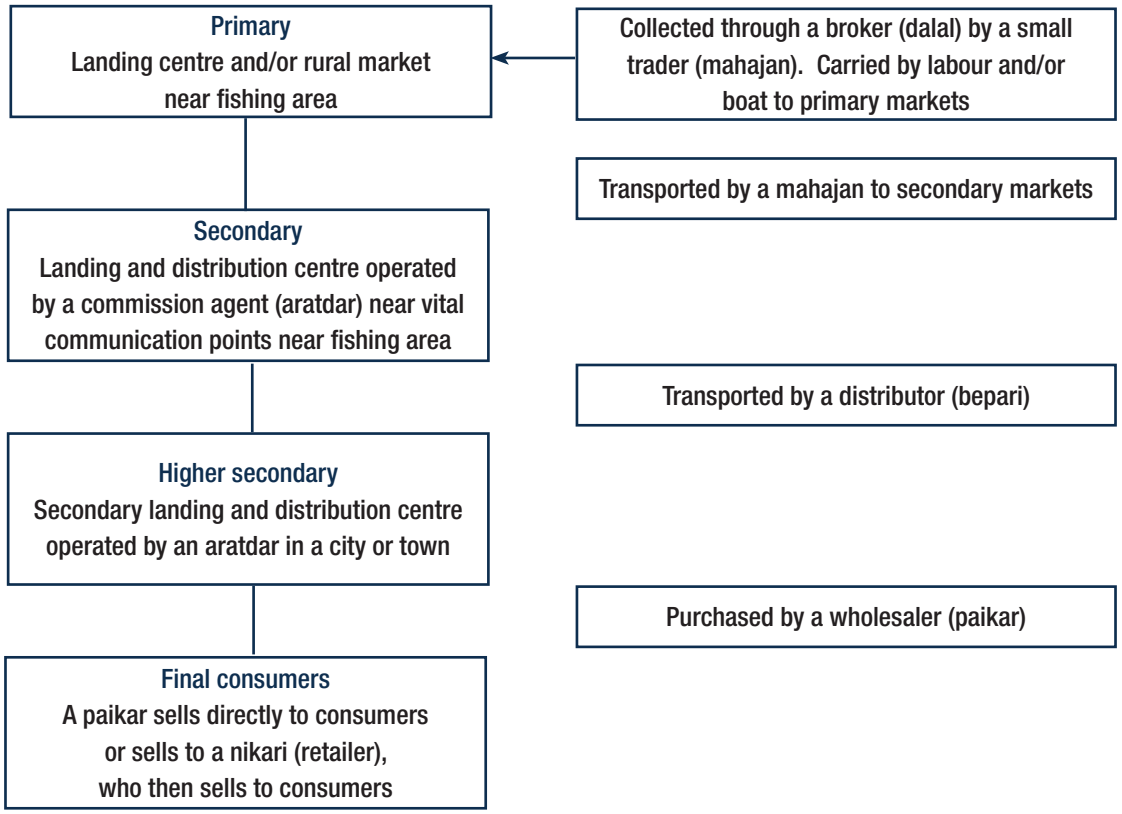
In addition to overfishing, Bangladesh has suffered from negative ecological impacts on the Ganges River caused by the construction of the Farakka Barrage in India, completed in 1975. The subsequent gradual upstream diversion of the river has resulted in excessive siltation along the coastline as well as increased shoreline erosion, harming species that have not been able to tolerate the higher salinity levels (Hussain and Hoq, 2010). The construction of additional dams along shared rivers may cause further ecological upheaval, and Bangladesh is particularly vulnerable to environmental disasters. The construction of dams on shared rivers combined with the overexploitation of fish stocks underlines the gravity of the open-access problem of water resources. In order to establish a more sustainable water resource management system, Bangladesh should establish property rights among fishers and water-sharing rights and environmental agreements with neighbouring countries, possibly mediated by third-party multilateral organizations.

Distribution chain and supply-side constraints

A complex network of intermediaries between artisanal fishers and final consumers defines the typical distribution chain in Bangladesh, as shown in figure 5. Generally, fishers are unable to distribute fish themselves because of poor transport infrastructure and an absence of public cold-storage facilities at landing sites, in addition to a lack of clean water and reliable electricity (Dey et al., 2010). The isolation of fishers from final consumers constrains their ability to obtain market information and higher profit margins. More importantly, artisanal fishers are locked in a perpetual cycle of debt with a mahajan, or local broker, who offers credit in exchange for fish. An aratdar – commission agent who conducts public auctions and often has icing facilities – generally gains the highest share of margins, and the limited number of such agents means that the mahajan and bepari – distributor – pay higher commissions, and the latter in turn further squeeze the margins of fishers upstream.

The distribution chain highlights some critical supply-side deficiencies that prevent the Bangladesh fish industry from reaching its full potential and producing high-value export-grade fish that could increase the incomes of fishers. First, the unavailability of public icing and cold-storage facilities at landing sites leads to a high proportion of discarded catches and poor hygiene practices. Second, the absence of quality, well-connected roads from landing sites to wholesale markets leads fishers to be beholden to distributors, and the limited connectivity results in squeezed margins for fishers. Recent improvements in roads and communications networks in urban areas have seen more fishers participate directly in the secondary market, leading to shorter distribution chains, and this trend augurs well for the fish industry given that, in some areas, 80 per cent of fish farmers consider lack of information and poor distribution as the main barriers to business (Dey et al., 2010).

Figure 5. Bangladesh: Typical fishery product distribution chain



Source: Based on Alam, 2011.

Aquaculture and diversification opportunities

The growth of aquaculture in Bangladesh has been fuelled by important research findings from the Bangladesh Fisheries Research Institute, which has developed and disseminated 45 different fish farm technologies and management techniques through its regional stations. Since 1988, when the Institute initiated its fish genetic research programme, it has developed strains of silver barb, tilapia and rohu that show 35, 32 and 10 per cent gains in body weight compared with control groups of these species. Other initiatives, such as the development of low-cost feed from indigenous ingredients and the distribution of improved management practices, may have contributed to the extensive culture of cost-effective small-scale aquaculture systems among the rural population (Hussain, 2010).

Aquaculture grew at an annual average rate of 10.16 per cent in 1985–2013, compared with a rate of around 3.2 per cent for capture fisheries (FAO, 2017a), with pond culture accounting for 86 per cent of production (Belton et al., 2011). Many rural households have homestead pond culture systems that serve as both a source of income and subsistence, and 73 per cent of rural households are involved in aquaculture production (Dey et al., 2010). To maintain the growth of aquaculture, the Government and the Bangladesh Fisheries Research Institute should address abiotic production constraints faced by fish farmers, that is those related to water, soil and temperature, rather than biotic constraints, such as pests and diseases. Research shows that the yield gap – the ratio of actual yield to best practice yield achieved in a research setting – is 52–54 per cent, due to flooding, soil erosion and low dissolved oxygen in freshwater sources (Dey et al., 2010). In addition, in order to improve the efficiency of the aquaculture sector, the Bangladesh Fisheries Research Institute might reorient its research towards the management of soil and water quality. Related government agencies and international donors could redouble efforts to establish training programmes for fish farmers, in order to boost production, as technical training in aquaculture practices significantly increases the productivity of freshwater fish farmers (Dey et al., 2010). Technical efficiency refers to the ability of a farm to obtain maximum output from a given set of inputs and technology (Dey et al., 2010). In results from one study, the technical efficiency of fish farmers who received training was 86 per cent, those given credit and technical advice was 69 per cent and those who received no training and no credit was 61 per cent (Ara et al., 2004).

Aquaculture also presents opportunities to diversify exports away from frozen shrimp and prawn, for example to striped catfish, which was introduced to Bangladesh fish farms from Thailand in 1998. The species has become a low-cost alternative to the popular rohu, and can be grown in small, shallow ponds, unlike rohu. While striped catfish is currently only marketed to domestic consumers, farms could process and export catfish, raising prices and incomes for producers. Production in Viet Nam – the current major exporter – costs more than in Bangladesh; producers in Bangladesh may therefore be encouraged to initiate catfish exports and diversify away from shrimp and prawn (Edwards and Sazzad, 2010). However, overproduction of catfish recently led to a market glut that plunged farm prices below production costs.

Assessment and lessons

Bangladesh, home to a diverse range of fish species and an established artisanal fishing tradition, has generally managed to overcome the most difficult constraint with regard to exports in the international trade of fishery products, namely health and quality standards in major importing regions, particularly the European Union, despite periodic bans on its products. The European Union has not imposed a ban on Bangladesh fish exports since 1998, and recent contamination issues faced by shrimp exporters could be minor problems related to a developing industry. Bangladesh also faces another challenge, namely excess fish processing capacity due to declining resources. Ensuring sustainability through diversification and better management should go together with productivity growth. Although domestic actors have access to lucrative markets and domestic production has tripled in the last two decades, continued efforts are needed to upgrade basic landing and transportation infrastructure; monitor fish stocks and prevent harmful fishing practices; and diversify exports, in order to improve long-term incomes for industry stakeholders. Most industrial factories largely process shrimp and prawn – frozen shrimp and prawn exports accounted for 81 per cent of exports by value (Bangladesh Bureau of Statistics, 2011b) – but operate at only 20–25 per cent of capacity (Dey et al., 2010). In 2013, frozen shrimp and prawn exports accounted for 81 per cent of fishery exports by value (Bangladesh Ministry of Fisheries and Livestock, 2014). A complex artisanal distribution chain prevents most traditional fishers from supplying to industrial-grade factories. Investment in cold chains and to improve the quality of the road network would greatly assist in reducing the dependence of fishers on intermediaries and in increasing the quantity of fish supplied to processing factories. Continued research and investment in aquaculture is an important means of boosting productivity, equity and sustainability.