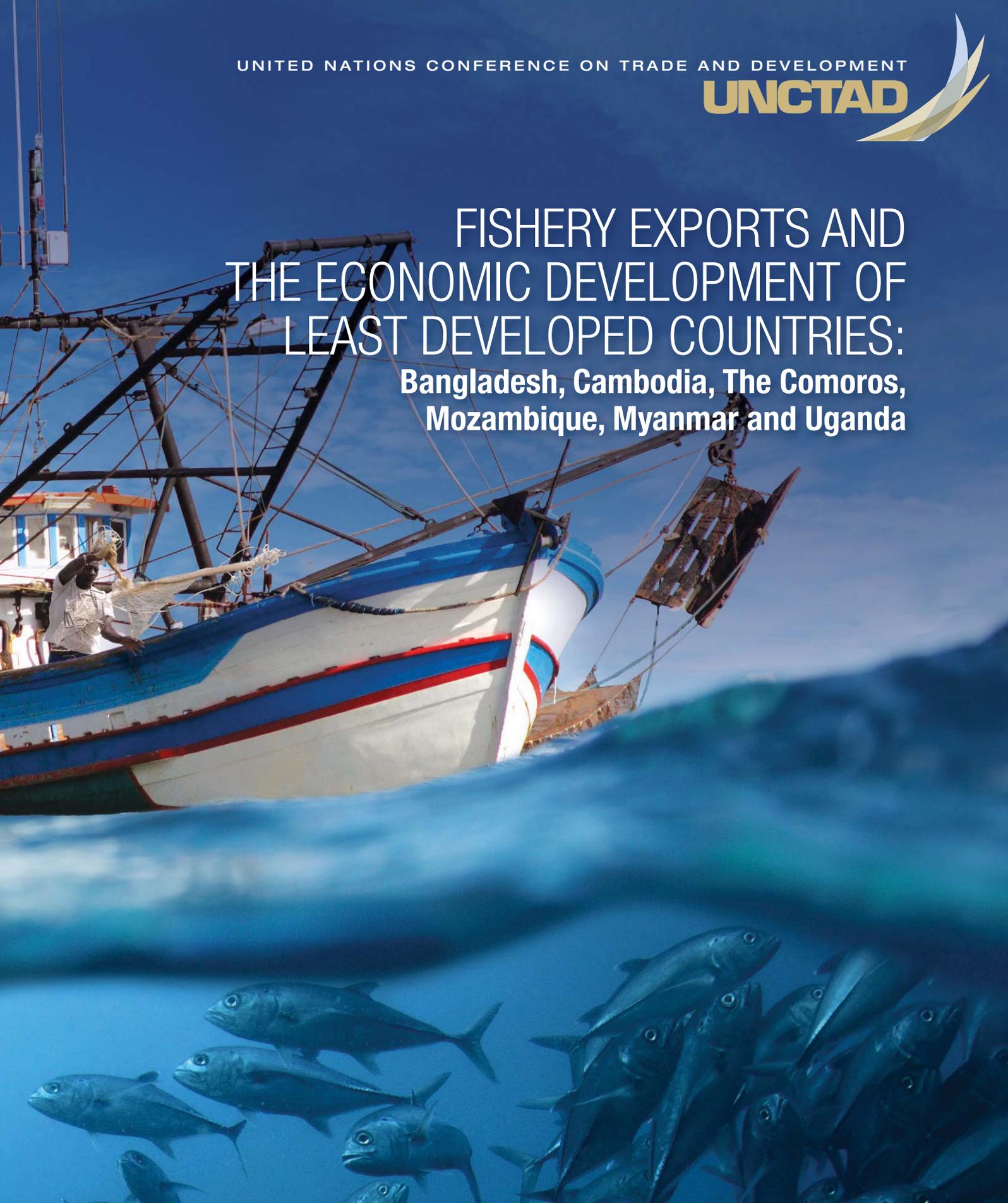




FISHERY EXPORTS AND THE ECONOMIC DEVELOPMENT OF LEAST DEVELOPED COUNTRIES:

**Bangladesh, Cambodia, The Comoros,
Mozambique, Myanmar and Uganda**



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"We believe that a series of case studies conducted by UNCTAD and policy and technical level training organized in Mozambique are of great value in assisting Mozambique in harnessing her fishery resources for socioeconomic transformation."

Mr. Henrique Bongeço, Deputy Minister, Ministry of Sea,
Inland Water and Fisheries



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Abstract

There is significant potential for the fishery sector to enhance export competitiveness and diversification and contribute to the overall socioeconomic development of a number of the 48 least developed countries (LDCs).¹ According to the Food and Agriculture Organization of the United Nations (FAO, 2016), of the top 16 producers of inland waters captures in 2003–2012, six were LDCs, namely Myanmar, Bangladesh, Cambodia, Uganda, the United Republic of Tanzania and the Democratic Republic of the Congo, in declining order by capture size. Myanmar was also among the top 10 producers of marine captures in the same period. UNCTAD, in *The Least Developed Countries Report 2006*, identified that in 14 LDCs, fishery exports were ranked in the top five merchandise exports (UNCTAD, 2006). Further research by UNCTAD on the export competitiveness of LDCs emphasized that, despite many complex development challenges facing LDCs, there was considerable scope for them to join the group of successful exporters, including in fisheries (UNCTAD, 2008).

Notwithstanding the socioeconomic importance of fisheries, the sector is often underdeveloped and unexploited. Consequently, while the share of non-LDC developing countries in world fishery exports increased from 34.6 per cent in 1981 to slightly over 50 per cent in 2013; in the same period, the share of LDCs rose marginally, from 1.6 to 3.5 per cent. This was despite the fact that LDCs receive preferential market access in major fish importing countries, particularly in the European Union.

The present study analyses the main supply-side and demand-side constraints that undermine the growth and development potential of the fishery sector of LDCs, with a particular focus on international food quality and safety standards in major importing countries. The study presents evidence from six case studies – Bangladesh, Cambodia, the Comoros, Mozambique, Myanmar and Uganda – and provides policy conclusions and recommendations for action by stakeholders in LDCs and their development partners. The study argues that, if nationally or regionally imposed standards are harmonized, simplified and realigned with internationally agreed standards, and if LDCs receive robust targeted technical and financial support to build their capabilities to meet such standards, there is considerable scope for many LDCs to become successful exporters of fishery products. There is, equally, a need to establish in LDCs pragmatic and forward-looking trade policies that emphasize tapping the potential of their fishery sectors for the diversification of exports. Fishery policies should be fully integrated into and made consistent with overall trade and national development strategies (UNCTAD, 2016).

Keywords: Fishery exports; international standards; least developed countries; Sustainable Development Goals; UNCTAD

¹ Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Lao People's Democratic Republic, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Solomon Islands, Somalia, South Sudan, Sudan, Timor-Leste, Togo, Tuvalu, Uganda, United Republic of Tanzania, Vanuatu, Yemen and Zambia.

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The project has led to the formulation of an UNCTAD manual on upgrading and diversifying LDC fishery exports, and to the organization of national and interregional capacity-building workshops in the countries covered by the project. In addition, an interregional training and capacity-building workshop was organized in Mauritius in April 2017, with 60 participants from Cambodia, the Comoros, Mauritius, Mozambique, Myanmar and Uganda, from the public and private sectors and academia. An intensive training programme was also organized for experts and middle-level managers from the countries covered by the project, at the Freshwater Fisheries Research Centre in Wuxi, China, with financial support from the Government of China. The workshops and training sessions assisted in validating the manual and sharing the findings and conclusions of the present study, and facilitated the sharing of successful experiences and best practices from other developing countries in fishery trade, management and development. The analysis and policy recommendations from the present study fed into the national and interregional workshops, which were particularly important in identifying key priority areas for further action by stakeholders in LDCs and development partners.

The project was implemented by a team consisting of Mussie Delelegn and Benjamin McCarthy, under the overall supervision of Taffere Tesfachew and Guillermo Valles and of Paul Akiwumi, Director, Division for Africa, LDCs and Special Programmes, UNCTAD. Patrick Osakwe, Head, Trade and Poverty Branch, UNCTAD, provided guidance on the overall implementation of the project and valuable input to the present study. Alba Solé Sorribes, Lidet Kebede Assefa, Olamide Oshodi and Jeremie Gingras provided research assistance and technical support for the organization of the workshops at the technical and policy levels. Stephen Golub, Franklin and Betty Barr Professor of Economics, Swarthmore College, Abir Varma, Swarthmore College, and Michael Brat, consultant, provided consultancy services. In addition, the following provided support: Rajalingam Madasamyraja (layout, graphics and desktop publishing); Deniz Barki (editing); Nadège Hadjemian (graphic design); Raul Javaloyes, Yan Zhang and Win Myint. Secretarial and administrative support for the project and in the preparation of the study were provided by Regina Ledesma and Paulette Lacroix.

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List of acronyms

ASEAN	Association of Southeast Asian Nations
COMTRADE	United Nations International Trade Statistics Database
FAO	Food and Agriculture Organization of the United Nations
GDP	gross domestic product
HACCP	Hazard Analysis and Critical Control Point
IUU	illegal, unreported and unregulated
LDC	least developed country
WTO	World Trade Organization

Foreword

Many LDCs have comparative advantages in fishery resources. Of 16 top inland waters fishery producers, six are LDCs. Overall, in 14 of the current 48 LDCs, fishery exports are ranked in the top five merchandise exports. The growing role of the sector in socioeconomic development in LDCs and other developing countries is well recognized.

The 2030 Agenda for Sustainable Development, adopted in 2015, includes Sustainable Development Goal 14: conserve and sustainably use the oceans, seas and marine resources for sustainable development. At the fourteenth session of the United Nations Conference on Trade and Development, held in Nairobi in 2016, more than 90 countries supported an initiative of UNCTAD, the United Nations Environment Programme and FAO towards ending harmful fishing subsidies (see <http://unctad.org/en/pages/MeetingDetails.aspx?meetingid=1170>). The statement urges the international community to view regulating fishery subsidies as an integral part of the implementation of the 2030 Agenda. Two further global events – the United Nations Conference to Support the Implementation of Sustainable Development Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development (New York, June 2017) and the eleventh Ministerial Conference of the World Trade Organization (WTO; Buenos Aires, December 2017) – are expected to provide political momentum and policy direction to enhance the role of fisheries in development.

The work of UNCTAD on the fishery sector, including in the present study, provides conceptual, analytical and technical support to LDCs in promoting and protecting their trade and development interests. UNCTAD is developing a manual on diversifying and upgrading LDC fishery exports, drawing on the experiences of LDCs – as documented in the case studies in this study – that may be relevant for other LDCs that have untapped fishery resources. The manual was discussed and validated at national workshops held in the Comoros, Mozambique and Uganda in 2015 and in Cambodia and Myanmar in 2016. The workshops brought together experts and senior officials from the public and private sectors and civil society in each country, to discuss country-specific potential and prospects for developing the fishery sector, as well as challenges facing the sector in each country. The workshops were important in at least three important ways, as follows:

- (a) Identifying domestic gaps or limitations such as weak infrastructure, notably in transport, energy and cold storage; a lack of technical capacity to upgrade food quality and safety standards; an absence of research and development institutions; water pollution; and environmental degradation
- (b) Assessing opportunities and prospects to tap the development potential of fishery resources in pilot countries
- (c) Sharing successful and less successful experiences among countries in the areas of fishery trade, management and development.

The national workshops culminated in an interregional training and capacity-building workshop held in Mauritius in April 2017, which provided further opportunity to draw important lessons from the experiences of Mauritius, seek ways and means to tap the development potential of the fishery sector and collectively explore how to best advance the trade and development interests of LDCs and small island developing States in the future.

The work of UNCTAD reveals that, despite the significant potential that fisheries hold for socioeconomic development, the fishery sector in LDCs is predominantly traditional or artisanal. While many developing countries have substantially increased their share in world fishery exports, from 34.6 per cent in 1981 to 50.2 per cent in 2013, the share of LDCs has risen marginally, from 1.6 to 3.5 per cent in the same period. The sector remains informal, untapped or underdeveloped, facing interacting supply-side and demand-side constraints.

The present study documents evidence from selected LDCs in Africa and Asia of a series of supply-side and demand-side challenges undermining the role of the fishery sector in LDCs. On the supply side, the main challenges are deficient transportation and storage facilities; poor energy infrastructure and high electricity costs; a lack of investment, finance or credit for small operators; overfishing and depletion of fish resources; water pollution; and a lack of common fishery policies among countries that share water resources. On the demand side, the most pervasive problem is a lack of compliance with the food quality and safety standards of importing countries, compounded and reinforced by the supply-side challenges.

The study argues that stringent public or private quality and safety norms limit access to major importing markets for many LDC fishery exporters. This is mainly due to the fact that standards are not harmonized and are costly for LDCs to meet. It is also due to structural problems in LDCs, including in processing facilities and procurement methods, as well as a lack of testing and certification of products throughout the value chain.

The study provides policy conclusions and recommendations in areas such as the provision of infrastructure, improvement of regulatory and institutional capacities, monitoring and regulation of domestic fishing, harmonization of international standards and building of LDC capacities to enable them, to fulfil the development potential of their fishery sectors.

Introduction

The last 50 years have witnessed a virtuous cycle of rapid growth of labour-intensive exports, expanding employment and rising wages and living standards in a number of emerging countries, as labour has been absorbed out of subsistence agriculture and informal urban activities into modern industries. Export-led growth is often identified with manufacturing, based on successes in East Asia and, to a lesser extent, Latin America. It is often difficult for LDCs, however, to compete in manufacturing, given the lead taken by emerging economies, such as China (Collier, 2008).

UNCTAD has been a leader in emphasizing that agriculture and fishing are viable alternatives to manufacturing for export-led growth (UNCTAD, 2008). Agriculture and fishing share many of the features of manufacturing, with regard to their potential to spur growth and employment and the institutional constraints faced in achieving this potential (Brenton et al., 2009; UNCTAD, 2008; UNCTAD, 2010).

Several critical aspects of promoting development and poverty reduction through manufacturing exports also apply to agriculture and fishing, namely high labour intensity, possibilities for technological upgrading and the consequent rise in producer incomes, access to state-of-the-art foreign technology through foreign direct investment and technical assistance and the necessity of attaining international competitiveness. With regard to agriculture and fishing in particular, sanitary and phytosanitary norms in developed country markets are a major hurdle for successful exports (FAO, 2011; UNCTAD, 2010), analogous to the demanding quality specifications of global buyers of manufactured products.

The present study focuses on fishing, both coastal and inland, which holds great potential for a number of LDCs. Fish have become the world's most highly traded food commodity, demand for fish is continuing to grow strongly and some developing countries have a comparative advantage due to a combination of low-cost labour and waters rich in highly prized varieties of fish.

A distinctive feature of agriculture and fishing involves natural resource management. This is particularly crucial for fishing, given that a lack of property rights creates a tendency for overexploitation – the tragedy of the commons. Overfishing is a grave threat to the global fishery industry. Preventing overfishing by limiting access to the resource is difficult under any circumstances, but poses particular challenges in LDCs with limited administrative capacities and funds for monitoring activities. LDCs face the challenge of, on the one hand, boosting productivity and competitiveness and, on the other hand, preserving fish stocks.

Besides diversifying exports, creating employment and increasing foreign exchange earnings, fishing provides a major source of protein in many LDCs and is important for improving food security.

A further characteristic of LDC fishery industries is the co-existence of industrial and artisanal fishing. LDCs, particularly in Africa, feature large informal sectors accounting for about half of gross domestic product (GDP) and 80–90 per cent of employment (Benjamin and Mbaye, 2012; Fox et al., 2013). With regard to fishing, the distinction between formal and informal operations takes the form of industrial and artisanal fishing. Foreign vessels using advanced technologies to catch high-value demersal species dominate industrial fishing. Industrial fishing operations provide revenues to LDC Governments through fishing agreements, yet often land little of their catch in LDCs and sometimes contribute to the depletion of stocks. As is the informal sector more generally, artisanal fishing is a subsistence activity. It is a major source of employment and earnings, but is limited by rudimentary infrastructure and poor hygiene standards. The importance of artisanal fishing further complicates fishing sector policy, as there may be trade-offs between employment and resource management.

This study approaches these issues through case studies of six LDCs, namely Bangladesh, Cambodia, the Comoros, Mozambique, Myanmar and Uganda.

Chapter 1 provides an overview of the global fishing industry to place actual and potential participation by LDCs in context. Chapter 2 assesses the demand-side constraints LDCs face in meeting quality and hygiene standards in developed country markets and chapter 3 considers supply-side constraints to LDC fishery exports, including a lack of information, infrastructure and access to credit. Chapters 4–9 contain the case studies and chapter 10 provides conclusions and recommendations.

Chapter 1

Trends in fish production, employment and exports

Global production and employment: Summary²

In 2014, the total world production of fish was 167 million tons. The global supply of fishery products has steadily grown at an average annual rate of 3.2 per cent in the last five decades, but capture production has reached a plateau since the mid-1990s, at around 90 million tons. The growth in fish production has been sustained by the rapid expansion of aquaculture; over the last three decades, global aquaculture production has tripled, growing at an average annual rate of 8.3 per cent. In 2014, aquaculture constituted 44 per cent of world fish production, compared with 26 per cent in 1994.

The growing importance of aquaculture is also reflected in employment trends. In 2008–2012, employment in fish farming increased by 5.5 per cent annually, in contrast to the 0.8 per cent recorded for both marine and inland capture fisheries. However, in 2012, aquaculture only accounted for about 32 per cent of total fishing employment. Capture fisheries are on average more labour-intensive than aquaculture, mainly due to the predominance of low-productivity small-scale or artisanal fisheries.

Fish production supports employment across a variety of sectors. Harvesting, processing, packaging and distribution activities constitute the supply chain for delivery of the commodity. The production of equipment and technology for vessels, handling, processing and shipping constitute support services. The primary sector alone generated employment for 56.6 million people in 2014; nearly 36 per cent of the total employment generated in the fishery sector is full time and 23 per cent is part time. If all related services and dependents of the employed are taken into account, fisheries support the livelihoods of about 10–12 per cent of the world's population.

Large-scale industrial fishing and small-scale artisanal fishing both contribute to GDP, but in different ways. The latter are more labour intensive and employ the vast majority of people engaged in fishing-related activities in developing countries. The World Bank et al. (2010) estimated that in the mid-2000s, in developing countries, small-scale fisheries employed about 79 million people, of whom 23 million were engaged in fishing and 56 million in post-harvest employment, while large-scale fishing employed a total of only approximately 5 million, of which 1.5 million were fishers and 3.5 million were engaged in post-harvest activities. FAO estimates that, in 2014, nearly 57 million people were engaged in the primary sector; 90 per cent, or 52 million, were small-scale fishers. There is significant variation in fishery sector employment data, particularly between national and international sources.

Exports: Focus on developing countries

Fish is one of the highest value commodities in world trade and accounts for approximately 10 per cent of total world agricultural exports. Global trends in fish trade are shown in tables 1–9. Exports of fish as a proportion of total fishery production rose from 25 per cent in 1976 to 37 per cent in 2012.

The evolution of world fishery export volume and average annual growth rate in 1981–2013 is shown in table 1; the 36.4 million tons exported in 2013 were more than triple the volume in 1981. The increase in trade in seafood reflects several factors, including increased consumption demand, especially in developed countries; depletion of stocks in developed country fishing waters; and technical advances in preservation, processing and transport.

Table 1. World fishery export volume and average annual growth, 1981–2013

	1981	1991	2001	2011	2013	Average annual growth rate, 1981–2011
	<i>(Millions of tons)</i>					<i>(Percentage)</i>
Total	10.5	17.3	27.5	35.4	36.4	3.90
From all developed countries	6.7	9.5	13.8	16.0	16.8	2.73
From all developing countries	3.8	7.8	13.8	19.4	19.6	5.30
From the least developed countries	0.2	3.6	0.7	1.2	1.3	6.89

Source: FAO, 2017a.

The diffusion of storage and packaging technology and improved processing methods have been crucial drivers of the globalization of fish distribution. Processed fish make up to 90 per cent of total world fish trade due to the highly perishable nature of fish commodities. Frozen fish accounted for 46 per cent of exports in 2012, compared with 25 per cent in 1980,

² Unless otherwise stated, all data in this chapter are from FAO, 2012a; FAO, 2012b; FAO, 2016; and FAO, 2017a.

and the proportion of prepared and preserved fish as a share of total fish trade expanded from 9 to 17 per cent in the same period (FAO, 2014).

In addition to large stocks of fish, developing country comparative advantages derive from the high labour intensity of fishing and fish processing. Advances in transport and storage technology also enable global fragmentation of the fishing value chain, as in manufacturing (Golub et al., 2007); fish may thus be caught, produced, processed and ultimately consumed in different countries. In the last three decades, exports from developing countries have increased more rapidly than exports from developed countries, and LDC exports have grown even faster, although from a lower base (see table 1). The shares of these groups of countries in world fishery exports by volume and value in 1981–2013 are shown in tables 2 and 3.

Table 2. Share of fishery export volume in world total by income group, 1981–2013

(Percentage)

	1981	1991	2001	2011	2013
Developed countries	63.8	54.7	50.0	45.1	46.3
Developing countries					
Least developed countries	1.6	2.1	2.4	3.5	3.5
Other	34.6	43.2	47.6	51.3	50.2
Total	100.0	100.0	100.0	100.0	100.0

Source: FAO, 2017a.

Table 3. Share of fishery export value in world total by income group, 1983–2013

(Percentage)

	1983	1993	2003	2013
Developed countries	62.7	55.2	52.6	46.0
Developing countries				
Least developed countries	1.1	1.0	2.6	2.0
Other	36.3	43.8	44.9	52.0
Total	100	100	100	100

Source: United Nations International Trade Statistics Database (COMTRADE), 2017.

As shown in table 2, the share of fishery exports from non-LDC developing countries rose from 34.6 per cent in 1981 to 50.2 per cent in 2013. While the share of fishery exports from LDCs rose from 1.6 per cent in 1981 to 3.5 per cent in 2013, it totals only 1.3 million tons, equivalent to 34.2 per cent of the quantity exported by non-LDC developing countries in 1981. Several LDCs are among the leading global inland water and marine fish producing countries, yet their share in global fishery exports is marginal. With the exception of, for example, aquaculture-grown shrimp, catfish and canned tuna, consumers in the United States of America and the European Union tend to prefer North Atlantic and North Pacific species found closer to home (FAO, 2011). These species are caught by domestic fishers and often exported to processing hubs such as China, then re-exported back to retailers. In addition, much of LDC fishery exports take the form of unrecorded cross-border trade with neighbours, particularly in Africa, for example around Lake Victoria. The share of LDCs in global exports may thus be higher than as shown in tables 1–3.

The leading exporting and importing countries by value are shown in tables 4 and 5. Fishery exports are increasingly concentrated in a few relatively labour-abundant developing economies that supply the developed world.

Table 4. Top 10 fishery exporters, 2003 and 2013

	2003 (Millions of dollars)	2013 (Millions of dollars)	Average annual growth rate, 1983–2013 (Percentage)
China	3 335	12 526	13.69
Norway	3 386	10 125	8.80
United States	2 927	5 128	5.91
Viet Nam	2 074	5 062	17.04
India	1 276	5 033	9.32
Chile	1 574	4 111	13.09
Canada	2 886	3 864	3.78
Sweden	599	3 405	13.37
Spain	1 810	2 885	8.05
Indonesia	1 437	2 856	8.70

Sources: COMTRADE, 2017; FAO, 2017a.

Table 5. Top 10 fishery importers, 2003 and 2013

	2003 (Millions of dollars)	2013 (Millions of dollars)	Average annual growth rate, 1983–2013 (Percentage)
United States	9 227	14 714	4.65
Japan	10 583	11 782	3.90
China	1 864	5 993	19.24
Spain	4 611	5 336	9.10
France	2 901	4 992	5.35
Germany	1 844	4 317	6.64
Italy	2 819	4 300	6.25
Sweden	833	4 097	10.55
Hong Kong (China)	1 564	3 237	6.97
Republic of Korea	1 737	3 136	14.78

Source: COMTRADE, 2017.

Note: Average annual growth rate for China calculated from 1984 to 2013 as data unavailable for 1983.

China contributed about 12.5 per cent of total fishery exports in 2013 (COMTRADE, 2017). Increasing volumes of fresh or minimally processed catches are imported into China and subsequently reprocessed and exported to major consumer markets. Such reprocessing has driven the recent emergence of China as the leading fish-exporting nation. Viet Nam and Thailand – the fourth and fourteenth largest exporters by value, respectively – have also established major fish processing industries that have fuelled their contribution to trade. The formation of major reprocessing centres in these countries has meant that re-exports of fish have been a major driver of the trade in fishery products.

The evolution of the volume of world imports and average annual growth rate in 1981–2013 is shown in table 6, and the shares of groups of countries in world fishery imports by volume and value in 1981–2013 are shown in tables 7 and 8. Developing country imports have grown rapidly. For example, the share of fish imports of non-LDC developing countries increased from 25.3 per cent in 1981 to 42.0 per cent in 2013. However, developed countries still account for the majority of fish imports – around 72.6 per cent of imports by value in 2013.

Table 6. World fishery import volume and average annual growth, 1981–2013

	1981	1991	2001	2011	2013	Average annual growth rate, 1981–2011
	(Millions of tons)					(Percentage)
Total	10.1	17.8	27.9	35.9	35.2	4.08
To all developed countries	7.4	12.4	18.7	19.7	19.7	3.09
To all developing countries	2.7	5.4	9.2	16.2	15.5	6.05
To the least developed countries	0.2	0.2	0.2	0.6	0.7	1.83

Source: FAO, 2017a.

Table 7. Share of fishery import volume in world total by income group, 1981–2013

(Percentage)

	1981	1991	2001	2011	2013
Developed countries	72.9	69.8	66.9	54.8	56.0
Developing countries:					
Least developed countries	1.8	1.2	0.7	1.7	2.0
Other	25.3	29.0	32.4	43.5	42.0
Total	100	100	100	100	100

Source: FAO, 2017a.

Table 8. Share of fishery import value in world total by income group, 1983–2013

(Percentage)

	1983	1993	2003	2013
Developed countries	87.3	86.4	81.2	72.6
Developing countries				
Least developed countries	0.1	0.03	0.2	0.8
Other	12.6	13.6	18.6	26.7
Total	100.0	100.0	100.0	100.0

Source: COMTRADE, 2017.

The European Union, the United States and Japan are the three largest import markets for fish, and their dependence on developing country imports is expected to increase in future. They are highly reliant on external suppliers, with imports accounting for approximately 64, 60 and 54 per cent, respectively, of domestic fish consumption (European Fish Processors Association and European Federation of National Organizations of Importers and Exporters of Fish, 2013). The European Union – the largest market for imported fish products – currently accounts for slightly more than one quarter of world imports, and has a common regulatory system for such products in the 28 member nations. Excluding intraregional trade, the European Union accounted for 37.8 per cent of total world fishery imports in 2013. In addition, it is a particularly important market for sub-Saharan Africa – with 34 of the 48 LDCs – due to both proximity and historical connections. The volume of fish exported from sub-Saharan Africa is relatively limited, yet 70 per cent of these exports are destined to the European Union (Josupeit, 2011). The European Union has the most stringent quality and sanitary regime (see chapter 2), which many small-scale producers and processors cannot satisfy, although there is potential for increasing exports of fishery products, since European Union import demand is projected to rise as local supply is reduced by the need to rebuild depleted fish stocks.

There is also substantial regional fisheries trade between LDCs. However, statistics can be unreliable due to the fact that such trade takes place in black or grey markets. In Africa, particularly in the Great Lakes region, a large amount of regional cross-border fish trade is unrecorded.

Bilateral trade between non-LDC developing countries and developed countries, and between non-LDC developing countries and LDCs, have grown more rapidly compared with that between LDCs and developed countries, as shown in table 9.

Table 9. Bilateral trade by income group, 1993–2013

(Millions of dollars)

	1993	1998	2003	2008	2013
Least developed countries to other developing countries	38.3	71.02	201.01	454.1	590.0
Least developed countries to developed countries	221.5	375.1	973.3	1 281.4	726.1
Developed countries to least developed countries	24.0	65.3	58.8	127.9	253.0
Developed countries to other developing countries	1 436.2	2 279.4	3 695.3	6 360.7	11 667.0
Other developing countries to least developed countries	8.1	18.7	33.5	115.8	502.2
Other developing countries to developed countries	8 929.7	12 502.8	16 055.2	22 407.2	28 427.6

Source: COMTRADE, 2017.

Major traded commodities

Higher priced fish products such as shrimp, prawns, salmon and tuna are the most frequently traded products by value, and exports of these species are mostly directed towards markets in developed countries. Aquaculture has facilitated the production and trade of these high-value species, allowing producers to diversify product ranges and sell in developed markets. Species such as shrimp, prawns, salmon, tilapia and catfish – among the most farmed fish products – are those that have demonstrated the highest export growth rates in the last decade. LDCs have generally not been able to participate in the trade of high-value species; one reason is their proportion of world aquaculture production – in 2013, their share was only 4.2 per cent by quantity and 5.6 per cent by value. Low-value species such as anchovies are exported in large quantities, yet the value of trade in anchovies and other pelagic species is less than the value of trade in high-value species.

LDCs tend to supply unprocessed or minimally processed fish. Southern European countries buy mostly whole fish, while northern European consumers, particularly in Germany and the United Kingdom of Great Britain and Northern Ireland, buy more processed fish products such as frozen or breaded fillets. Consequently, most LDC exports are to southern Europe.

The most important fishing product from sub-Saharan Africa is canned tuna. African countries are exempt from the 24 per cent tariff on imported tuna, providing a significant competitive advantage over non-LDC exporters. Tuna fishing and canning has shifted from East to West Africa; the largest African exporter was Senegal and is currently Mauritius. Frozen

fish fillets, mainly of hake from Namibia and South Africa but also including Nile perch from lakes in Kenya, Uganda and the United Republic of Tanzania, are the second most important fish product from Africa (Josupeit, 2011).

Importance of fishing to gross domestic product, employment and poverty reduction

Fishing plays a crucial role in a number of LDC and non-LDC developing countries, including those emphasized in the present study. The World Bank et al. (2010) noted that the share of capture fishing (gross value of fishery output) as a percentage of GDP was 4 per cent in Bangladesh, 10 per cent in Cambodia, 15 per cent in the Comoros, 4 per cent in Mozambique and 3 per cent in Uganda. Including post-harvest activities raised the share to 16 per cent in Cambodia and 12 per cent in Uganda (data unavailable for the other countries).

In addition to job creation, agriculture and fishing contribute to food security, both directly and indirectly. In many LDCs, such as Bangladesh, Cambodia, the Gambia, Guinea, Sierra Leone and Togo, fish provide more than half of the animal protein consumed (Béné, 2006). Incomes earned from selling fish are also important. People engaged in artisanal fishing and fish processing tend to have low incomes (Béné 2006; Béné et al., 2010). Nevertheless, fishing can contribute to poverty alleviation through several mechanisms. Artisanal fishing, as does the informal economy more generally, provides employment of last resort. The common resources aspect and low capital intensity of fishing enable easy entry by low-skilled people with few other options. Béné et al. (2010) distinguished a labour-buffer effect of absorbing chronic surplus labour and a safety-net effect during short-term shocks. However, artisanal fishers are vulnerable due to high exposure to risks, high sensitivity to risks and low capacity to adapt to risks, including physical risks, such as drowning and accidents; weather-related risks, such as tropical storms, tsunamis and floods, possibly exacerbated by climate change; and resource-related risks, such as migration of fish stocks or subjection of fish stocks to overfishing or disease. Béné et al. (2010) contrasted wealth-based and welfare models of poverty alleviation for fisheries – the former focuses on increased investment, value added and exports, and the latter on safety-net and labour-buffer effects in sustaining the incomes of the poor – and stated that the former focused overly on resource conservation and income growth at the expense of employment.

Limiting the overexploitation of resources is essential to maintaining fishing as an income-generating activity. Modernizing fishing and fish processing does not necessarily imply a decline in demand for labour, as both are likely to remain labour intensive. Moreover, the scale effect of expanded fishing activities on employment could dominate the reduced labour intensity following from increased production. There is no evidence that creating processing factories, for example, reduces the employment of artisanal fishers. On the contrary, local processing can increase demand for fish (see chapter 9). To the extent that fish exports contribute to higher earnings, they lower poverty; there may not necessarily be a contradiction between improving productivity and maintaining employment.

Role of women

Fishing may often be considered a profession dominated by men yet this usually refers only to the capture of fish. With regard to freshwater fishing, for example, women may own boats, as for example in Benin and Cambodia. In Bangladesh, fishing was traditionally reserved for low-caste Hindu men, yet this is gradually changing; the World Bank et al. (2010) found that women of different religions and castes engage in shrimp fishing in coastal areas. In addition, the majority of jobs in fisheries are in post-harvest distribution and processing, and women tend to dominate in these activities, particularly when they are artisanal. The World Bank et al. (2010) estimated that 47 per cent of those involved in fisheries worldwide are women, with wide variations across countries, for example 73 per cent in Nigeria, 72 per cent in India, 57 per cent in Cambodia, 32 per cent in Senegal, 19 per cent in China and 5 per cent in Bangladesh. In 2014, 19 per cent of women were directly engaged in the fishery primary sector. Women also frequently provide funds to invest in family fishery businesses. Yet despite women's substantial and increasing involvement in fisheries in some countries, a lack of gender equality arises from traditional beliefs and customs and existing legal and regulatory barriers.

Chapter 2

Demand-side constraints

Complying with mandatory quality and safety standards in major importing countries

LDC fish products face few or no tariff barriers in developed country markets as there are low or no tariffs on unprocessed fish and there is preferential market access for processed fish products. The greatest non-tariff trade barrier for LDC producers and processors is the quality and safety standards system imposed on fish products in major markets abroad, instituted in the 1990s and 2000s. Exporters face a complex regulatory landscape compounded by many differences in national regulatory regimes. WTO has ongoing efforts to facilitate the standardization of various national requirements; its Agreement on the Application of Sanitary and Phytosanitary Measures and Agreement on Technical Barriers to Trade establish the rights of member countries to implement food quality and safety norms to protect the welfare of consumers and animals and/or plants pertaining to trade of a particular product. These agreements support the harmonization of standards, based on the guidelines of the Codex Alimentarius Commission, a joint commission of the World Health Organization and FAO on international food standards, yet allow countries to adopt enhanced measures if they deem further protection necessary or if there is a scientific basis for doing so (FAO, 2011).

The three largest importers – the European Union, the United States and Japan – have adopted varying standards in response to growing consumer concerns about the quality and safety of seafood. Such quality and sanitary requirements are major hurdles for exporters in developing countries, in particular LDCs, whose fisheries are primarily artisanal. The shift from final product sampling for quality and safety inspection towards Hazard Analysis and Critical Control Point (HACCP) methods, based on prevention rather than testing, has made compliance with import regulations more challenging for LDCs (FAO, 2005; see box 1).

Box 1. Hazard Analysis and Critical Control Points

The HACCP system was initiated in the 1960s as a result of a joint public-private venture to provide safe food for United States astronauts. In the 1980s, developed country Governments started to adopt HACCP principles. The Codex Alimentarius Commission has developed guidelines for the application of the HACCP system in food production, including a specific code of practice for fishery and aquaculture. The objective is to lower risks rather than increase inspection and testing, as testing can fail to uncover contamination in some food products even with large samples, due to the enormous variety of products and unknown probability distribution of contamination. Under these circumstances, the prevention of hazards is more effective. The HACCP system involves seven steps, as follows:

1. Conduct a hazard analysis: Identify main risks of contamination in production and distribution process
2. Determine critical control points or areas where preventative steps can be applied
3. Establish critical limits at each critical control point, that is, the value of indicators that trigger corrective action
4. Establish critical control point monitoring requirements, including mandated procedures and their frequency for monitoring indicators at control points
5. Establish corrective actions or measures to be taken in the event that critical limits are exceeded
6. Establish procedures for ensuring that the HACCP system is working correctly, including regular inspections and gathering of evidence on functioning of above steps
7. Establish recordkeeping and documentation of implementation of above steps.

The perishability of fish products and the high risk of contamination mean that detailed HACCP measures can be judged necessary and applied at all stages of the production process, including on fishing boats, at landing sites and in storage areas, processing factories and transport facilities.

Sources: FAO, 2011; Sperber and Stier, 2010.

While the adoption of the HACCP system by the Codex Alimentarius Commission is intended to spread responsibility for compliance throughout the value chain, the system has put significant pressure on small-scale producers, which must follow the required procedures and, in some cases, certify the quality and safety of harvests. The HACCP system includes requirements for everything from the design of vessels used for capture to the personal hygiene and training of personnel in landing areas. The rising importance of private standards, discussed in the following sections, is an additional obstacle for LDC exporters.

European Union regulations

The European Union is the largest market for imported fish and also has the most stringent regulations. Import regulations are largely set at the European Commission level but individual countries may also impose their own regulations or establish bilateral agreements. The main legislation is Directive 91/493/EEC, which requires member countries and importers to have in place good hygiene practices and HACCP systems. Regulation No. 466/2001 sets maximum limits for heavy metals in several species of fish and Regulation No. 2065/2001 imposes labelling requirements for wild-caught fish and aquaculture. Other regulations detail required hygiene practices for food products in general, including fish (Ponte, 2007). Since 1998, the European Commission has established a list of countries eligible to export to the European Union, and can suspend countries from the list if they are considered not to be adhering to European Union regulations. According to Decision 2009/951/EU, amending Annexes I and II to Decision 2006/766/EC, LDCs eligible to export to the European Union are Bangladesh, Benin, the Gambia, Madagascar, Mauritania, Mozambique, Senegal, Uganda, the United Republic of Tanzania and Yemen. Guinea is eligible to export only fish that has not undergone any preparation or processing operation other than heading, gutting, chilling or freezing; Myanmar is eligible only for wild-caught frozen fishery products; and Togo is eligible only for lobsters. Fish from some excluded countries find their way to the European Union through fishery partnership agreements that allow foreign vessels to fish in national waters. A significant number of coastal LDCs do not have permission to export to the European Union.

The most distinctive feature of the European Union regulatory structure is the certification of a competent authority in an exporting country. That is, to export fish to the European Union, an exporting country must have an agency – competent authority – that enforces regulations similar to those of the European Union. The competent authority must harmonize national regulatory laws with those of the European Union and ensure that operators at all stages of the value chain – from capture fishers and exporting farms to processors and distributors – produce fish under a system similar to that of the European Union. Even if a firm's processing operations meet international standards, the firm cannot export fish products to the European Union unless the country has a competent authority accredited by the European Union. Prior to establishing a competent authority, countries must have legislation that requires safety and hygiene that is at the same level as in European Union legislation (Doherty, 2010). In addition, imports are permitted only from factories or storage facilities inspected and validated by the competent authority as being at a level equivalent to those in the European Union. Additional requirements apply to aquaculture, limiting levels of heavy metals, pesticides, pollutants and medicines.

The European Union requires an HACCP approach to implementing regulations, of which a crucial component is traceability, that is the ability to identify the path of a suspect fishing product throughout the value chain so that the source of any problems can be quickly located and remedied. If problems are identified, the competent authority must promptly intervene to suspend the operations of the producers responsible. Recent European Union laws related to illegal, unreported and unregulated (IUU) fishing that prevent fish products obtained in uncertified fishing vessels from entering the international market set additional regulatory burdens (Josupeit, 2011). In 2013, the European Commission proposed a ban on fish from Belize, Cambodia and Guinea, and warned several other countries for failing to prevent IUU fishing (European Commission, 2013a). In 2016, Kiribati, Sierra Leone and Trinidad and Tobago were warned for failing to cooperate in the fight against IUU fishing (European Commission, 2016).

United States regulations

The United States instituted an HACCP system in 1997. Fish is subject to the Food and Drug Administration mandatory inspection programme. The National Oceanic and Atmospheric Administration of the Department of Commerce provides optional seafood quality and safety inspections. The regulatory system is more fragmented than that of the European Union, with numerous different federal and state government agencies involved (FAO, 2012b).

Japanese regulations

Health scandals in the early 2000s led to growing public concern and the Government of Japan amended the Food Sanitation Act and enacted the Food Safety Basic Law, which mandates a risk assessment approach, as in the United States and Europe. The revised Food Sanitation Law bans imported foods containing potentially dangerous residues. The Food Safety Commission, composed of scientific experts, oversees food testing.

A comparison of the three largest importing markets is shown in table 10, providing an overview of the quality and safety norms that Governments and private-sector participants in LDCs should establish in order to sell fish products to consumers in these markets, and illustrating the relative stringency of European Union requirements. LDC exporters that successfully overcome regulatory hurdles to market access in the European Union will generally also be able to meet the sanitary requirements of other major importers.

Table 10. Selected fishery product import guidelines: European Union, United States and Japan

	Importing country or region		
	European Union	United States	Japan
Can export to importing country or region without competent authority in exporter's country?	No	Yes	Yes
Role of exporting Government	European Union certifies competent authority in exporting country	Can voluntarily create agreement with the United States	Can voluntarily create agreement with Japan
Role of exporter	Apply HACCP to be certificated by own country's competent authority after physical inspections, documentation and final product checks	Have HACCP-based programme and present necessary documentation to Food and Drug Administration through importer	Have HACCP-based programme
Role of importing Government	a) Inspection system to ensure European Union requirements are met; mandatory b) Border inspection posts	a) Inspection system to ensure United States requirements are met; not mandatory b) Border inspection posts	a) Inspection system to ensure requirements of Japan are met; mandatory b) Border inspection posts
Role of importer	Receive cleared imports	Verify HACCP plans of exporters and present them to Food and Drug Administration inspectors; notify authority of all imports, under act on bioterrorism	Notify authority of all imports

Source: FAO, 2005.

Proliferation of private standards

The rise of global retailers and supermarket chains, with clients that demand high-quality and environmentally sustainable produce, has driven the demand for increasingly stringent private quality and safety standards, as well as eco-labels or certifications related to the sustainability of fish stocks. Private standards certifying the use of sustainable fishing methods apply to marine and inland wild fish, while quality and safety standards are more relevant to aquaculture. Rather than risk negative publicity, loss of consumer confidence and falling sales in the event of a food scare, large international companies have often adopted private certification systems to monitor the quality and safety standards of the fish marketed in their stores (FAO, 2011). Private systems are based on the HACCP system, as are mandatory public regimes, yet private standards tend to be more stringent due to the priority of safeguarding the reputation of firms. Private certification is often compulsory for suppliers of large retailers. Upscale chains seek to position themselves as socially responsible through the promotion of sustainable fishing and often rely on independent organizations to do so, such as the Marine Stewardship Council. The Council has an extensive private system of fishery certification, and provides two types of standards, namely sustainable fishing and seafood traceability. Many large retailers refer to Council certification in publicity and documentation. Numerous other organizations are active in eco-labelling.

The emergence of private standards and certification has added to the regulatory burden faced by processors seeking to export fish products to developed markets. The dominant market presence of large food firms in the United States and the European Union means fish exporters are obliged to comply with these standards to sell fish products to a sizeable share of consumers in the two largest importing regions. Private standards cover approximately 70 per cent of all retail trade in fishery products, and supermarket chains are responsible for more than 80 per cent of fish sales in some European countries (FAO, 2011). Retailers often develop relationships with large suppliers, as the latter operate on a scale that guarantees a steady supply of fish. Supermarkets prefer to buy products with specified sizes and varieties, yet fish from artisanal and small-scale fishers cannot be easily standardized. Adherence to private standards is thus more relevant to suppliers in professional aquaculture – where it is easier to produce to specifications – and industrial fisheries (Josupeit, 2011).

Effects of standards on least developed country fish exporters

Public regulations are a more pressing issue for LDC exporters of fish than private standards. Few LDCs can meet stringent private standards and, with regard to exports destined to other developing countries or auction houses and wholesalers in developed countries, standards are less stringent, although prices are lower. In addition, LDCs primarily export minimally processed fish products, and private standards are mainly applied to processed products such as frozen and ready-to-eat items imported by retailers for their own labels and other brands (FAO, 2011). European Union standards are of particular importance to LDC fish exporters due to the dominant role of the European Union as a market for LDC fish products and the greater stringency of standards. These standards pose challenges with regard to set-up and continuing costs for both public and private sectors in LDCs (Doherty, 2010), as follows:

(a) Public-sector challenges. There are high set-up costs in establishing a competent authority to meet European Union regulations. LDCs generally have lower levels of public resources devoted to health and safety and lower expectations with regard to protection from food hazards. LDC authorities are less likely to be knowledgeable about HACCP systems, laws may be outdated and government officials may have less ability to implement them. Public infrastructure and services are likely to be below European Union standards, including laboratories with outdated equipment and inadequately trained staff; inadequate cold-storage facilities; low levels of monitoring and reporting of breakdowns; and landing sites that may be lacking sanitary facilities for those handling the fish and for the fish itself, as well as access to clean water, freezers and roads that permit access to trucks.

(b) Private-sector challenges. Substantial investments by processors are often required to meet HACCP system requirements including, for example, hiring foreign consultants to advise on upgrades. Small-scale producers are particularly impacted by traceability requirements, and cold storage may be a problem for private firms, including cold rooms, freezers and ice machines. Okello (2011) detailed some of the steps Kenya (a non-LDC developing country) took at landing sites to obtain European Union certification, namely to establish potable water, washable tables, cold-storage facilities, toilets and a perimeter fence, as well as tin roofs, walls and cement floors for storage areas.

Standards are costly to meet and can constitute barriers to exporting, yet can also serve as catalysts to promote the upgrading of fishing infrastructure and technology in developing countries (Anders and Caswell, 2009). Many requirements for certification are also supply-side constraints to boosting productivity and efficiency. For example, in Bangladesh and Uganda, the need to overcome import bans by the European Union galvanized public and private stakeholders in the fishing industry to work together and make progress on longstanding impediments (see chapters 4 and 9).

The benefits of certification include greater security of access to existing markets, access to new markets, diversification into higher value added products, price premiums for higher quality products and fewer losses due to spoilage. Moreover, certification by public and private agencies can provide an opportunity for dialogue with and assistance from foreign Governments and non-governmental organizations in improving the fishing value chain. For example, in 2007–2008, a Marine Stewardship Council pre-assessment of Lake Victoria Nile perch fishing in Kenya, Uganda and the United Republic of Tanzania played an important role in the development of the Fisheries Management Plan for Lake Victoria 2009–2014. In addition, the non-profit association Naturland collaborated with the German Agency for Technical Cooperation, a Netherlands importer, a processing firm in the United Republic of Tanzania and 350 small-scale fishers on a project entitled “Eco-labelling of Nile Perch from Bukoba”, in the United Republic of Tanzania (FAO, 2011).

Efforts at both national and international levels are required for LDCs to upgrade fishing industries. At the local level, the supply-side constraints associated with poor administration and lack of infrastructure should be addressed (see chapter 4). At the international level, harmonization of the multiplicity of public and private standards is of particular importance to LDCs, given limited capacities. WTO could explore modifications to the Agreement on the Application of Sanitary and Phytosanitary Measures and Agreement on Technical Barriers to Trade, keeping developed country Governments from adopting standards unsupported by scientific evidence and formulating guidelines for the implementation and duration of suspensions of market access that balance the legitimate concerns about health in developed countries with the onerous effects of lengthy bans and costly procedures on LDC exporters (Doherty, 2010).

Quantifying effects of developed country standards on least developed country exporters

Some studies have examined the effects of developed country standards on LDCs. Nimenya et al. (2012) computed the tariff-equivalent price wedge of quality standards for frozen fish fillet exports from East Africa, namely Kenya, Uganda and the United Republic of Tanzania, and found that quality standards imposed barriers that were often equivalent to tariffs of 100 per cent or more, with the tariff equivalent particularly high at the time of European Union import bans in the late 1990s, and still above 50 per cent in the mid-2000s. Anders and Caswell (2009) used a gravity equation to estimate losses of fishery exports following the introduction of the HACCP system in the United States, finding that, with other determinants controlled for, the system was associated with a significant decline in fish exports. Moreover, the negative effect on fish exports was concentrated on smaller and poorer exporters, that is LDCs, while developed country exporters gained. These studies are consistent with the hypothesis that quality standards pose barriers to LDC fish exporters.

Erosion of tariff preferences and competition from other developing countries

The growing fish exports of non-LDC developing countries provide the greatest competitors to LDC fish exporters. Governments in developing countries such as China, Thailand and Viet Nam that have nurtured high-quality processing facilities and good public and private management practices have helped the countries become some of the leading global exporters. As developed country consumers purchase more fish from retail markets – mostly processed or frozen items – developing countries that have a combination of relatively abundant low-cost labour, established value added processing facilities and strong quality and safety controls will most likely deepen their dominance in the international trade in fishery products (FAO, 2011).

In addition, since retailers prefer streamlined supply chains and have started to buy fish products directly from aquaculture producers, additional business may be directed towards countries where quality and safety controls are already in place. For example, the French company Carrefour – currently the world's second largest retailer – now sources its shrimp directly from farmers in Thailand (FAO, 2011).

LDCs benefit from preferential access to developed country markets, with exemptions from tariffs on processed fish products. The European Union has traditionally allowed duty-free access to the African, Caribbean and Pacific Group of States, and most African LDCs can export duty-free to the United States under the African Growth and Opportunity Act. The European Union has replaced the unilateral partnership agreement with the African, Caribbean and Pacific Group of States signed in Cotonou in 2000 with economic partnership agreements. Multilateral or bilateral negotiations that lower import duties on non-LDC developing countries erode the value of preferences already in place for LDCs, and thus tend to be opposed by LDCs (Doherty, 2010).

However, several factors are propitious to the further growth of LDC fishery exports. Some major developing country exporters are encountering limits to growth as they have excessively or fully exploited nearby stocks of fish. For example, in China, overfishing in the Yangtze River has led to a drastic decline in fish stocks and sparked discussion over whether to implement a 10-year ban on fishing in the river (Straits Times, 2013). In addition, if LDCs can attract foreign investment in aquaculture, enabling retailers to monitor both the harvesting and processing of fish, LDCs could become more competitive with other developing countries. Finally, LDCs that have an established artisanal fishing sector, such as Bangladesh and Senegal, may be able to leverage their fishing traditions, as developing countries such as China that both harvest and process fish may increasingly specialize in processing in order to stabilize fish stocks.

Chapter 3

Supply-side constraints

Stringent quality and safety norms limit access to major importing markets for many LDC fish exporters, given poor processing facilities and procurement methods and a lack of testing and certification of products throughout the value chain. Related high costs reflect general limitations in the business environment in LDCs, as well as sector-specific problems. The combination of poor human capital, deficient infrastructure, limited access to finance and weak administrative capacities restricts LDC capabilities in developing industrial standard fishery sectors. Such supply-side barriers prevent both coordination between actors along the value chain and the development of competent supply chains that can compete with those in leading exporting countries. Moreover, the prevalence of artisanal fisheries in LDCs means that operations are difficult to monitor and regulate, and are less likely to adhere to international standards. The substantial share of unregistered fishers in artisanal fisheries also often leads to violations of regulations on IUU fishing. Operations that register with authorities are often unable to attain a scale at which they can adopt internationally accepted best practices at acceptable costs, due to the high fixed costs involved. Other problems include unhygienic practices, a lack of ancillary support services, high input costs and a lack of physical infrastructure. For example, in Indonesia (a non-LDC developing country), artisanal fishers report the need for improved packaging and lower fuel and finance costs in order to learn and adapt new skills and technology, and firms report poor quality logistics infrastructure as an important cost driver (Lord et al., 2010). Such problems are generally more acute in LDCs.

Deficient transportation and storage

Inefficient transportation is a major constraint to fishery exports. Distance is the greatest determinant of transportation costs; efficient and cheap transport is crucial for exporters. The lack of paved roads in LDCs – on aggregate, 20.8 per cent of roads are paved, compared with 46.9 per cent in all developing countries – contributes to inconsistent delivery schedules and substantial fuel costs, even for transport over small distances (World Bank, 2017a). The lack of investment in and maintenance of roads is compounded by excessive bureaucracy at customs and border checkpoints, resulting in costs and delays for LDC fish exporters (Biggs, 2011). Exporters in sub-Saharan Africa are particularly disadvantaged because their internal transport costs – transporting exports from production and processing areas to ports of departure – are often greater than the costs of transport between countries. Equally important, the lack of access to cold-storage facilities at landing areas in LDCs severely limits the ability of artisanal fishers to participate in distribution chains that supply to developed countries. The lack of refrigeration means that LDCs cannot participate in the rising share of frozen and processed fish exports in world trade. Traditional processing and preservation techniques employed by artisanal fishers in the absence of refrigeration – such as the smoking of fish using kilns with firewood, charcoal or gas as sources of fuel among fishing communities in sub-Saharan Africa – can increase the concentration of harmful chemicals to limits above those specified by international regulations (Akande et al., 2011).

High electricity costs

Intermittent electricity supply and the costs of operating back-up generators in the event of power shortages make up a significant share of operating costs for small and medium-sized firms in LDCs. This restricts the number of fish processing businesses to a few large oligopolistic firms in the industrial sector. Moreover, frequent outages add friction to the supply chain – making processing operations less efficient – and the cost of running generators is generally much higher than of using electricity from the grid. In sub-Saharan Africa, the cost of operating generators can be up to three to five times greater than obtaining electricity from national distribution networks (Biggs, 2007). In 2013, on average across all LDCs, 21 per cent of electricity generated was lost in transmission and distribution; transmission and distribution losses in Cambodia, for example, accounted for 28 per cent of the total output generated, while the corresponding share for most leading non-LDC exporters was around 6 per cent (World Bank, 2017a).

Lack of access to finance

Processing firms must operate on a large scale in order to lower costs of compliance with developed country standards. However, access to credit is limited for small and medium-sized fishery enterprises in LDCs because of underdeveloped financial systems, inhibiting investment to expand and upgrade facilities (see table 11). Financial markets in most LDCs are characterized by high real interest rates and high collateral requirements, and banks are reluctant to lend to agribusiness ventures (Biggs, 2011).

Table 11. Domestic credit to the private sector, 2015

(Percentage of gross domestic product)

Five selected least developed countries	Bangladesh	43.9
	Cambodia	63.1
	Comoros	27.0
	Sierra Leone	5.2
	Uganda	14.6
Top five exporters	China	152.6
	Norway	138.4
	United States	189.0
	Viet Nam	111.9
	India	52.2

Source: World Bank, 2017a.

Financial systems are particularly inaccessible to low-income artisanal fishers, who often do not have sufficient registered assets to provide suitable collateral to banks. Working capital is difficult to obtain, and fishers often have to borrow from customers at high cost. For example, fishers operating on Lake Victoria often enter into advance payment arrangements with traders (Masette, 2011). The resultant pressure on fishers to meet contracted fish deliveries and repay traders can compromise catch quality. More generally, prepayments create a debt and poverty trap for fishers.

Resource management and data collection

Without accurate information on the number of fishers and incomes, as well as trends and data on current fish stocks, Governments in LDCs find it difficult to evaluate the impact of different production and export upgrading strategies (Josupeit, 2011). Wild fish are a common resource and sustainable catch levels can only be secured if Governments regulate the intensity of fishing activities. The relevant authorities in LDCs should collect data on the stocks of different species in order to monitor the impact of their policies. For example, the recognition by the Government of the importance of statistics on the fishery and aquaculture sector has been a major factor in China's rise as a leading global fish exporter. Monthly, mid-year and annual data are collected under multiple statistical indicators, and special institutes are commissioned to use the latest technology to verify the numbers of different species (FAO, 2012b). Regulators also collect data on wholesale market prices and both aquaculture and capture production by species, fishing area, fishing vessel, fishing gear and farming method, among other indicators. Such data collection systems would allow LDC Governments to evaluate their fishery resources and target policies accordingly.

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

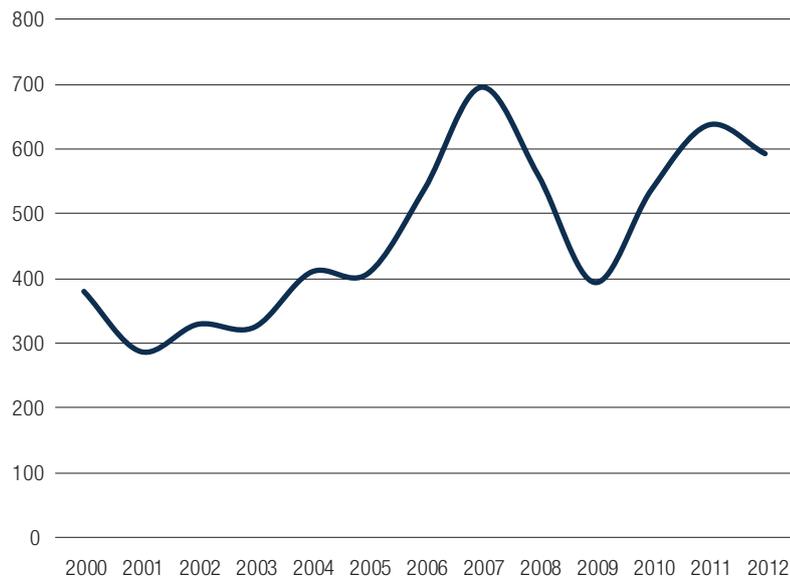
	Water area (Hectares)	Total production (Tons)	Share of total catch (Percentage)	Catch/area (Kg/hectare)
Inland fishery	4 699 387	2 821 266	82.7	600.3
Capture	3 916 828	961 458	28.0	1 126.0
Aquaculture:	782 559	1 859 808	54.5	2 376.6
Marine fishery	..	588 988	17.3	..
Industrial (trawler)	..	73 030	2.1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

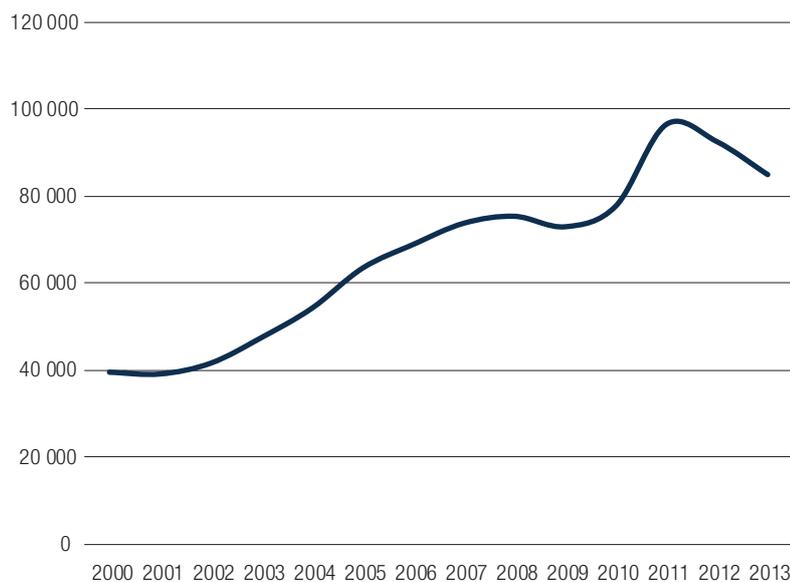
(Millions of dollars)



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.

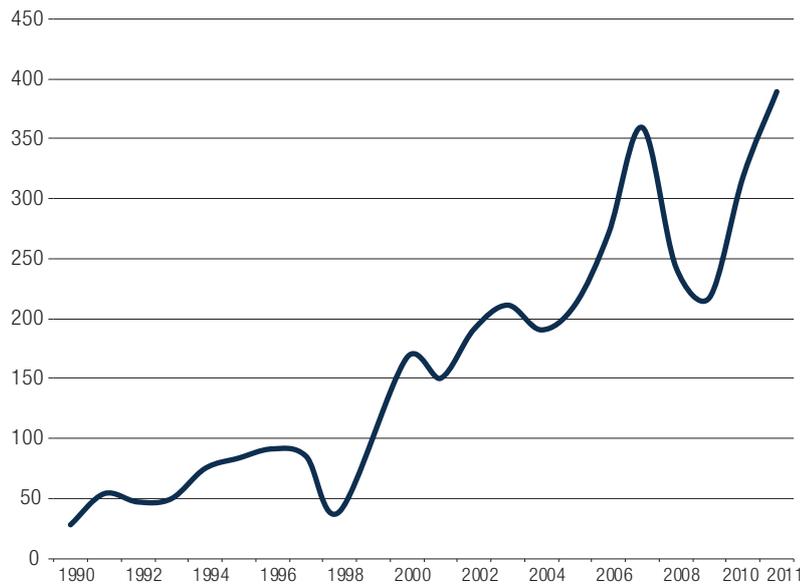
In 1996, FAO initiated a project to assist in preparing a quality and safety control programme for shrimp and fish processing plants based on the HACCP approach adopted by major importers. FAO provided assistance to stakeholders from the public and private sectors, including advising the Government on 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 nitrofurans 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)

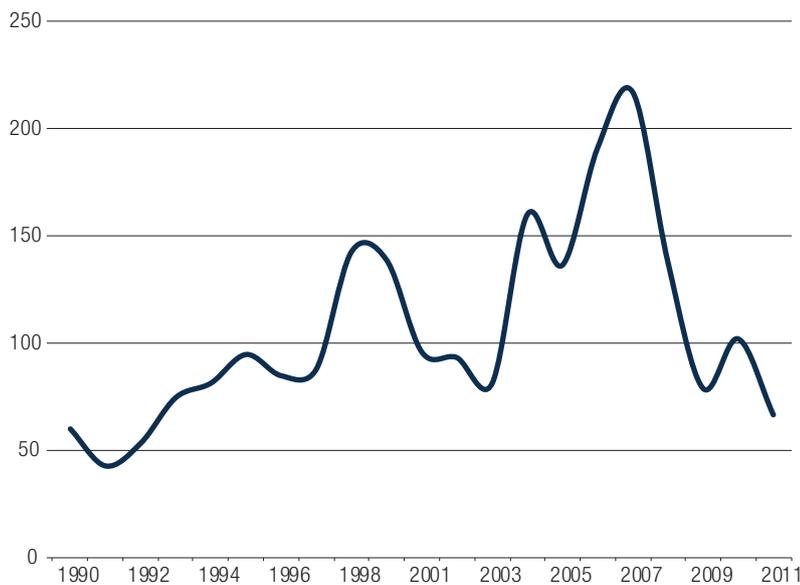


Source: COMTRADE, 2017.

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).

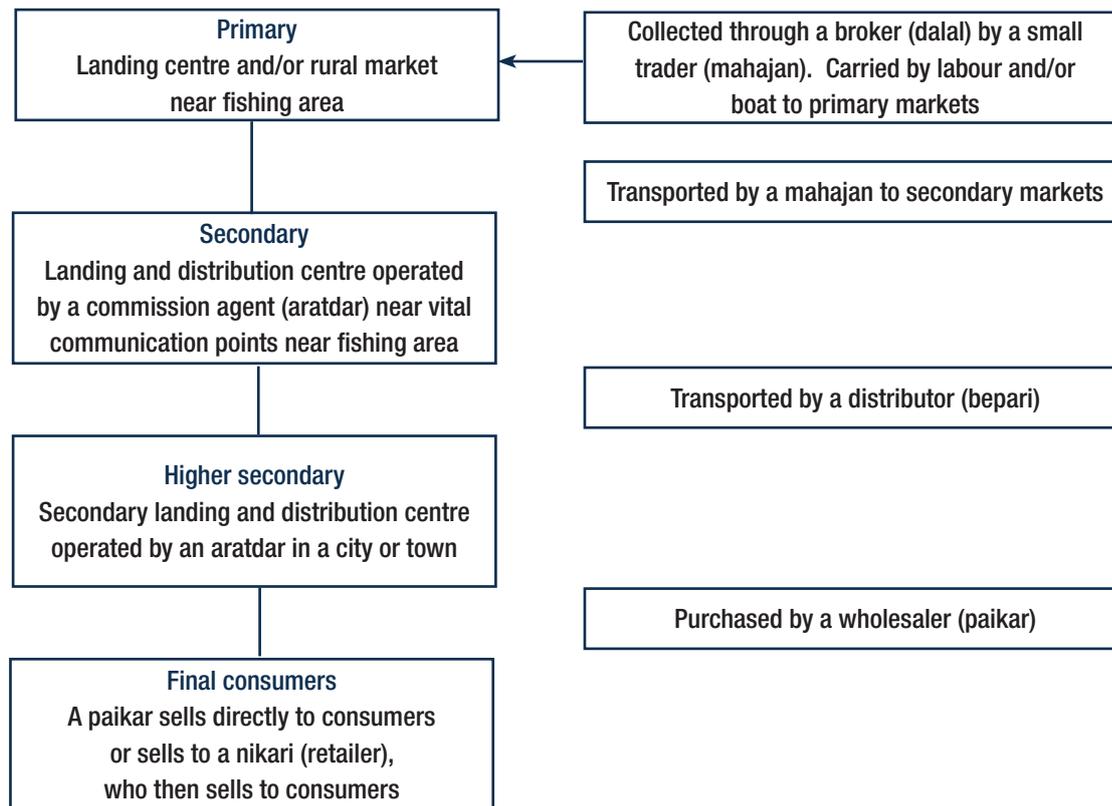
Moreover, government surveillance of fishing practices should be broader in scope; artisanal fisheries are unregulated, although they account for 90 per cent of marine capture and the majority of aquaculture catches. The modernization of the artisanal sector in the last two decades – there are now as 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.

Chapter 5

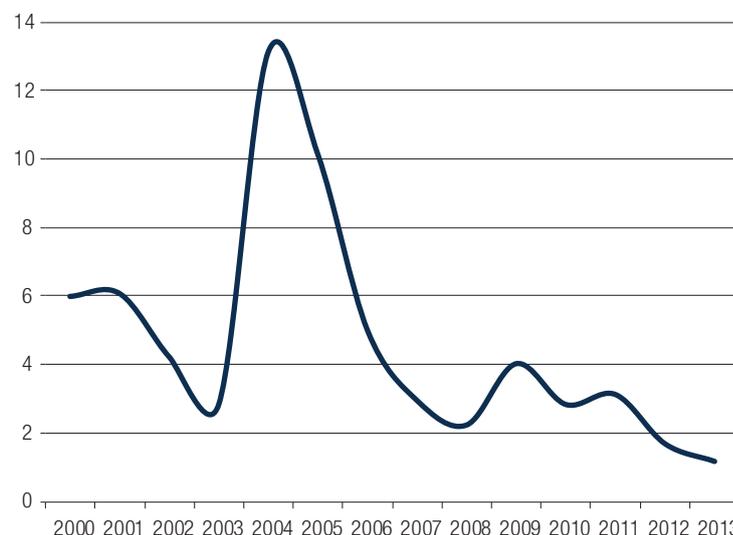
Case study: Cambodia

Overview

The fishery sector plays a crucial role in the economy of Cambodia. Capture and aquaculture fisheries produce around 750,000 tons of fish annually (FAO, 2017a). Fishery production – not including processing and other related activities – makes up around 10 per cent of overall GDP. The fishery sector provides full-time, part-time and seasonal employment for up to 6 million people – approximately 40 per cent of the population – in capture and subsequent value added services (Sothorn et al., 2011). In addition to being a major driver of livelihoods in a country where 80 per cent of the population lives in rural areas (World Bank, 2017a), the fishery sector is vital for food security: on average, fish provide around 80 per cent of daily national animal protein consumption. However, fishery exports are a small proportion of production, and policy changes by the Government have caused further decreases in exports. Aside from a temporary increase in the early 2000s attributable to the break-up of Kampuchea Fish Import and Export Company, a state enterprise that had sole distribution rights for all fish trade into and out of Cambodia, the recorded value of exports declined in 2000–2013, as shown in figure 6.

Figure 6. Cambodia: Value of fishery exports, 2000–2013

(Millions of dollars)



Source: COMTRADE, 2017.

Although there are discrepancies between data released by different government bodies on the volume and value of annual fishery exports, such exports are not a substantial share of international trade in fish products. In 2011, estimates by the Fisheries Administration showed the volume and value of fishery exports to be around 30,000 tons and \$60 million, respectively (The Phnom Penh Post, 2012; Xinhua, 2012). This is above estimates for that year by the Ministry of Commerce, which showed the volume and value of fish exports to be around 1,600 tons and \$3.5 million, respectively, as well as the value of \$3.13 million in COMTRADE (2017). In 2013, the value of fish product exports was \$1.17 million (COMTRADE, 2017). However, the general downward trend in fish exports is clear. The Fisheries Administration estimates are generally about 10 times greater – possible a more accurate representation of actual trade given the large amount of unrecorded activity – than those of the Ministry of Commerce. Officials from both departments suggest that policies introduced in 2010 diverted exports towards the domestic market in order to meet rising local demand (The Phnom Penh Post, 2012). Fish exports from Thailand and Viet Nam – wealthier, more populous neighbours with longer coastlines and established processing centres – have significantly eclipsed those of Cambodia. The low volume of exports and a lack of government support for industrial fisheries help explain the volatile trade flows to Cambodia's main export partners, as shown in table 14.

Table 14. Cambodia: Fishery export flows by country of destination, 2000–2013

(Dollars)

Year	Australia	China	Japan	Thailand	United States	Viet Nam
2000	89 891	1 161 183	81 089	807 329	166 153	211 743
2001	322 817	1 839 068	13 335	440 469	36 777	26 643
2002	242 392	1 299 124	18 291	246 397	71 124	54 308
2003	188 235	658 674	493	201 864	222 228	116 678
2004	160 064	393 779	528	460 043	11 214 506	53 632
2005	82 032	265 023	20	717 412	8 343 792	3 357
2006	40 323	428 815	0	733 424	3 360 282	41 596
2007	0	351 587	10 900	462 627	1 425 315	0
2008	0	314 874	30 080	136 967	1 242 374	0
2009	8 350	280 669	0	102 488	3 075 269	43 064
2010	17 884	510 353	541 117	0	745 364	81 324
2011	10 480	692 510	1 375 768	20 620	624 512	64 917
2012	0	619 867	593 321	51 281	552	177 933
2013	0	507 098	0	106 484	0	359 466

Source: COMTRADE, 2017.

Importance of inland fisheries

Inland freshwater capture fisheries contribute the majority of Cambodia's fish supply, accounting for 528,000 tons of the 639,468 tons obtained in 2013, with marine fish captures of 111,468 tons and an aquaculture harvest of 90,000 tons (FAO, 2017a). Inland fisheries are highly productive due to the annual flooding of the Tonlé Sap or Great Lake – the largest freshwater lake in Southeast Asia – which, during the rainy season, expands to 3–5 times its normal size, temporarily occupying approximately 44 per cent of the country's total area (Asian Development Bank, 2005). This is due to a unique hydrological cycle whereby the rise of water levels in the Mekong River reverses the flow of the Tonlé Sap River, draining it into the lake and creating one of the world's most productive capture fishery areas. Each year, the Tonlé Sap contributes to approximately 50 per cent of Cambodia's capture production, with the value of catches reaching \$250 million–\$500 million as it passes through the value chain (Asian Development Bank, 2005; Mensher, 2006). The lake also accounts for about a quarter of fishery exports from Cambodia, primarily to Thailand (Asian Development Bank, 2005) and many fishers cross the porous amphibious borders to sell their products unofficially to Thailand traders. The wetlands and flooded forests are a fertile spawning habitat for diverse species, including at least 200 species of fish, such as the endangered giant catfish (Asian Development Bank, 2005; Mensher, 2006). Cambodia supplies a large quantity of freshwater fish species to markets in Thailand and Viet Nam, where processors add value and prepare fish for re-export to major importing countries (Rab et al., 2006).

Export constraints

In 2013, the production volume – 528,000 tons per year – made Cambodia's inland fisheries the fifth largest in the world after those of China, Myanmar, India and Bangladesh (FAO, 2017a). However, since 2000, this natural endowment has increasingly been threatened by the overexploitation of fish stocks. Overfishing has been driven by a combination of systemic factors that have resulted in the gradual environmental degradation of the Tonlé Sap basin.

Until the government-initiated expansion of fishing communes starting in 2000, access to the Tonlé Sap was governed by the Fisheries Management and Administration Law, 1987, which divided the majority of common resources into publicly auctioned lots and an open-access system for the benefit of rural communities. The Government sought to eliminate the problem of the commons with the establishment of private lots, yet lot owners frequently sub-let access to an excessive number of fishers and, where there was common access, competition among small-scale fishers to stake out the best areas resulted in the rise of housing communities on stilts. The subsequent soil erosion was worsened by the destructive harvest methods employed by the high number of IUU fishers operating in the industry. The increasing use of the samra method – using tree branches placed in the water to concentrate and harvest fish using seine nets – resulted in the loss of habitats for many migratory fish species that use the roots of trees as spawning territory during the annual flooding of the lake (Mensher, 2006).

Overfishing and the nutrition requirements of Cambodia's domestic population inhibit Cambodia's export potential (Nam, 2008). In addition, inadequate storage, handling and packaging facilities at landing sites and a lack of knowledge of modern processing methods and international hygiene standards among the large number of small-scale fishers has hampered the transition from artisanal to industrial fishing. Moreover, until the early 2000s, all exports had to be sold to the Kampuchea Fish Import and Export Company, limiting local operations from accessing lucrative export markets (Rab et al., 2006).

Cambodia currently does not have access to the European Union market because of non-compliance with HACCP systems, but showed considerable export potential in 2003–2005 when the Kampuchea monopoly was first eased to incentivize private-sector participation in fish exports. An almost 30 per cent rise in fish exports was recorded during this period (Van der Meer and Ignacio, 2007), as shown in figure 6, partially because a substantial share of previously unrecorded trade was brought into the purview of the official system. However, in 2006, Cambodia only had four processing factories with export permits, of which one was owned and operated by Kampuchea, one was owned by a conglomerate based in Hong Kong (China), and two were owned by a Cambodian firm (Rab et al., 2006). Available information on the industrial sector suggests that the landscape has not changed since 2005. In 2013, the chair of the conglomerate, Sun Wah, cited a longstanding 10 per cent export tax on seafood as a major obstacle to the growth of a modern processing and export sector in Cambodia (The Cambodia Daily, 2013). Sun Wah has recently scaled back its presence in Cambodia by reducing factory staff from more than several hundred to less than 100 and operating seasonally due to the limited supply of high quality catches (The Cambodia Daily, 2013).

Changes in government policies create opportunities

Over the last decade, the Ministry of Agriculture, Forestry and Fisheries has encouraged the development of sustainable fishing practices and promoted cooperation rather than competition in the national fishery industry. In 2011, the Prime Minister announced the suspension of all commercial lots on the Tonlé Sap, in favour of community fisheries gradually established by the Government over the last decade (World Fish Centre and European Initiative on Agriculture Research for Development, 2013). The promulgation of a new fishery law combined with the establishment of the Strategic Planning Framework for Fisheries 2010–2019 also strengthened the regulatory regime governing the conservation of Cambodia's fisheries (Sothorn et al., 2011). The Strategic Planning Framework outlined the aim of the Government to develop the aquaculture sector to boost both food security and the volume of exports.

After the Government took steps to divert production to the domestic market, exports fell from \$3.13 million in 2011 to \$1.17 million in 2013 (COMTRADE, 2017; The Phnom Penh Post, 2012). The Director General of the Fisheries Administration expects fishery exports from Cambodia to be worth \$1 billion by 2019 (The Phnom Penh Post, 2011).

A rapidly growing aquaculture sector and increased focus on sustainable fishing practices may help authorities build capacity to implement HACCP-compliant systems in the long term. Moreover, the rapid growth of aquaculture in Thailand and Viet Nam, which fuelled their rise as leading global exporters, has levelled over the last few years, providing an opening for exporters in Cambodia to gain market share in regional trade for fish products (World Fish Centre, 2011). The potential opportunities through the Economic Community of the Association of Southeast Asian Nations (ASEAN)³ provide a further basis for improved intraregional export performance. However, without collaboration with the private sector – both industrial and artisanal – to develop industry-wide capacity to meet international requirements in the quality and handling of fish, aims or efforts to boost exports to the most lucrative foreign markets may be hindered. In 2013, the European Union proposed a ban on fish imports from Cambodia in response to IUU fishing by vessels bearing the flag of Cambodia (Xinhua, 2013). While the ban would not impact exports from Cambodia, as national exporters do not sell their products to the European Union, the dent in the national reputation and worsening relations with the European Union might hamper opportunities for exporters to access its markets.

Assessment and lessons

The fishing industry made progress following institutional reforms begun in 2000, particularly in the break-up of the Kampuchea monopoly and the establishment of community-based initiatives to control overfishing and environmental degradation. Despite the significance of the sector – the fish industry provides employment for 40 per cent of the population – Cambodia's fish exports are a relatively small proportion of overall production. In the global market, Cambodia's fisheries are behind those of industries in neighbouring Thailand and Viet Nam. The country's insufficient institutional climate and lack of processing capacity mean that its mainly artisanal fishers supply processing centres in Thailand and Viet Nam, limiting domestic value added. The Government has strengthened its regulatory mechanisms, yet may allow the private sector to develop a modern processing sector, and make further commitments to building institutional and industrial capacity to meet international quality and safety standards.

³ Member States are Brunei Darussalam, Cambodia, Indonesia, the Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Viet Nam.

Chapter 6

Case study: Comoros

Overview

The Comoros is an island nation in the Indian Ocean, off the coast of East Africa, with a total population of about 734,900 in 2013 (World Bank, 2017a). Following independence in 1975, the country experienced a number of changes of Government; political stability has improved since 2009, enhancing prospects for economic development. As in many African LDCs, the population is young, and creating remunerative employment opportunities for new entrants to the labour force is a major challenge. Fishing is the second most important sector of the economy after agriculture, accounting in 2013 for 10 per cent of employment and 8 per cent of GDP (Cofrepeche et al., 2013). The share of the fishing sector in GDP decreased from 15 per cent in 2010 to 8 per cent in 2013, indicating the informal and subsistence nature of the sector and its vulnerability to shocks. The poverty reduction and growth strategy of the Government for 2010–2014 prioritized the sector (International Monetary Fund, 2010).

Artisanal and industrial fishing at present operate entirely separately, to a greater extent even than in most LDCs. All domestic fishing operations are artisanal, and industrial fishing is fully conducted by distant water fishing nations. Foreign vessels, mainly purse seine vessels from France and Spain, fish offshore for several varieties of tuna and swordfish. Fish caught by distant water fishing nations are not landed in the Comoros due to the lack of infrastructure and processing facilities, and there are no exports from domestic fishers. The main local benefit from distant water fishing nations operations comes from the fees that foreign entities pay to the Comoros. Local fishers operate in a circumscribed area of 900 km² on the continental shelf, for a large variety of demersal and pelagic species, of which the most important are mackerel, anchovies, white marlin and cuttlefish.

Tuna fishing

The Comoros is situated on the migration path of tuna and swordfish, the main targets of industrial fishing off the coast of East Africa. The Indian Ocean Tuna Commission has found that tuna species are not overfished, although swordfish show signs of overexploitation.

The Comoros has signed agreements on fishing with the European Union since 1988, renewed every three years, specifying the numbers of European boats allowed to fish off the coast and the maximum tonnage of their capture, in exchange for an annual fee. The European Union provides €615,000 annually for fishing rights and another €161,000 in other fees and payments, for a total of close to €800,000. In comparison with development assistance of nearly €10 million from the European Union and other sources, these fees and payments are relatively small. Given estimated annual captures of 3,582 tons of tuna, this amounts to €217 per ton, or about 15 per cent of the wholesale price of tuna estimated at €1,400 per ton. European fishing companies contribute €45 per ton and the European Union the remaining €172. Significantly, €300,000 is earmarked for the development of domestic fishing, thus providing a vital source of funding for modernization of the industry, and the agreements include technical assistance in planning for and oversight of the sector, monitoring fishing stocks and implementing infrastructure investments (Cofrepeche et al., 2013).

The European Union, Indian Ocean Tuna Commission and regional governments work together to ensure that foreign fleets follow sustainable fishing practices. The European Union may have disproportionate power relative to the Comoros in negotiating agreements and such agreements may have failed to develop the domestic industry. They have, however, provided a tool for transforming the conditions of fishing in the Comoros. Moreover, the agreements are transparent, with provisions spelled out in detail. The World Bank (2012) noted the transparency of European Union fishing accords relative to those of other countries.

A review of the agreements suggests that the funding provided to the Comoros could perhaps be tied to the price of fish, which would be to the advantage of the Comoros if prices continue to rise. In addition, the review suggests a number of areas for reinforced technical assistance, particularly for improving domestic capacity for the management and surveillance of fishing, including combating illegal fishing. Overall, the agreement with the European Union appears fair and transparent, serving the mutual interest of the Government and economy of the Comoros and its fishing industry, and the European Union has suggested lengthening the current three-year duration of the agreements (Cofrepeche et al., 2013).

Since 2005, tuna fishing off the coast of East Africa has been disrupted by piracy. The number of purse seine vessels operating in the region dropped from 55 in 2001 to 35 in 2011. The routes of these boats have been modified to avoid the zones in which pirates are most active. The number of longline vessels operating in the region has dropped more sharply, by 50 per cent since 2007, as they are more vulnerable to piracy than purse seine vessels. Currently, no longline vessels operate off the Comoros, although the European Union agreement allows them to do so. Consequently, total captures of fish in the western Indian Ocean have dropped considerably, although to varying extents in different areas. The Comoros has been less affected than most other countries. The positive aspect of this reduction in tuna fishing is that fish stocks are at healthy levels (Cofrepeche et al., 2013). Recently, piracy has declined due to the use of armed guards and alternative routes.

In contrast to other countries in the region, tuna fishing creates no employment for nationals of the Comoros, as no fish caught in its waters are landed in the Comoros. European vessels either bring their catches directly to Europe or land for processing in neighbouring countries with more developed infrastructure and handling facilities, mainly in Kenya, Madagascar, Mauritius and Seychelles. Due to the unavailability of experienced personnel, there are no observers from the Comoros on board European vessels, contrary to normal European Union procedures and the agreement with the Comoros, and nationals from other developing countries with greater experience are substituted. In addition, the need for armed guards to defend against piracy reduces room for local observers (Cofrepeche et al., 2013).

Artisanal fishing

Domestic fishing is largely an informal, subsistence activity but has partially transitioned from traditional to artisanal (World Bank, 2006). The 8,000 fishers represent 10 per cent of the population (Cofrepeche et al., 2013). Most fishers still use traditional wooden canoes, but over the last 20 years, small motorized fiberglass boats have been introduced into artisanal fishing, and account for about one third of boats. Traditional canoes stay close to the coast, where fishing resources are more limited. The availability of motorized boats along with fish aggregating devices has enabled artisanal fishers to travel further offshore and obtain some varieties of tuna, substantially increasing catches. A mostly foreign-owned semi-industrial fishing operation registered in the Comoros travels further, but mostly lands its catch in other countries. Stronger and more transparent governance of fisheries could enable smaller, marginalized fisheries communities to capture greater value from the fisheries resources present in Comoros (World Bank, 2014). Lack of access to finance for investment in boats is also a constraint to upgrading the fishing fleet from canoes to fiberglass and increasing the sizes of boats, to travel further and remain at sea for longer, and levels of human resources in both the public and private sectors are low.

Domestic fish processing

Little processing occurs on land in the Comoros, including in artisanal fishing, due to the lack of landing and cold-chain facilities and know-how. Most fish caught by artisanal fishers are sold directly to the local population and, as noted, foreign vessels do not land fish in the Comoros. However, a tuna-processing facility is under construction, under a mixed public-private venture by Qatar and Sri Lanka. The Government has envisioned several other steps to promote additional local processing, including the construction of larger boats, a quality-control laboratory and a new fishing school (Cofrepeche et al., 2013).

Institutional structure

The Comoros has a limited institutional structure overseeing fishing, and human and other resources are lacking in the Government. A fishing code was adopted in 2007, with assistance from FAO. There is no official legal framework regarding the exclusive economic zone. The situation is complicated due to the fact that the island of Mayotte continues to be administered by France, and that the Comoros exclusive economic zone overlaps with those of Madagascar, Mozambique, Seychelles and the United Republic of Tanzania (Cofrepeche et al., 2013). Legislation governing the operation of foreign vessels in waters off the Comoros allows for flexibility. The Department of Fishing of the Ministry of Agriculture, Fishing and the Environment is responsible for domestic policies on fishing.

In 2012, funding totalling about €10 million was received from several sources, including Japan, Qatar, the European Union, the International Fund for Agricultural Development and the World Bank (Cofrepeche et al., 2013).

Several intergovernmental agencies govern fishing in the western Indian Ocean, in particular the Indian Ocean Tuna Commission. Cooperation with other Governments in the region is improving. In 2012, the Governments of the Comoros and Seychelles announced an agreement on fishing (Seychelles Department of Foreign Affairs, 2012).

Assessment and lessons

Relative to other countries in the region, fishing in the Comoros is underdeveloped but has considerable potential for growth. The Comoros currently has no domestic processing and no exports, as domestic fishing is almost entirely artisanal and foreign vessels do not land their catches in the Comoros. This is gradually changing as the Comoros develops infrastructure and capabilities and foreign investment is made in domestic processing, such as the investment in tuna processing by Qatar and Sri Lanka. The Comoros lacks the hard and soft infrastructure required to compete in fishing, and policies on fishing are limited by a lack of information. To achieve the goal of becoming an exporter of fish, reforms are needed in the administration of fishing, along with increased investment in infrastructure. The Comoros is in competition with other countries in the region for processing facilities and should be cautious of prematurely promoting its domestic industry, but should continue to progressively upgrade its human and physical resources, with assistance from the European Union and other partners, while improving the domestic business climate more generally, especially the supply of electric power. If the Government and donors are able to invest in fishing-specific and generalized human capital and infrastructure, foreign and domestic investment should accelerate. Finally, although foreign boats have minimal direct impact on the Comoros and do not create jobs in the Comoros, the agreement with the European Union is important for the fishing industry in promoting modernization and sustainability.

Chapter 7

Case study: Mozambique

Overview

Mozambique, located on the east coast of Southern Africa, has a total population estimated at about 25.7 million in 2015 (see <http://www.ine.gov.mz/>). Mozambique was considered one of the fastest growing economies in the world in 2001–2010 (Benkenstein, 2013a), had an annual GDP growth in 2013 of an estimated 7.4 per cent, and is an LDC, with a GDP per capita of \$610 (World Bank, 2017a). The current GDP is estimated to be close to \$15.63 billion (World Bank, 2017a). Mozambique has about 2,700 km of coastline, one of the longest coastlines in Africa (Benkenstein, 2013a; Souto, 2014). Mozambique has 100,000km² of marine waters with an exclusive economic zone of 200 nautical miles and 13,000km² of inland waters (Transtec, 2013), and possesses abundant marine and freshwater fishery resources. The fishery sector contributes to about 3–4 per cent of GDP (Benkenstein, 2013a; Oceanic Développement, 2014) and about 850,000 families – around 20 per cent of the population – depend on fishing for part of their income, while a larger proportion relies on the fishery sector for subsistence, with the sector accounting for 50 per cent of total animal protein consumed nationally (Souto, 2014). In some instances, fish is the only accessible source of protein (Brugere and Maal, 2014). The fishery sector therefore plays “a crucial role in food security and contributes to the economies of rural areas, where the majority of Mozambicans live [68 per cent of the population (see <http://www.ine.gov.mz/>)] and where poverty and lack of access to resources remain significant challenges” (Benkenstein, 2013a).

Since the end of a period of civil war in 1992, the fishery sector – with a particular focus on small-scale fisheries – has been part of efforts by the Government aimed at enhancing socioeconomic development and poverty reduction objectives (Benkenstein, 2013a). The development of the fishery sector was one of the main pillars of the Government’s Poverty Reduction Action Plan 2011–2014, which aimed to achieve economic growth and reduce poverty and economic vulnerability. A further objective was to increase employment through the sector and associated value chains. Some of the issues the Government aimed to address were the improvement of market access by upgrading infrastructures such as fishing ports, landing sites, fish markets, laboratories and applied research facilities, as well as training and social facilities for fisher associations (Mozambique Ministry of Sea, Inland Waters and Fisheries, 2014). About 90 per cent of total fish production – more than 200,500 tons of annual catches – is provided by marine fisheries (Benkenstein, 2013a).

Artisanal fisheries, which provide income to about 280,000 people, contribute to 90 per cent of marine captures and account for 42 per cent of total value (Oceanic Développement, 2014). Artisanal fishing is the most important sector by volume and contribution to the economy; other segments include industrial and semi-industrial fishing, of which the latter comprises mainly small trawlers involved in domestic coastal shrimp fisheries. Semi-industrial fishing accounts for 2 per cent of annual marine catches and 6 per cent of total value (Souto, 2014). Produce is either sold in local markets or exported (Oceanic Développement, 2014). Industrial fishing includes large vessels flagged in Mozambique and other countries, mostly targeting crustaceans – coastal shrimp and deep-sea shrimp – usually processed at sea and for export, mainly to Japan and Europe. This latter segment accounts for 7 per cent of annual marine capture and 52 per cent of total value (Oceanic Développement, 2014). The majority of production is by capture – 99.68 per cent of total catches. Despite the country’s robust aquaculture potential and the Government’s efforts to promote the sector (Benkenstein, 2013a; Souto, 2014), it remains underdeveloped, with limited contributions. Total fish production by sector in 2013 is shown in table 15.

Table 15. Mozambique: Fish production by sector, 2013

	Catch (tons)	Share of total catch (percentage)
Capture	222 101	99.68
Commercial	26 046	11.68
Artisanal	196 055	88.00
Aquaculture	721	0.32
Industrial	207	0.09
Small-scale	514	0.23
Total	222 822	100.0

Source: Mozambique Ministry of Sea, Inland Waters and Fisheries, 2014.

The European Union is the largest market for fishery products from Mozambique (United States Agency for International Development, 2010), and Portugal and Spain are its principal trading partners; Portugal absorbed 30.41 per cent of the total value of fish exports in 2014 (COMTRADE, 2017). Shrimp and prawn are the main seafood exports, representing about 90 per cent of the total value of imports from Mozambique to the European Union (Oceanic Développement, 2014; United States Agency for International Development, 2010). The world trade value of Mozambique fishery exports was estimated at about \$60 million in 2014, and China has become its third major trading partner, contributing to slightly more than 11.64

per cent of the total value, about \$7 million, in 2014; the share of China has been growing at an average annual rate of 66.9 per cent since 2002 (COMTRADE, 2017). The top five importers of fish from Mozambique by value are shown in table 16, and the general trend of fishery exports by value is shown in figure 7.

Table 16. Mozambique: Value of fishery trade to major partners, 2014

(Dollars)

Portugal	18 214 480
Spain	13 750 810
China	6 971 370
South Africa	6 180 810
Zimbabwe	5 160 440

Source: COMTRADE, 2017.

Figure 7. Mozambique: Value of fishery exports, 1995–2013

(Millions of dollars)



Source: COMTRADE, 2017.

Note: Data unavailable for 1998.

In 2004–2013, fish exports by value dropped by almost 58 per cent. This fall was associated with negative impacts from the fuel and global financial crisis that exerted adverse impacts on the fishing industry of Mozambique. The rise in oil prices, which peaked in 2008, led more than half of the country's industrial fishing vessels to cease operations. In addition, the financial crisis induced a fall in international demand for fishery products, causing a decline in the trade volumes and prices of such products, especially shrimp; in 2000–2013, exports of shrimp and prawn, which constitute the main seafood exports of Mozambique, dropped by 38.59 per cent in volume and 56.86 per cent in value. Shortage of capital for private and public investment in the sector has also been associated with the decrease in fish production in and exports from Mozambique (United States Agency for International Development, 2010; World Bank, 2017a). Fishery export flows to the three major trade partners by value and share of total exports in 2000–2014 are shown in table 17.

Table 17. Mozambique: Fishery exports to major partners, 2000–2014

Year		China	Portugal	Spain	World
2000	Value (dollars)	..	26 757 212	37 450 743	100 663 642
	Share of total exports (percentage)		26.58	37.20	
2001	Value (dollars)	..	16 930 527	26 574 886	99 616 802
	Share of total exports (percentage)		17.00	26.68	
2002	Value (dollars)	14 924	33 682 036	54 987 589	119 953 512
	Share of total exports (percentage)	0.01	28.08	45.84	
2003	Value (dollars)	8 298	16 268 626	37 298 329	95 920 316
	Share of total exports (percentage)	0.01	16.96	38.88	
2004	Value (dollars)	19 183	33 375 294	36 901 619	100 410 253
	Share of total exports (percentage)	0.02	33.24	36.75 per cent	
2005	Value (dollars)	46 797	17 258 434	31 898 143	86 503 964
	Share of total exports (percentage)	0.05	19.95	36.87	

Year		China	Portugal	Spain	World
2006	Value (dollars)	111 561	22 326 688	42 638 470	96 626 699
	Share of total exports (percentage)	0.12	23.11	44.13	
2007	Value (dollars)	351 204	16 702 227	31 680 673	70 106 997
	Share of total exports (percentage)	0.50	23.82	45.19	
2008	Value (dollars)	175 278	17 726 981	38 197 904	75 689 750
	Share of total exports (percentage)	0.23	23.42	50.47 per cent	
2009	Value (dollars)	700 205	14 378 647	26 239 662	65 440 593
	Share of total exports (percentage)	1.07	21.97	40.10	
2010	Value (dollars)	234 724	11 187 815	24 062 981	56 646 093
	Share of total exports (percentage)	0.41	19.75	42.48	
2011	Value (dollars)	1 371 000	14 856 000	17 267 000	51 807 000
	Share of total exports (percentage)	2.65	28.68	33.33	
2012	Value (dollars)	4 100 410	4 510 215	5 103 115	25 786 670
	Share of total exports (percentage)	15.90	17.49	19.79	
2013	Value (dollars)	8 907 110	9 956 088	10 409 773	42 200 315
	Share of total exports (percentage)	21.11	23.59	24.67	
2014	Value (dollars)	6 971 370	18 214 480	13 750 810	59 888 890
	Share of total exports (percentage)	11.64	30.41	22.96	

Source: COMTRADE, 2017.

Small-scale fisheries and poverty reduction

The economy of Mozambique is fast growing, mainly owing to the exploitation of coal and gas reserves and an increase in tourism and manufacturing. However, the vast majority of the population is poor and depends on a rural economy, especially agriculture and fishery. Small-scale fisheries are crucial in contributing to food security, community livelihoods, employment, exports and overall socioeconomic development. Around 334,000 people rely directly or indirectly on small-scale fisheries, 280,000 of whom are fishers who provide support to family members and serve as a network of suppliers, processors and traders. Small-scale fishing, also considered artisanal fishing, involves fishing for subsistence as well as for commercial activities, and represents 80 per cent of total fish landings, mainly targeting near-shore fish stocks such as pelagic species, demersal linefish and crustaceans such as shrimp and crab (Benkenstein, 2013b; see table 18). The gear commonly used in artisanal fisheries includes beach seines, traps, gillnets, handlines and longlines and, in some instances, mosquito nets or nets with fine mesh (Darkey and Turatsinze, 2014). Only 41 per cent of fishers use boats, of which less than 10 per cent are motorized, while the rest are collectors or use shore-based fishing gears (Benkenstein, 2013b).

Small-scale fisheries accounted for 88.3 per cent and 71.3 per cent of total fish catches and aquaculture production, respectively, in 2013. As in many LDCs, the fishery sector in Mozambique faces challenges in the development of this vulnerable sector, with important socioeconomic implications for fishing communities. Some pressures arise from within the sector. For example, in recent years, fishers have witnessed considerable reduction in catches, largely owing to population growth. With the decline in agricultural productivity, the number of people engaging in small-scale fishing has significantly increased, leading to overfishing and increased illegal fishing. Further pressure is created by the development of other sectors of the economy, such as the exploitation of coal and gas reserves, the expansion of tourism and the rise in the number of national parks, which in turn increases demand for fish and seafood and thus overfishing. Such developments have led to restrictions in fishing area access and the free movement of fishers, as well as traffic in shipping lines, with a greater risk of pollution.

Table 18. Mozambique: Artisanal fish production – total catch, 2012

(Tons)

Lobster	159
Crab	1 346
Fish, marine	10 874
Fish, inland waters	68 215
Shallow-water shrimp	3 020
Shrimp for shrimp paste	2 241
Cephalopoda	1 671
Shark	653
Other	4 557
By-catch	3 319
Total	96 055

Source: Mozambique Ministry of Sea, Inland Waters and Fisheries, 2014.

Climate change poses a threat to small-scale fisheries and, in addition to the above-mentioned pressures, supply-side constraints to the development of such fisheries include lack of access to finance and credit and to external markets, as well as inefficient processing and trading systems (Benkenstein, 2013a). Given their significance for economic growth, exports and job creation and in contributing to food security and the support of livelihoods, small-scale fisheries have been given special attention in the development policies and strategies of Mozambique.

Among the numerous national fishery management institutions, the National Institute for the Development of Small-scale Fisheries provides particular support to the small-scale sector (Benkenstein, 2013a). Its aims include alleviating poverty and enhancing the quality of life in fishing communities (Darkey and Turatsinze, 2014). Management strategies also aim to improve fishing technologies and gears, as well as rural infrastructure, including roads and sanitation, to increase the sector's efficiency, competitiveness and overall productivity (Benkenstein, 2013a). These objectives are included in several government programmes, such as the Poverty Reduction Action Plan.

Aquaculture development and opportunities

Mozambique possesses great untapped aquaculture potential, with a favourable environment, including climatic conditions – tropical temperatures allowing for year-round production – suitable land for coastal aquaculture and wild native species that can be farmed, such as giant tiger prawn (FAO, 2017b). However, the growth of the sector is constrained, mainly by infrastructure deficiencies (Omar, 2013). Increasing demand for seafood and recognition of aquaculture as a high priority activity due to its capacity to contribute to export earnings, as well as its role in the country's socioeconomic development, bring the sector to the forefront of policy discussions. These factors, combined with the need to improve the food security situation and generate jobs and income, are expected to drive the growth and expansion of the aquaculture sector in Mozambique (Blythe et al., 2014). Although the sector is still in its infancy, freshwater species such as tilapia have been cultivated in Mozambique since the 1950s with the support of the Government, which supported and promoted the construction of a large number of small dams, hatcheries and demonstration farms.

The cultivation of marine species – marine aquaculture – has recently begun. All production of tilapia is marketed locally, while high-value marine aquaculture production such as of shrimp and prawn are principally destined to external markets, including Japan, the United States, the European Union and, recently, China (FAO, 2017b; Omar, 2013). Shrimp is one of the most valuable and highly traded seafood products of Mozambique. In the 1980s, wild-caught shrimp was the second largest export earner, contributing 28.8 per cent of foreign exchange. However, mainly owing to stock depletion, its contribution to foreign exchange has recently begun to decline. The Government has been promoting the development of a commercial shrimp aquaculture industry (Blythe et al., 2014).

Commercial aquaculture began in 1988, when the Government established a 10-hectare pilot farm near Maputo, followed by the first industrial fish farm, built in 1994. Shrimp aquaculture producers are currently organized under the Association of Shrimp Producers, which consists of three incumbents, namely Aquapesca, Indian Ocean Aquaculture and Sol and Mar, representing a combined private investment of about \$100 million in the fishing sector, generating around 2,000 direct jobs and a potential income of \$25 million per year (Omar, 2013). In 2008, the Ministry of Sea, Inland Waters and Fisheries established the National Institute for Aquaculture Development and prepared an Aquaculture Development Strategy 2008–2017, with the objective of developing commercial and small-scale aquaculture (Blythe et al., 2014). Government actions promoting the aquaculture sector include, among others, facilitating transfers of knowledge and technology, enhancing technical capabilities through rural extension services and improving fingerling quality and availability. The National Institute for Aquaculture Development has also created a research centre for aquaculture to genetically improve some culture species (*Oreochromis mossambicus* and *O. niloticus*), and is responsible for improving access to export markets for aquaculture fish, professional training and the mobilization of funding for aquaculture projects. Although the sector is small, with a total production in 2013 of 721 tons, estimates suggest that marine and freshwater aquaculture in Mozambique have a potential of about 800,000 and 2 million tons, respectively (Mozambique Ministry of Sea, Inland Waters and Fisheries, 2013; 2014).

European Union agreements

Mozambique is a beneficiary of the Everything but Arms initiative of the European Union, and has duty-free and quota-free access to its markets for all exports, including fisheries (European Commission, 2013b). In addition, the economic partnership agreement between the European Union and the Economic Partnership Agreement Group of the Southern African Development Community offers duty-free and quota-free access to the European Union market for Botswana, Lesotho, Mozambique, Namibia and Swaziland. Mozambique is expected to benefit from the security of a bilateral agreement while also benefiting from the Everything but Arms regime. Most of the market access under the economic partnership agreement concerns agricultural and fishery products (see <http://ec.europa.eu/trade/policy/countries-and-regions/regions/sadc/>). Although such market access initiatives enhance the competitiveness of Mozambique in the European Union market, market access is subject to compliance with certain conditions, such as international standards (Trademark Southern Africa, 2011).

Since 1987, a renewable fishery partnership agreement has been in place between Mozambique and the European Union. The agreement approved in 2007, under Regulation No. 1446/2007, allowed European Union vessels, from France, Italy, Portugal, Spain and the United Kingdom, to fish in Mozambique waters; the protocol to this agreement covered 2012–

2015 and provided a financial contribution of €980,000 per year, of which €460,000 per year was destined to supporting Mozambique fishery policies (European Commission, 2007), and the total amount of the fees that Mozambique received for the duration of the protocol was €2.94 million. This agreement, part of the tuna network fishery agreements in the Indian Ocean, enables a maximum of 89 European Union tuna fishing vessels to operate in the fishing zone of Mozambique, under Decision No. 2012/91.

Annex II of Decision 2006/766/EC establishes the list of third countries and territories from which imports of fishery products for human consumption are permitted, and includes Mozambique. The annex to Decision 2011/163/EU indicates that the residue monitoring plan of Mozambique was approved in accordance with Directive 96/23/EC and that Mozambique is allowed to export aquaculture products to the European Union. However, in 2013, an audit by the Food and Veterinary Office of the European Commission identified some deficiencies in the official control system, and Mozambique submitted an action plan on addressing these (Oceanic Développement, 2014; see box 2). Mozambique has notified of its competent authority in accordance with Regulation No. 1005/2008 on IUU fishing, and the audit identified that Mozambique had implemented a catch certification scheme that met the standards required by the regulation (Oceanic Développement, 2014).

Tuna and shrimp fisheries

Tuna and other related species are exploited by national and foreign enterprises; domestic tuna fisheries include an artisanal fleet and one industrial longline vessel authorized to fish in the Indian Ocean Tuna Commission zone. In 2013, 45 foreign vessels were licensed to fish tuna and related species in the Mozambique fishing zone, mainly under the flag of the European Union, operating under fishery partnership agreements, as well as Japan, the Republic of Korea and Seychelles (Oceanic Développement, 2014). In 2013, total foreign catches accounted for 3,768 tons (Mozambique Ministry of Sea, Inland Waters and Fisheries, 2014).

None of the European Union authorized vessels operating under fishery partnership agreements land their catches in Mozambique. According to professional associations, vessels do not land in Mozambique ports as they do not have adequately organized and sufficiently equipped logistics and related services to be able to distribute catches to processing plants in the region or provide support operations during port calls. The principal landing ports of European Union vessels are Victoria, Seychelles; Diego Garcia, Madagascar; and Durban, South Africa (Oceanic Développement, 2014).

The Government is currently developing a national tuna industry to increase the contribution of these fishery resources to national socioeconomic development. Efforts include increasing the number of fishing vessels and improving landing sites to directly benefit Mozambique and its citizens. This strategy was developed by the Government under the Fisheries Master Plan and the Strategic Plan for Tuna Fisheries Development 2010–2019. In 2013, Mozambique submitted a fleet development plan for 2014–2028 to the Indian Ocean Tuna Commission (Oceanic Développement, 2014).

Full compliance with European Union standards related to fish exports poses enormous challenges for LDCs such as Mozambique. It is financially costly, and administratively and institutionally complex. Mozambique is unable to fully meet public standards or satisfy industry requirements and standards that are higher than public standards. As with all fish and seafood exports originating from LDCs, such exports from Mozambique are thus confined to wholesales, which generally offer prices lower than those offered by supermarkets.

In 2012, annual shrimp capture production totalled 5,878 tons, including artisanal and industrial fisheries (Mozambique Ministry of Sea, Inland Waters and Fisheries, 2014). Shrimp are processed and frozen on board and mostly exported to Japan and Europe, with an annual value of about \$40 million–\$50 million (Oceanic Développement, 2014). Fishing companies registered in Mozambique acquire fishing rights for coastal shrimp catches on the basis of a percentage of total allowable catches approved by ministerial decision. The percentage is determined on the basis of technical recommendations from the research institute based on analyses of fishery data and surveys to estimate biomass during a given season. Total allowable catches decreased from 5,000 tons in 2012 to 4,000 tons in 2013, and may be further reduced in future as recent assessments indicate that coastal shrimp stocks are severely depleted (Oceanic Développement, 2014).

Box 2. Mozambique: International standards compliance for European Union exports

In 2013, an audit by the Food and Veterinary Office of the European Commission evaluated whether the official controls established by the competent authority could guarantee food quality and safety standards set by the European Union, in particular whether production conditions of fishery products for export complied with the requirements in European Union legislation. The competent authority in Mozambique is the National Fish Inspection Institute, which works at a central level in Maputo and at a regional level with six provincial delegations. The audit noted that legislation and standards in Mozambique with regard to fish exports were in accordance with European Union provisions, provided that the competent authority continued to implement an official control system in order to ensure conformity with European Union requirements. In addition, the audit determined that the competent authority had an adequate structure and organization to perform official controls, including the implementation of sanitary requirements for handling, processing and distributing fishery products through licensing and inspection, health certification and laboratory analysis. The provisions and procedures used to list authorized facilities, as well as the control systems in place, were found adequate and capable of providing satisfactory guarantees of conforming to European Union requirements. Inspections of listed establishments determined that these were in accordance with European Union equivalent standards.

Some deficiencies were identified with regard to maintenance and hygiene, as well as occasional weaknesses in the implementation of individual HACCP procedures, which had not been identified or followed-up on by the competent authority. The audit noted that landing operations were conducted in accordance with European Union equivalent rules, namely that the competent authority implemented official controls on fishery product exports that adequately covered most requirements. However, the audit identified a lag in the determination of environmental contaminants that would require the competent authority to take timely and appropriate measures if required. The audit evaluated national measures to control contaminant residues to determine whether the control system could guarantee that exported aquaculture products complied with the residue levels in European Union legislation, and concluded that the residue monitoring plan was based on and in conformity with the requirements of Directive 96/23/EC. However, the established national maximum residue limits in some cases exceeded European Union limits and aquaculture products that complied with national limits but not with European Union limits might therefore not be eligible for export to the European Union. The audit also identified that although the residue monitoring plan was generally implemented as planned, the integrity of samples could not be guaranteed, as they were not officially sealed, unpacked and repacked. In general, the effectiveness of the residue monitoring plan was compromised by deficiencies in implementation largely due to weak laboratory performance and control systems, including distribution and the use of veterinary medicines. The competent authority had established a laboratory network to provide analytical support for samples collected under the programme of regular inspections and to assist food business operators with their self-check or control analyses. The laboratory in charge of the official analysis of fishery products was in the process of accreditation under the International Organization for Standardization and International Electrotechnical Commission 17025 standard. However, it had systemic weaknesses in its internal controls. The competent authority also used external laboratories accredited under this standard for some specific tests. Since the last audit in 2007, 22 notifications under the rapid alert system for food and feed had been issued for fishery products originating from Mozambique, of which 19 were due to ruptures of the cold chain, primarily in chilled or frozen shrimp, two to a high content of sulphites and one to an incorrect health certificate for frozen lobster. The audit identified that improvements had been made since the last audit in 2007. The competent authority particularly had adequate organization, standards and documented operational procedures. However, certain deficiencies in implementation did not allow the competent authority to guarantee that fishery products to the European Union market complied with and were produced in accordance with the sanitary conditions for fishery products indicated in export health certificates.

Source: European Commission, 2013c.

Assessment and lessons

Mozambique possesses vast fishery resources and a vibrant fishery sector that has great potential to expand in both domestic and foreign markets, enabling Mozambique to join a group of successful developing country exporters. Small-scale fisheries are the most important fishery segment by volume, as well as in contributions to food security, poverty alleviation and the national economy. This is critical for rural populations dependent on agriculture and fisheries. However, the potential of the sector remains untapped, mainly owing to deficient infrastructures, weak institutions and insufficient access to finance and in meeting the stringent requirements of international markets.

The aquaculture sector in particular has an unexploited potential estimated at about 800,000 tons in marine production and 2 million tons in freshwater production. Its growth and expansion are mostly limited by infrastructure deficiencies. However, the Government has been actively promoting the sector, with a particular focus on shrimp production to benefit from highly lucrative international shrimp markets.

In 2013, fish exports from Mozambique were estimated at about \$75 million, and the European Union is its major trading partner. European Union trade initiatives such as Everything but Arms and the economic partnership agreement with the Economic Partnership Agreement Group of the Southern African Development Community are expected to promote trade between Mozambique and the European Union. The European Union is one of the markets with the most stringent international standards, which are costly to meet. Mozambique is currently included in the list of countries allowed to export fish products to the European Union. However, an audit by the Food and Veterinary Office identified some systemic deficiencies in the official control system and, while overall conclusions were satisfactory, Mozambique was requested to undertake a number of steps, including with regard to infrastructure and technical laboratories (European Commission, 2013c). Moreover, a fishery partnership agreement between Mozambique and the European Union allows European vessels to fish tuna in waters off Mozambique, yet foreign fleets do not land their catches in Mozambique ports due to insufficient logistics. The Government aims to develop a national tuna industry to address the challenges, and capture the benefits to the economy from tuna exports.

Chapter 8

Case study: Myanmar

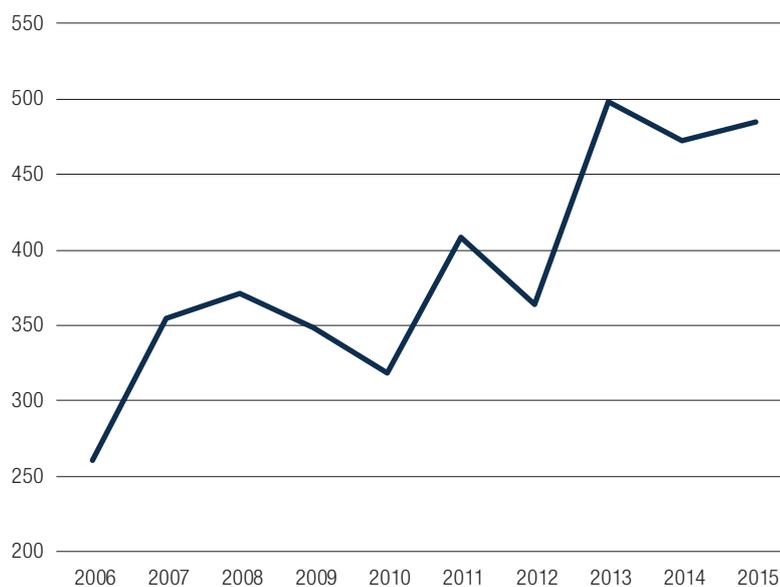
Overview

Myanmar is situated in Southeast Asia and has 213,720 km² of marine waters along the Indian Ocean, Bay of Bengal and Andaman Sea. Total inland water bodies consist of 8.2 million hectares of lakes, rivers and reservoirs and, during the monsoon season from May to September, flood plains are breeding and nursery grounds for freshwater fish (Win, 2004). Such richness in marine, freshwater and brackish-water fisheries makes the sector vibrant and vital to national food security objectives, as seafood is a staple food and major source of animal protein, and plays an important role as a source of income, exports and employment (FAO, 2010; FAO, 2012b).

In 2014, Myanmar had an estimated total population of 53.4 million and GDP of \$65.58 billion (World Bank, 2017b). The agriculture and seafood sectors contribute about 40 per cent of total GDP and employ around 70 per cent of the total labour force (Centre for the Promotion of Imports from Developing Countries, 2012). Total fish production in 2014 was about 5 million tons. Captures contribute 81 per cent of total production, or about 4 million tons, and aquaculture contributes about 19 per cent, or approximately 1 million tons. In 2014, total fish exports reached about \$500 million, largely due to the emergence of China as a major destination for fishery exports from Myanmar (Myanmar Department of Fisheries, 2016). Figure 8 shows the value of fishery exports in 2006–2015. With regard to sources, 53 per cent of total fish production is marine and 47 per cent is freshwater; the proportion of capture to aquaculture fishery production and the proportion of inland to marine captures are shown in figures 9 and 10.

Figure 8. Myanmar: Value of fishery exports, 2006–2015

(Millions of dollars)



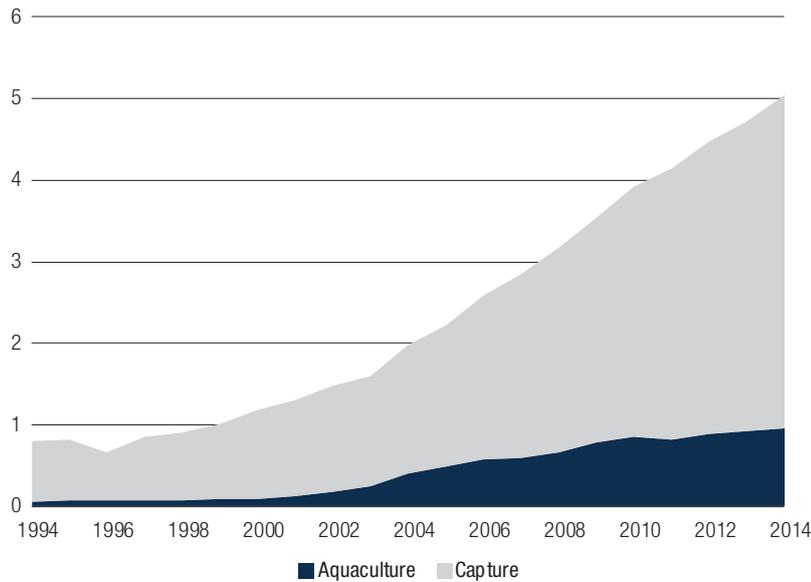
Source: UNCTAD, 2017.

China is Myanmar's largest export destination for fishery products, absorbing 35 per cent of total fishery exports, or more than \$169 million in value. Thailand also imports a high percentage of fishery products from Myanmar, totalling 26 per cent, or approximately \$128 million in value (Myanmar Department of Fisheries, 2016). In the last two decades, fishery exports have grown at an average annual rate of 11 per cent. The period since 2010 has experienced a sharp increase in fishery exports by value. Myanmar's global fishery imports of about \$16 million create a positive national trade balance. Sources of fishery imports include Thailand, India and Indonesia, accounting for 44.2, 31.1 and 9 per cent, respectively (UNCTAD, 2017). In the last two decades, total fishery production has grown at an average annual rate of 14.5 per cent. In 2014, the marine sector contributed 2.2 million tons and the inland sector accounted for about 2.7 million tons.

The fishery sector contributes to food security and job creation. With regard to food security, it is second to the agriculture sector in meeting the protein requirements of the population; fish account for 22 per cent of total protein consumed (FAO, 2014). With regard to employment contributions, exact figures on the number of fishers vary between studies. In 2001, 440,000 full-time fishers were employed in the sector, with approximately 1.8 million people thus deriving direct benefits from all fishing activities (FAO, 2006). According to government estimates, the fishery and aquaculture sector employs over 2.6 million people, full time and part time (Wildlife Conservation Society, 2014). In coastal areas, commercial fishing operations provide employment to families living in the area. Depending on the season, families alternate between selling their labour to fishers and farming fish themselves. The pond aquaculture concentration around the Twente region and surrounding districts creates abundant employment opportunities. Employment in the fishing sector is seasonally variable and vulnerable to natural shocks. For example, damage to the industry, shrimp farms and salt farms by a cyclone in 2008 significantly reduced employment opportunities in the Ayeyarwady delta region.

Figure 9. Myanmar: Production of capture and aquaculture fisheries, 1994–2014

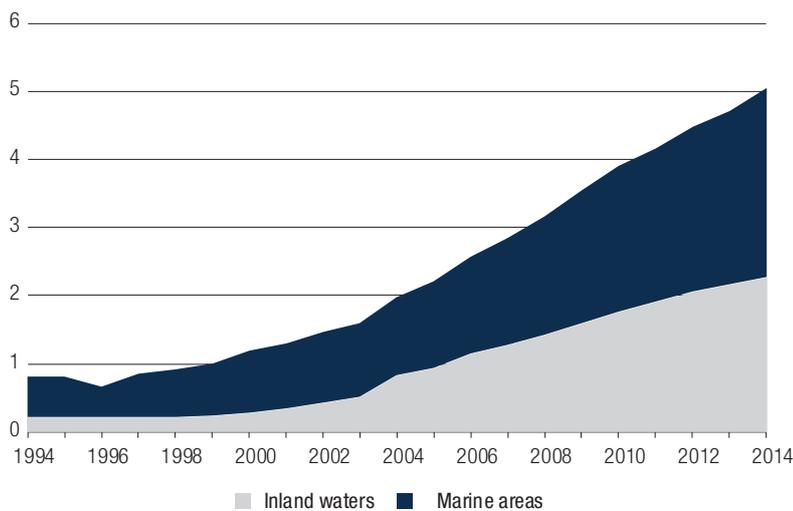
(Millions of tons)



Source: FAO, 2017a.

Figure 10. Myanmar: Production sourced from inland waters and marine areas, 1994–2014

(Millions of tons)



Source: FAO, 2017a.

Fishing methods

Traditional and commercial fishing vessels are used in inshore marine fishing. The vessels operate within 10 nautical miles off the coast in the southern area and 5 nautical miles in the northern area. The fishing gears commonly used for inshore fishing are drift nets and longlines, while offshore vessels operating beyond the outer boundary of the inshore fishing zone to the outer boundary of the exclusive economic zone use more sophisticated boats and fishing gears that include trawl nets, purse seines and longlines.

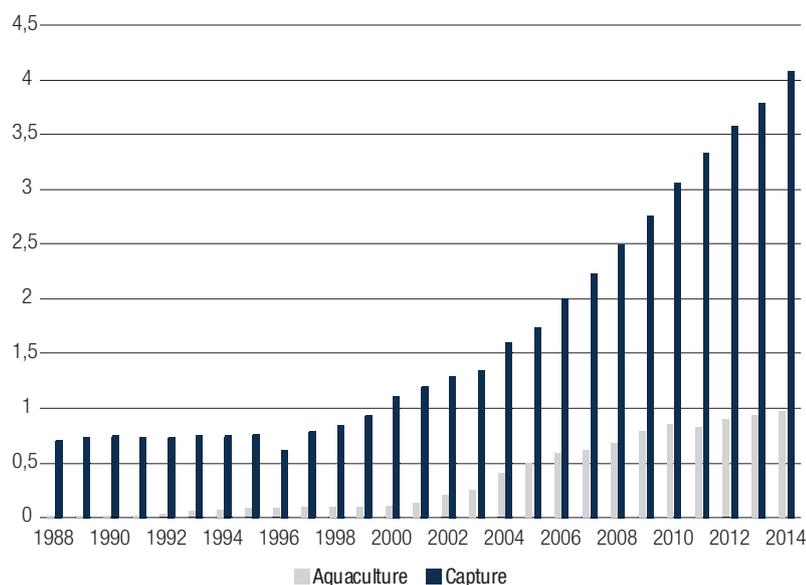
Marine fishery production has substantially increased in recent decades, from almost 600,000 to over 2.7 million tons. However, indicators suggest a decreasing trend in marine resource abundance owing to overfishing or overexploitation of marine fishery stocks. For example, the average length of captured fish and the catch per unit effort of some commercially relevant species have been substantially reduced. In order to preserve fish stocks, commercial fishing vessels, including trawlers and purse seine vessels, are not allowed to fish in an area less than five nautical miles from shore. In addition, nursery areas have been identified and protected to ensure the survival of juveniles of commercially relevant species. Marine fishing activities are regulated by a licensing and registration system under the Marine Fisheries Law and the entry of new individuals into the industry is controlled (FAO, 2010).

State of aquaculture

Aquaculture in Myanmar started in 1953, with the farming of imported species such as tilapia, common carp and snakeskin gourami, originating from countries such as China, Indonesia and Thailand. The sector began to expand after 1960, when the Government began to promote it and provide support, particularly in training and research, the primary aim of which was to increase the supply of low-cost fishery products destined for local consumption and high-value and export-oriented products such as shrimp destined for international markets (FAO, 2017c). In 2014, fish production from aquaculture was around 999,630 tons, representing 19 per cent of total fish production of 5 million tons and accounting for an estimated total value of aquaculture of \$1.8 billion (see figure 11). Aquaculture in Myanmar has been the fastest growing sector since 1988, registering an average annual growth rate of about 28.1 per cent up to 2014, compared with 7.0 per cent for capture fisheries.

Figure 11. Myanmar: Growth of aquaculture and capture fisheries, 1988–2014

(Millions of tons)



Source: FAO, 2017a.

In 1991–2013, the area designated for aquaculture production increased from 12,225 to 180,614 hectares and, in 2014, the sector employed around 130,000 farm workers (Myanmar Ministry of Information, 2015). However, despite the country's potential and the availability of diverse species necessary to develop the aquaculture sector, and notwithstanding the substantial growth rate that it has experienced in recent years, the share of aquaculture production remains small compared with capture production.

The most cultured species is rohu, followed to a lesser extent by catla, tilapia and giant tiger prawn. Total production of these species are, respectively, about 586,000; 63,000; 47,000; and 40,000 tons, representing 60.8, 6.5, 5.0 and 4.1 per cent of total aquaculture fish production. Rohu is characterized by great growth potential and a high level of consumer preference, making the species the most important freshwater species cultured in Myanmar, as well as in neighbouring countries such as Bangladesh and India. However, a major portion of the rohu produced from aquaculture is consumed in

local markets, and post-harvest processing is rare. Such freshwater species are highly preferred by consumers compared with other cultured carps and therefore fetch comparatively high market prices. Owing to high demand and prices, rohu has become popular among farmers. Rohu is either marketed fresh in local markets or transported to nearby urban markets on ice.

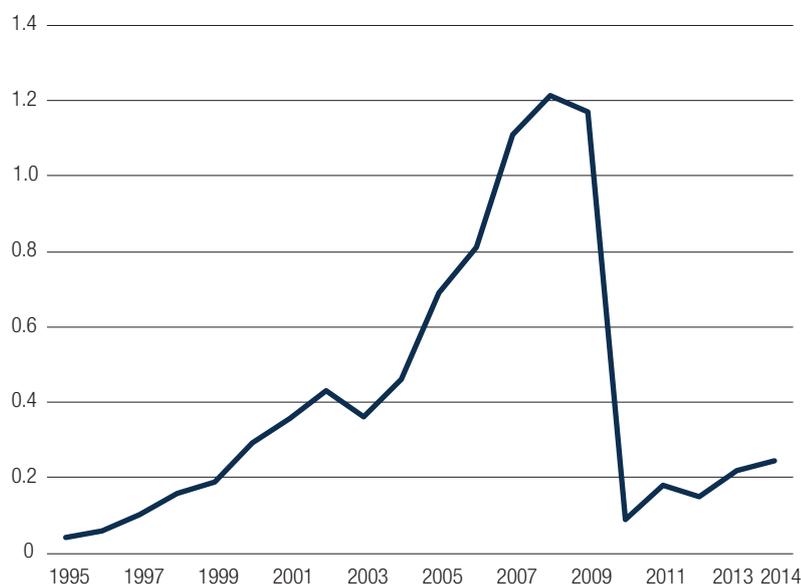
Aquaculture marketing in Myanmar may depend on loans or subsidies from wholesalers, exporters or processors under contract, whereby farmers must pay back loans at prevailing prices following harvests. Marketing may also be based on direct selling by farmers at fish markets or farm gates, whereby farmers fix the price of the product in advance through negotiation with buyers. As shrimp are export-oriented products, the price is subject to international demand, trade opportunities and market access conditions. Fishery products destined for international markets are inspected and certified by the Department of Fisheries before they leave the country. Fishery exports, including aquaculture products, face non-tariff barriers such as restrictions and conditions from most of Myanmar's trading partners, with which local processors and farmers have difficulty complying, due to lack of investment in infrastructure and lack of technical capabilities and know-how (FAO, 2017c).

European Union market for fishery products

Myanmar is an LDC benefiting from the Everything but Arms initiative of the European Union. The country receives duty-free and quota-free treatment for almost all exports destined for the European Union market, including fishery products. European Union market access benefits were withdrawn in 1997 due to claims that the country had violated the International Labour Organization Forced Labour Convention. However, in response to a process of political and economic reform that started in 2011, benefits were reinstated in 2013 under Regulation No. 607/2013, with a retroactive application from 2012. This preferential treatment is not free of conditions. Food safety requirements are in place, as are obligations related to IUU fishing, and all exports must originate in Myanmar in line with the regulations on rules of origin (Centre for the Promotion of Imports from Developing Countries, 2012). In 2014, total merchandise exports from Myanmar to the European Union accounted for about \$246 million (see figure 12), representing 2.0 per cent of the country's total merchandise exports. Seafood exports account for about \$10.9 million, or 4.4 per cent, of Myanmar's total merchandise exports to the European Union.

Figure 12. Myanmar: Value of merchandise exports to the European Union, 1995–2014

(Billions of dollars)



Source: UNCTAD, 2017.

Total merchandise exports from Myanmar to the European Union grew in value from \$42 million in 1995 to around \$1.2 billion in 2008. However, in 2008–2010, there was a sharp decrease to \$90 million. A moderate recovery was observed after 2010, although export value remains far from the level in 2008.

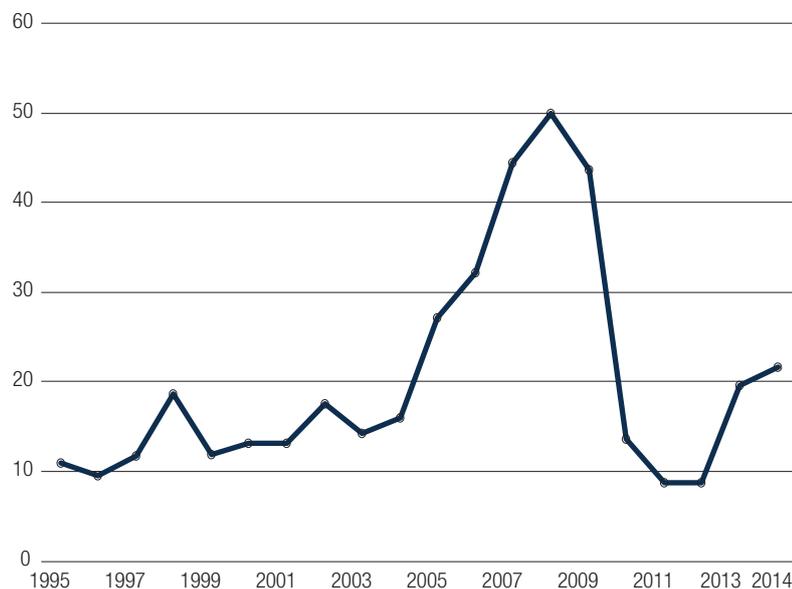
The evolution of fishery exports from Myanmar to the European Union by value in 1995–2014 is shown in figure 13.

Fishery export trends to the European Union are similar to the trends in total merchandise exports from Myanmar to the European Union, showing an initial increase in exports from about \$10 million in 1995 to \$50 million in 2008, followed by a sharp drop, to around \$14 million in 2010. In 2012–2014, fishery exports to the European Union recovered. The precipitous drop in exports to the European Union after 2008 may have been caused by a changing focus to exports in Asia, for example to China, following on from concerns about market access to European countries. In 2003, the export of seafood products from Myanmar was banned by the European Union due to hygiene conditions in the supply chain that did not meet European Union requirements. The ban was lifted in 2007, and imports of fishery products obtained through

capture were reappraised or certified for compliance with established standards. The import of aquaculture products to the European Union from Myanmar is banned, mainly because the Department of Fisheries has not yet implemented the residue monitoring plan that is a requirement to be allowed to export such products to the European Union (Blaha, 2015; Centre for the Promotion of Imports from Developing Countries, 2012; see box 3).

Figure 13. Myanmar: Value of fishery exports to the European Union, 1995–2014

(Millions of dollars)



Source: UNCTAD, 2017.

Box 3. Compliance with aquaculture prerequisites to export to the European Union

Under European Union import regulations, aquaculture products face more stringent requirements than capture fish. For example, in order to be authorized for export to the European Union, in addition to complying with requirements imposed on capture fish, aquaculture products must satisfy further requirements, including an additional control system involving an annual control plan run by the competent authority on heavy metal contents, contaminants and residues of pesticides and veterinary medicines. A residue monitoring plan must be submitted in accordance with articles 29 and 30 of Directive 96/23/EC and must offer guarantees with regard to the monitoring of the groups of residues and substances referred to in annex 1 of the Directive. The residue monitoring plan and technical regulations, which should be consistent with European Union legislation, must be submitted by the competent authority of the country of origin to the European Commission for approval and must be reviewed and presented annually for evaluation and renewal. In order to be effective, the plan should cover all aquaculture farms, processing establishments, feed mills and hatcheries linked to and/or intended for the export-oriented production of aquaculture products, and should be complemented by rigorous testing and certifying laboratories in order to ensure the overall monitoring of aquaculture products at different stages. The competent authority recognized and authorized by the European Union is in charge of designing and implementing the plan at the national level and its mandates include following up on and investigating incidences of non-compliance identified through sampling and testing systems.

The plan and technical regulations, as well as annual results or outcomes of investigations, should be published. Effective regulatory provisions for fish feeds should be clearly established, concerning contaminants and veterinary medicine, and testing and certifying laboratories must be accredited under International Organization for Standardization standards in order for analytical results to be considered officially valid. Such accreditation allows the competent authority to trust the impartiality and accuracy of results and approve laboratories, for testing results to be official. Such requirements apply equally to government and private laboratories. Eggs and gametes of live fish intended for aquaculture, and raw materials intended for further processing in the European Union, are subject to systematic monitoring and certification, including compliance with Directive 2006/88/EC on animal health requirements for aquaculture and related products, which takes into account the guidelines and standards set by the World Organization for Animal Health referred to in the WTO Agreement on the Application of Sanitary and Phytosanitary Measures. Such directives do not apply to aquaculture products intended for retail. The development of a national regulatory system for the control of fish diseases or to manage the risk of fish diseases undermining the aquaculture sector may be required, to comply with European Union directives and established guidelines.

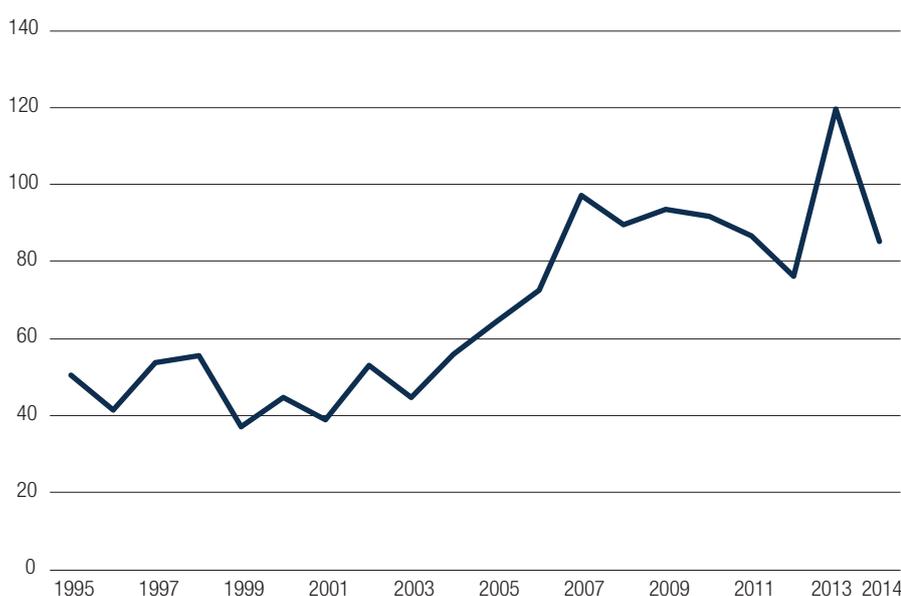
Sources: Blaha, 2015; Goulding and Kamel, 2013.

Association of Southeast Asian Nations membership and fishery exports opportunities and constraints

Myanmar has been an ASEAN member State since 1997. ASEAN has established a free trade area in which intraregional tariffs have been lowered through a Common Effective Preferential Tariff Scheme. As detailed in the ASEAN Free Trade Area tariff reduction schedule for Myanmar, the country benefits from tariff elimination for fish and seafood products, instead of the most-favoured nation tariffs that would otherwise be applied. ASEAN is in the process of harmonizing food quality and safety requirements and principles, and harmonized documents concerning food quality and safety controls elaborated on the basis of Codex Alimentarius Commission guidelines and texts are expected to be implemented as common regulations and standards by all ASEAN member States, in order to guarantee food safety and quality control systems in the region. The objective is to generate interest and maintain public confidence in consumer protection and facilitate trade in foodstuffs within ASEAN and beyond (ASEAN Food Safety Network, 2015). In 2014, total fishery exports from Myanmar to ASEAN by value accounted for about \$85.2 million, or around 10 per cent of total annual national fish exports. Trends in seafood exports to ASEAN in 1995–2014 are shown in figure 14.

Figure 14. Myanmar: Value of fishery exports to the Association of Southeast Asian Nations, 1995–2014

(Millions of dollars)



Source: UNCTAD, 2017.

ASEAN has concluded free trade agreements with a number of countries, including Australia, China, India, Japan, New Zealand and the Republic of Korea (see <http://asean.org/asean-economic-community/asean-free-trade-area-afta-council/agreements-declarations/>). Such agreements allow ASEAN member States, including Myanmar, to benefit from tariff elimination or reduction for a number of goods, including fishery products, with trading partners. The sharp fall in the share of ASEAN since 2013 is due to the emergence of China as the main export destination for fishery exports from Myanmar. Many of the 10 most important fishery trade partners of Myanmar are either ASEAN member States or ASEAN free trade agreement dialogue partners, as shown in table 19. China, the main importer of fishery exports from Myanmar, accounted for 35 per cent of total exports of goods in 2014–2015.

Table 19. Myanmar: Top 10 fishery export destinations, 2014–2015

Rank	Country	Quantity (thousands of tons)	Value (millions of dollars)
1	China	75.7	169.7
2	Thailand	127.5	127.8
3	Malaysia	16.8	31.4
4	Singapore	21.5	23.0
5	Saudi Arabia	20.7	22.4
6	Kuwait	23.4	21.9
7	Japan	6.8	18.9
8	United Arab Emirates	13.8	14.6
9	United Kingdom	5.7	10.2
10	Bangladesh	7.6	9.0

Source: Myanmar Department of Fisheries, 2016.

Assessment and lessons

Myanmar's fishery sector is endowed with great potential to contribute to food security, income generation, trade, employment opportunities and overall economic development. The country is rich in fishery resources and, in order to tap this potential, a number of constraints must be overcome in production and exports (Centre for the Promotion of Imports from Developing Countries, 2012). Coastal areas are under significant pressure from overfishing, implying a risk for the sustainability of natural fishery stocks. Although it is difficult to determine the extent and magnitude, Myanmar is not immune from problems related to IUU fishing activities. The protection and maintenance of mangrove areas, as well as the improvement of surveillance mechanisms, are critical to preserving fishery resources and protecting rural communities from future natural disasters (FAO, 2010).

Meeting international quality and safety standards may be costly and difficult for some countries, including Myanmar. The right human and technical capabilities and institutions, as well as sound policies and strategies, should be put in place, including through the support of development partners. Myanmar faces difficulties in maintaining quality levels in post-harvest fishery products, owing to power cuts and a lack of electricity, particularly in rural areas, which poses impediments to development of the sector. Infrastructure such as electricity is key for cold storage in the fish value chain, and capacity in this area should therefore be strengthened. Currently, a small number of processing establishments are able to add value by producing fishery products destined for export. In this regard, an increase in product quality is needed, and the development of facilities, as well as procedures based on HACCP standards, should be improved. This may be achieved by improving the technical capacity of laboratories and research and development institutions and by introducing international quality control standards (FAO, 2010).

With regard to exports, the fishery sector in Myanmar is focused on regional markets, compared with other countries in Asia such as India, Indonesia and Viet Nam. However, the growth of exports to international markets such as the United States and the European Union is expected to contribute to development of the sector (Centre for the Promotion of Imports from Developing Countries, 2012).

In sum, the future of Myanmar's fishery exports to developed countries depends on compliance with food safety standards and sustainable fishing and technical measures of major fish-importing developed countries, which continue to be demanding and stringent. Failure to meet requirements may result in a ban, which in turn can result in the loss of business or market share, as well as jobs and overall economic benefits. Additionally, the lack of compliance with food safety standards such as HACCP systems among fishers and intermediaries may mean being unable to participate in fish and food value chains that cater to markets beyond domestic and regional markets.

Chapter 9

Case study: Uganda

Overview

Approximately 44,000 km, or about 18 per cent, of Uganda's total surface area of 241,000 km is covered by water (World Bank, 2006). Uganda is a landlocked country with many inland fishery resources; most capture fisheries are based in five major lakes, namely Victoria, Kyoga, Albert, Edward and George. The first three lakes together contribute about 95 per cent of the total annual catch, and Lake Victoria alone contributes about half the total annual catch. The major species caught in these lakes are Nile perch, tilapia and mukene; the former two account for the majority of fish exports to extraregional markets and the latter is generally heavily traded in the immediate Great Lakes region, yet this trade is mostly unrecorded.

Uganda has a long tradition of artisanal fisheries – an estimated 80 per cent of fishers may be categorized as artisanal. Its fishery industry, along with the rest of the economy, began to grow in the late 1980s, following a period of civil war (United Nations Environment Programme, 2006). Officially recorded fish exports grew from around \$1 million in 1990 to over \$45 million six years later (Ponte, 2007), peaking at around \$148 million in 2005, and declining since then, with the annual value of exports in 2013 amounting to \$126 million (FAO, 2017a; The Fish Site, 2008). As shown in figures 15 and 16, there was a sharp increase in exports through the late 1990s into the mid-2000s and a subsequent decline resulting from falling production.

Figure 15. Uganda: Value of fishery exports, 1991–2013

(Millions of dollars)



Sources: COMTRADE, 2017; FAO, 2017a.

Figure 16. Uganda: Volume of fishery exports, 1991–2013

(Tons)



Sources: FAO, 2017a.

Total annual production ranged between 200,000 and 250,000 tons through the 1990s into the mid-2000s, yet over the last decade, persistent overfishing, captures of immature fish and pollution in Lake Victoria have led to increasing concerns about declining fish stocks in capture fisheries, and the dramatic fall in exports has compounded these concerns (FAO, 2017a; Uganda Department of Fisheries Resources, 2011). As shown in table 20, the total catch from Lake Victoria fell from 238,533 tons in 2005 to 183,824 tons in 2011 (Uganda National Fisheries Resources Research Institute, 2012). Government policies to control unsustainable fishing practices – the promulgation of new regulatory laws, stricter licensing and equipment requirements and reorganization of community-level monitoring bodies – appear to have stabilized production in 2012 and 2013 (The Fish Site, 2013). Total annual production in 2013 was 517,312 tons (FAO, 2017a).

Table 20. Uganda: Estimated annual catch, Lake Victoria, 2005–2011

(Tons)

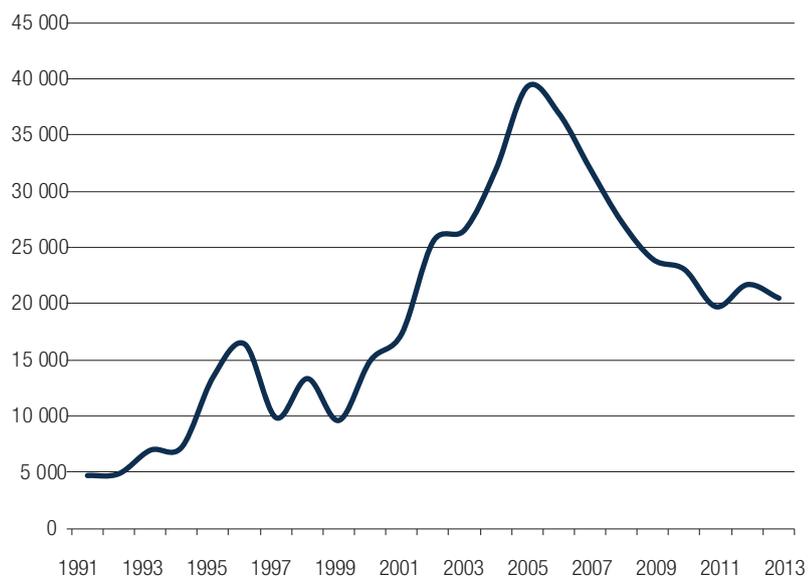
	2005	2006	2007	2008	2010*	2011
Total catch	238 533	215 943	227 487	173 024	162 929	183 824

Source: Uganda National Fisheries Resources Research Institute, 2012.

Despite the recent decline, the fishery industry remains the second largest foreign exchange earner for Uganda after coffee, and contributes to the livelihoods of close to 1.5 million people, or about 4 per cent of the population (The Fish Site, 2009a). Nile perch accounts for 90 per cent of official fish export earnings. The European Union is the largest market for Nile perch from Uganda, followed by Australia, South East Asia, the Middle East and Africa (Maurice, 2011). As shown in figures 17 and 18, export flows to major destinations generally match the overall trend of rising exports until 2005. Informal exports to neighbouring countries are estimated to have increased from \$60 million in the mid-2000s to close to \$70 million in the late 2000s (Uganda Department of Fisheries Resources, 2011). These exports are largely comprised of undersized or immature fish that are distributed through non-HACCP compliant value chains.

Figure 17. Uganda: Fishery exports to the European Union, 1994–2013

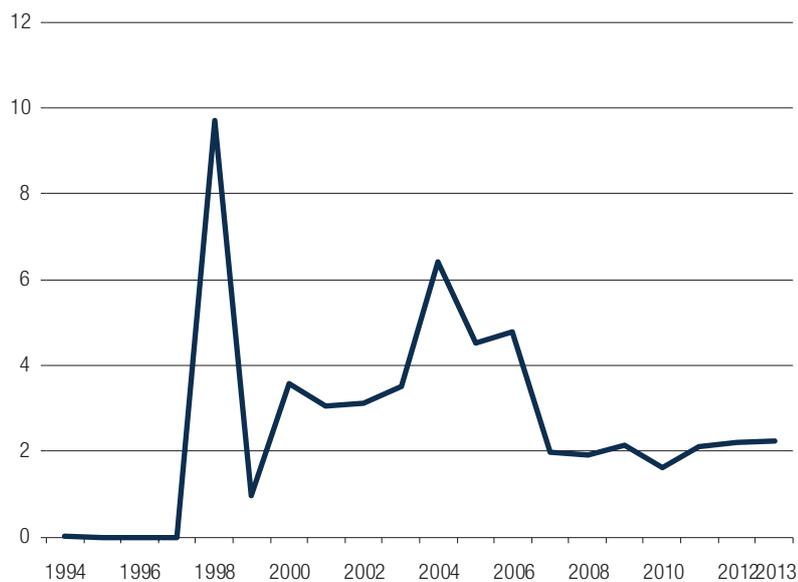
(Millions of dollars)



Sources: COMTRADE, 2017.

Figure 18. Uganda: Fishery exports to the United States, 1994–2013

(Millions of dollars)



Sources: COMTRADE, 2017.

Nile perch: Exports to the European Union and industrial processing

In 1991, the Government of Uganda banned exports of unprocessed fish, seeking to provide an initial stimulus for the growth of local processing operations (Ponte, 2007). While it is unclear whether the ban played any major role in the subsequent success of the industry, it is more certain that declining stocks of groundfish species, particularly cod and haddock, in Europe in the 1990s created an opportunity for exporters from Uganda. The diminishing stocks increased demand from European consumers for groundfish from foreign markets, and the following rise in demand for Nile perch – similar to groundfish of neutral flavour – drove the formal fish exports sector in Uganda. More recently, however, Nile perch exports have declined, partially due to overfishing and emerging competition from exports of similar species from other countries. The rapid increase in the global supply of farmed salmon – and the ensuing price decrease – has made salmon a viable substitute for Nile perch. The rise of farmed cod from Viet Nam has had a negative effect on the European Union market share of Nile perch exports from Uganda.

Uganda is one of the few LDCs that have permission to export fish to the European Union but has not always had such permission. In 1996–2000, the European Union imposed three export bans on fish from Uganda because of quality and safety issues (United Nations Environment Programme, 2006). Initially, in 1997, Italy and Spain banned fish from Uganda following the detection of salmonella in imported fish. A cholera epidemic at landing sites around Lake Victoria led to a complete ban on chilled fresh fish products later in the year. As 95 per cent of the fish exported to the European Union that year were chilled fresh fish, this amounted to a ban on all fish exports to the European Union. A fish-poisoning scare in 1998 led to a ban on all fish exports from Lake Victoria.

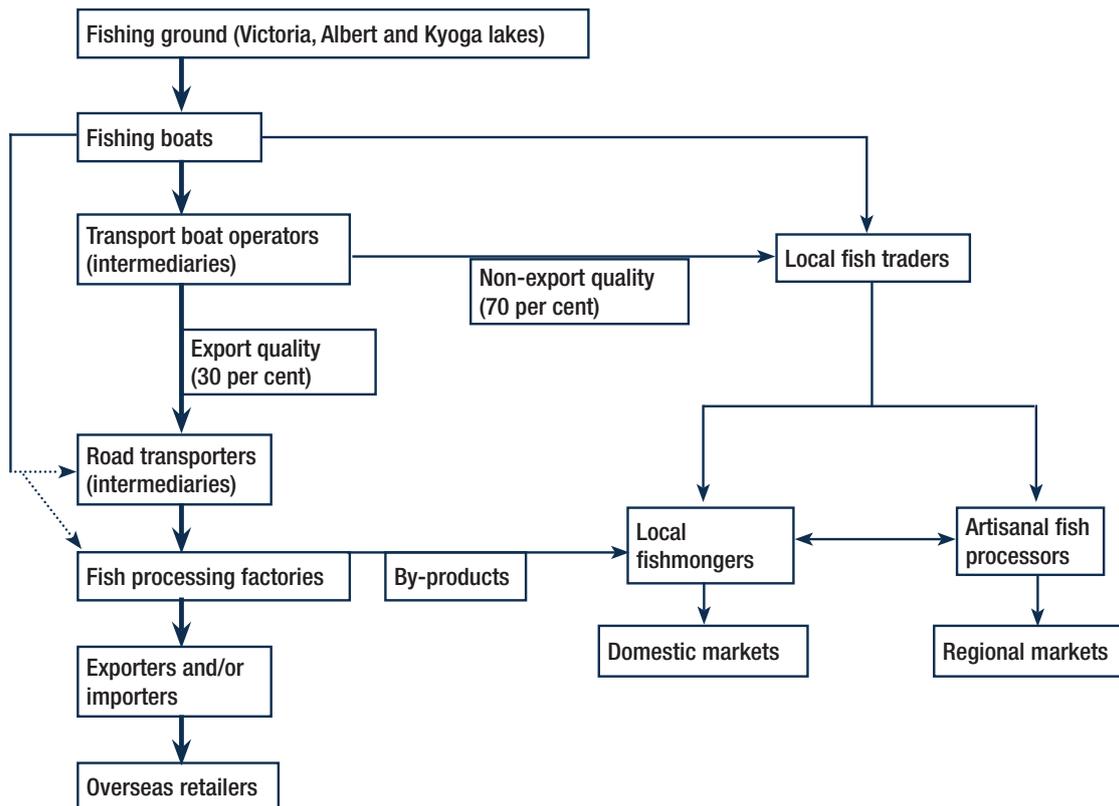
An assessment of the fish sector by the European Union highlighted several issues that prevented Uganda from meeting European Union quality and safety standards. First, inspectors identified a lack of coordination between the competent authority – the Department of Fisheries Resources – and the Uganda National Bureau of Standards. Second, the assessment highlighted the absence of laboratory facilities for chemical and pesticide analysis and the outdated regulatory laws, including Fish Act, 1964. Third, the inspectors emphasized the unhygienic handling of fish in the sector, along with uninformed fishery officers who do not comply with instructions regarding the handling of fish and the fact that most landing sites do not meet minimum European Union quality and safety requirements.

The bans catalysed government-led reform of the fishery sector. The Government invested in training programmes, disseminated an inspection manual for official inspectors and provided new equipment for landing sites managed by the Government. Technical support in adhering to HACCP systems was also provided by donors to the Department of Fisheries Resources, Uganda National Bureau of Standards and private-sector actors. The Government, together with donors, also invested in public-sector chemical inspection laboratories, and Chemiphar Uganda, a private laboratory, was approved for pesticide residue analysis. These measures led to the lifting in 2001 of the European Union ban on fishery exports from Uganda, and the Department of Fisheries Resources was designated the European Union-approved competent authority to monitor quality and safety throughout the value chain (United Nations Environment Programme, 2006). Uganda is allowed to export capture products to the European Union, yet it is currently not included in the list of countries authorized to export aquaculture products.

In 2004, to establish an updated framework to regulate the sustainability of fish, a National Fisheries Policy was implemented, to replace Fish Act, 1964. The progress made by the fish industry in Uganda highlights the importance of government–industry partnerships in meeting the sanitary and quality requirements of major importers. Public-sector investment in common chemical inspection and cold-storage facilities and efforts to educate the community on hygienic handling practices reduced the financial burden on private actors in overcoming the European Union ban. Moreover, the drive to improve the sustainability of fisheries in Uganda, which has included efforts to map the major breeding grounds of species in Lake Victoria and increase the regulation of harmful fishing equipment, appears to have arrested the decline in production and exports (The Fish Site, 2013; Uganda Department of Fisheries Resources, 2011).

Artisanal versus industrial fishery value chains

While the fish sector in Uganda is mostly artisanal, the distribution chain of industrial-grade fish, mostly Nile perch, differs markedly from that of other species of fish destined for domestic or regional consumption (see figure 19).

Figure 19. Uganda: Fishery product distribution chain

Sources: World Bank, 2006.

The distribution of export quality and non-export quality fish diverges after harvests reach landing sites, yet harvesting for all species is conducted by artisanal fishers; “the lack of industrial fleets has been reported to be a government strategy to protect the small-scale fisher[s] whose livelihoods solely depend on these lakes” (Maurice, 2011). Export-quality fish is transported to processing factories, inspected by quality assurance laboratories and either transported as air freight from Entebbe International Airport or, less often, loaded into temperature-controlled containers and shipped from ports in Kenya (Ponte, 2007). However, export discards and other fish destined for local consumption – undersized Nile Perch, tilapia and mukene – generally pass through a series of traders, agents and artisanal processors operating at landing sites and regional markets. A large amount of fish products are smuggled into the Democratic Republic of the Congo, Kenya, South Sudan and the United Republic of Tanzania.

Sustainability issues

The most serious obstacles to the continued expansion of the fish industry in Uganda are overexploitation of capture fisheries and increased water pollution in Lake Victoria. As mentioned before, overfishing in the major lakes has resulted in the decline of fish stocks and therefore exports, especially of Nile perch, as the catch per boat has decreased over the last few years. Rising demand for Nile perch has propelled overfishing in the industry. Processing factories that previously used to accept Nile perch with a minimum weight of 2 kg may now accept fish that weigh only 1 kg because of the fall in supply of the larger fish, and the number of factories that processed Nile perch grew from 31 in 2000 to 35 in 2005 despite the fact that all factories operate with excess capacity (Njiru et al., 2009). Increased competition between industrial processors for declining fish stocks has also resulted in the proliferation of harmful practices – including the continued capture of immature fish – downstream among artisanal fishers, who employ illegal fishing methods to obtain high catches of Nile perch despite declining stocks. Unrestrained use of small gill nets and banned equipment such as cast nets allow fishers to capture juvenile and immature Nile perch.

The primary obstacle to establishing sustainable harvesting practices in Uganda is thus the continued endorsement of an open-access approach – with no limit set on the number of fishers or boats – instead of a property-rights approach, whereby the Department of Fisheries Resources could determine and set quotas for different groups of fishers. In 2003, in efforts to improve surveillance, the Government established beach management units to encourage local management of sustainable practices at all publicly managed landing sites. A unit committee comprises local boat owners, crew and fish traders – of which at least one tenth must be women – and is required to regulate the sustainability of harvesting operations, including by regulating the mesh size of nets used to catch fish, as well as the size of catches. The Government has faced criticism of these units as their introduction does not mitigate the open-access policy (Njiru et al., 2009) and the committees lack the power to enforce regulations.

Opportunities: Regional trade and aquaculture

The growing integration of countries in the East African Community customs union offers many growth opportunities for stakeholders in Uganda's fishery industry. In 2009, the Common Market Protocol was signed and adopted by Burundi, Kenya, Rwanda, Uganda and the United Republic of Tanzania, and entered into force on 1 July 2010, establishing the free movement of labour, capital, goods and services among member countries.

Lower air freight costs of shipping to the European Union could provide a significant boost to the industrial processing sector. Relatively high air freight costs in Uganda are caused by a chronic imbalance, namely empty aircraft come in because of low use of air freight by importers yet outgoing cargo aircraft are relatively full (World Bank, 2013). High air freight costs in Uganda are partially due to the role played by Jomo Kenyatta International Airport in Nairobi, which has five times the cargo capacity of Entebbe and serves as the regional distribution hub for fish trade. Under the East African Community, exporters in Uganda may thus be able to use Jomo Kenyatta International Airport as a distribution centre.

Increased integration requires the harmonization of customs rules and regulations governing shared resources. However, currently, the regulations governing Lake Victoria and its resources differ in the three countries – Kenya, Uganda and the United Republic of Tanzania – that share access. For example, monofilament fishing lines – those made from a single fibre of plastic – are allowed in Uganda but banned in Kenya and the United Republic of Tanzania (fish and birds often get entangled in discarded monofilament lines and the lines also present a choking hazard for fish). In addition, there are different laws on the fish species to be protected – for example, in Kenya, fishing for mukene is prohibited only from 1 April to 31 August – while the mesh size limit also differs between countries (Njiru et al., 2009). Thus, to truly implement sustainable fishing practices and protect the ecosystem of Lake Victoria, Uganda should harmonize its policies with those of Kenya and the United Republic of Tanzania. Joint membership in the East African Community is expected to open avenues in this direction.

Equally important, coordinating customs processes and streamlining cross-border flows through the East African Community is expected to help improve data collection efforts with regard to the amount of informal fish trade in Uganda. In order to counter dwindling capture stocks, the Government has encouraged the growth of aquaculture fisheries. In 2007, the Ministry of Agriculture, Animal Industry and Fisheries secured \$30 million to fund an aquaculture promotion strategy throughout the country, to maintain the growth momentum of the sector (All Africa, 2007). In addition, a demonstration centre funded by China was established in 2009 as part of the Aquaculture Research and Development Centre, to provide technical training and demonstrations of best practices in breeding and processing for fish farmers (The Fish Site, 2009b). A draft aquaculture policy was completed in 2012, to provide an effective environmental management framework for the expansion of aquaculture in the next decade (The Fish Site, 2012).

Assessment and lessons

Uganda has a relatively high ratio of industrial to artisanal fisheries compared with other LDCs; an estimated 20 per cent of fisheries are categorized as industrial (United Nations Environment Programme, 2006). Uganda, a landlocked country, is a major inland fishery producer, sharing its main fishery resource – Lake Victoria – with Kenya and the United Republic of Tanzania. Uganda overcame quality and safety issues and, in 2001, was granted approval to export fish to the European Union. It is not clear whether Uganda's ban on unprocessed fish played a major role in the growth of the fishery sector. Unprocessed or lightly processed fish often commands a price premium over more processed products.

The main challenges faced by the fishery sector in Uganda pertain to increasing concerns about the health of fish stocks, and have prompted authorities to implement reforms in the monitoring and surveillance of fishing practices, while encouraging aquaculture to replace capture fisheries (Ponte, 2007). The sustainability issue can best be addressed through increased cooperation with neighbouring States. Lake Victoria, the most important fish source for Uganda, is a shared resource, yet there are inconsistent laws governing the regulation of fishing practices in Kenya, Uganda and the United Republic of Tanzania. This lessens the impact of policy reform in each country, and makes it difficult for the Government of Uganda to safeguard its stock of fish. Deepening integration within the East African Community should offer opportunities for Uganda to achieve a greater harmonization of regulatory mechanisms with its neighbours, while formalizing much of the unrecorded cross-border fish trade in the region.

Chapter 10

Conclusion

Fishing has great potential to boost growth, employment and food security for a number of LDCs with inland and coastal fish resources. Fishing improves export competitiveness and contributes to efforts to diversify, provided that the supply-side and demand-side constraints facing the sector in LDCs are effectively addressed. Of the top 16 producers of inland waters captures in 2003–2012, six were LDCs, namely Myanmar, Bangladesh, Cambodia, Uganda, the United Republic of Tanzania and the Democratic Republic of the Congo, in declining order by capture size (FAO, 2016). Myanmar was also among the top 10 producers of marine captures in the same period. Despite this potential, the share of LDCs in global fishery exports remains negligible, while other developing countries have substantially increased their share in such exports since the 1980s.

Sustainably tapping the potential role of the fishery sector in the socioeconomic development of LDCs requires effectively addressing supply-side and demand-side constraints. In particular, it requires LDCs and their development partners to view the fishery sector from economic, social and environmental perspectives. In this regard, the full and effective implementation of the 2030 Agenda for Sustainable Development, in particular Sustainable Development Goal 14, should be given particular significance. LDCs have preferential market access in major fish-importing markets, such as the European Union. However, they are unable to capitalize on this market access due to the fact that international standards, in particular those related to food quality and safety, including sanitary and phytosanitary standards, are not always met. These standards are the most significant barrier undermining the realization of the export potential of the fishery sector in LDCs. If international standards are harmonized and simplified, and national and regional standards are aligned with internationally agreed standards, and if LDCs receive robust targeted technical and financial support to build their capabilities to meet the standards, there is considerable scope for many LDCs to become successful exporters of fishery products.

The fishing industry has become increasingly globalized. Non-LDC developing countries have become the largest exporters, with China and Viet Nam among the top exporting countries, and developing countries as a group accounting for about two thirds of exports. Moreover, as in manufacturing, fishing is increasingly subject to fragmentation of production, with non-LDC developing countries, such as China in particular, importing raw fish and re-exporting after processing. A confluence of factors have contributed to the growth of trade in fresh and processed fish, including the following: advances in transportation, handling and storage technologies that can manage the perishability of fish; rising demand in developed countries; the need to rebuild depleted fish stocks in developed country waters; the abundance of fish resources in many tropical or subtropical regions; and the competitive advantage provided by low-cost labour in this labour-intensive industry. The share of LDCs in world exports is low but is growing rapidly, and could accelerate with improved management.

As in other industries, fisheries in LDCs are mostly informal and less organized, and raising productivity is required for international competitiveness. Fishing faces the additional imperative of maintaining resource sustainability (World Bank and FAO, 2009). Controlling overfishing is a major problem for countries and particularly daunting for LDC fishery administrations with limited administrative capacities and funding. This study has examined how LDCs have faced this dual challenge of boosting productivity and sustainability.

The capacity of LDCs to monitor and fully benefit from fishing licence agreements is severely limited. This is linked to deficient human resources-related, institutional and regulatory capacities in LDCs in negotiating the terms and conditions of agreements with countries dominating the fishing industry. In most instances, the amount of fees received by some LDCs and small island developing States from fishing agreements is too low to contribute to the socioeconomic development of these countries, when compared with the market value of fish. In addition, the extent of fishing and the types or species that are captured by major fleets under fishing agreements are not fully known or documented. These problems show the need to build the capacities of LDCs and small island developing States to negotiate the terms and conditions of fishing agreements, including fees, in order for such agreements to promote their sustainable development objectives.

Furthermore, trade and production-distorting fishery subsidies negatively affect the trade and development potential of fishery sectors in LDCs. In this context, the LDC Group has submitted to WTO its position regarding fishery subsidies disciplines (WTO, 2016). While LDCs are exempt from subsidy-reduction commitments contained in the WTO Agreement on Agriculture, their capacity to provide export or production-distorting fishery subsidies is limited due to financial constraints. LDCs are directly affected by the incentives created by cost-reducing subsidies, particularly those granted to large-scale industrial fishing. Hugely subsidized fishery exports from developed and more advanced developing countries distort markets for fishery exports from LDCs, rendering them uncompetitive. Lucrative subsidies have also led to overcapacity and overfishing, undermining food security and development prospects in LDCs. Therefore, it is in the interest of LDCs to discipline fishery subsidies through multilateral trade agreements. Such efforts should focus on subsidies that are granted to fishing vessels or fishing activities, which negatively impact fish stocks that are overfished; provided to vessels or operators engaged in IUU fishing, with prohibitions also applying to illegal trans-shipment at sea; and related to capital and operational costs, which contribute to overcapacity and overfishing.

The six LDCs examined in this study differ in the nature and level of development of their fishing industries, as shown in table 21.

Table 21. Fish production, markets and key constraints, selected countries

Country	Production source	Largest export market	Potential growth areas	Key constraints
Bangladesh	Marine: 588 988 tons Freshwater: 2 821 266 tons Aquaculture: 1 859 808 tons	European Union (\$341.8 million)	Increase exports by linking artisanal fishers to global value chains Market diversification within and outside region	Basic infrastructure, including landing and transportation Harmful fishing practices Linking small-scale fisheries to market segments
Cambodia	Marine: 111 468 tons Freshwater: 528 000 tons Aquaculture: 90 000 tons	China (\$507,098)	Aquaculture Market diversification outside region	Basic infrastructure, including landing and transportation Harmful fishing practices IUU fishing Processing capacity Meeting international standards
Comoros	Informal industry: Catches are small and not reliably recorded	None Fees received from fishing licence agreements with the European Union	Marine catches and onshore processing of fish caught under international agreements	Basic infrastructure Meeting international standards Institutional oversight of industry Balancing receipt of fees in licence agreements with fish stock captured
Mozambique	Marine: 222,101 tons Freshwater: Approximately 68,215 tons Aquaculture: 721 tons	European Union (\$38.0 million)	Aquaculture (freshwater: 2 million tons; marine: 800,000 tons) Market diversification	Basic infrastructure Meeting international standards in aquaculture Institutional and regulatory framework Access to credit for artisanal fishers
Myanmar	Marine: Approximately 2,854,200 tons Freshwater: Approximately 1,463,120 tons Aquaculture: 999,630 tons	China (\$169.7 million)	Aquaculture (many wild-catch areas at risk of overfishing) Market diversification outside region	Basic infrastructure, especially energy Meeting private or industry standards in major markets Overfishing and environmental risks Lack of research and development institutions with a focus on fisheries
Uganda	Marine: None Freshwater: 517,312 tons Aquaculture: 117,000 tons	European Union (\$77.2 million)	Aquaculture Market diversification outside region	Basic infrastructure, especially transport and energy) Meeting international standards in aquaculture Overfishing and management of fish stocks on lakes that are shared resources

The Comoros mostly has maritime capture fisheries, Uganda has access to freshwater fish in Lake Victoria and other lakes and Bangladesh, Cambodia, Mozambique and Myanmar have both maritime and inland fisheries. All of these countries feature both industrial and artisanal fishing, yet the relative significance of the two categories differs. Bangladesh, Mozambique and Uganda have well developed or emerging, dynamic domestic industrial fishing sectors that are certified to export to the European Union. Cambodia has emerged as an exporter to Japan and the United States following reforms since 2000, but does not yet fully comply with European Union norms. Bangladesh, Cambodia, Mozambique and Uganda have begun aquaculture production. Domestic fishing in the Comoros is overwhelmingly artisanal, with industrial fishing carried out by foreign vessels.

Some broad policy recommendations applicable to all six countries are provided in the following section.

Overall recommendations

Fishing requires a favourable policy and institutional environment to prosper. Following periods of civil war, Mozambique, Uganda and Cambodia all saw improvements in their fishing industries. Similarly, improved political stability in the Comoros is propitious for upgrading domestic fishing. The lifting of sanctions on exports from Myanmar provides a boost for the national fishing sector. Beyond basic political and macroeconomic stability, productivity and competitiveness in exports depend on a developmental state that invests in infrastructure and assists the private sector rather than predated on it.

A general principle of industrial policy, applicable to the fishing industry as elsewhere, is that countries should be proactive in assisting the private sector but focus on areas in which they have comparative advantage (Stiglitz et al., 2013). Governments should accurately assess current capabilities and weaknesses and attempt to provide assistance that will enable progressive upgrading into higher technology sectors. Moreover, Governments should focus attention on providing public goods and leave investment in commercial activities to the private sector, as to do otherwise invites costly failures.

In particular, Governments should view fishery sectors from economic, social and environmental perspectives, as fisheries provide employment, export opportunities and incomes in several LDCs, yet face the challenges of environmental degradation, including water pollution and overfishing. Policies should balance income and employment growth with environmental sustainability in the fishing industry. There is a complex relationship between productivity and sustainability. Under some conditions, improving the efficiency of domestic industry may be complementary to sustainable resource use,

including the increasing capture of fish when stocks are not in danger of overexploitation; increasing domestic capture at the expense of foreign fishing; and increased value added through reduced losses, improved use of by-catches and greater local processing and aquaculture. However, overfishing is a significant problem in many LDCs, as addressed in this study.

Given the common resource nature of fishing, regulatory oversight is essential. Government fishing agencies should monitor fish stocks, control overfishing, conduct research, provide technical assistance in quality control and invest in infrastructure, yet there is often a lack of financial resources and technical expertise to do so. Regional and international cooperation is crucial in many of these areas, in particular the monitoring of fish stocks and oversight of fishing rights. International institutions and non-governmental organizations have an important role to play in many of the areas discussed in the following sections. Similarly, enhanced public–private cooperation is conducive to solving problems. For example, in the late 1990s and the 2000s, cooperation between various stakeholders and donors played a key part in overcoming European Union bans on fish from Bangladesh, Mozambique and Uganda. For some purposes, policy should differentiate between artisanal and industrial fishing, and for the latter, between domestic and foreign vessels. Improved governance of the sector, however, benefits both small and larger fishing operations.

Providing infrastructure

Public and private investments in basic and specialized infrastructure are required for fishery sectors to reduce costs and enhance competitiveness. Governments should generally provide basic infrastructure, and specialized facilities may be developed mostly by the private sector. Transport and electric power infrastructure is lacking in many LDCs. Poor-quality roads increase transport times, pushing up costs. Electricity is critical, as the cold chain cannot function without reliable power. Governments, donors and industrial fishing companies should work together to upgrade fishing-specific infrastructure, such as landing sites and cold chains, since the adequacy of landing sites affects the ability to satisfy sanitary norms and inadequate cold-storage facilities constrain exports and processing operations. In the Comoros, for example, there are no common refrigeration facilities, one of the reasons for the lack of domestic industrial fishing. The poor quality and high cost of electricity in turn discourages investment in cold storage.

Improving capacities of Governments

In many LDCs, fishing agencies are underfunded, understaffed and lack adequate technical knowledge. Donors can assist with funding, institutional design and technical assistance. The designation of revenues received from fishing agreements to enhancing domestic policy agencies is a positive development. In the Comoros and Mozambique, nearly half of European Union financial contributions are earmarked to government capacity-building. Local authorities should develop capacity to collect data on the level of fish stocks, production and exports, possibly through partnerships with international organizations, in order to benchmark industry trends for policy purposes. Of the countries profiled in this study, there are reasonably reliable data on production and exports in Bangladesh and Uganda, and these two countries are among the few LDCs, including Mozambique and Myanmar, with approval to export to the European Union.

Attaining certification for access to developed country markets

Developed countries have established increasingly stringent public and private standards on imports of produce from developing countries, including fish. European Union standards are the most important and most demanding, and require the establishment of a local competent authority to provide oversight of the domestic application of HACCP standards. Only 12 LDCs, including Bangladesh, Mozambique, Myanmar and Uganda, meet European Union norms and have access to European Union markets. Private standards are more restrictive, and few LDCs are able to sell directly to large global retailers, instead selling to wholesale markets to which access is easier, although prices are lower.

Close coordination between local governments and donors and international organizations, as well as between the private and public sectors, is necessary to meet European Union norms, as illustrated by the experiences of Bangladesh, Mozambique and Uganda. These countries have faced intermittent European Union bans, from which they have emerged stronger, with assistance from donors. Meeting European Union norms can be a stimulus to upgrading. Bangladesh and Uganda have overcome and ultimately benefited from European Union bans, while other countries, such as Benin, have not yet fully done so (Houssa and Verpoorten, 2013); the difference can partly be explained by the relative sizes of the countries, as well as the quality of national institutions, combined with the willingness of public and private stakeholders to cooperate. Countries that meet European Union standards can usually also meet the less stringent requirements in other importing countries, such as Japan and the United States.

In the 1980s, FAO assisted the Government of Bangladesh in developing inspection schemes, laws and standards governing the capture and conservation of fish. The European Union played a similar role during the European Union ban on fishery exports from Uganda in 1997–2000. The provision of chemical inspection laboratories is a key requisite for ensuring fish quality. In Bangladesh, Mozambique and Uganda, Governments, together with external donors, invested in laboratory upgrades and employee training to overcome European Union bans. Similarly, the Government of Uganda, together with donors, financed inspection laboratories to overcome a European Union ban. Private firms should also upgrade plant

sanitary facilities, train employees and conduct audits of their facilities. International organizations and donors can inform and assist firms about regulations and technologies. The need to harmonize international standards not only between and among major importing countries but also between public and private standards has become ever more urgent. Finally, solutions should be found to align national and regional standards with internationally agreed standards, either in the context of WTO or through the Codex Alimentarius Commission.

Monitoring and regulating domestic fishing

Both industrial and artisanal fishing contribute to the depletion of fish stocks, but there are some differences in their management. In both segments, better knowledge of the state of fish stocks is the starting point. The monitoring of fish stocks and surveillance of fishing require resources and capacities lacking in most LDCs. Without good knowledge of local fish stocks, many LDCs are unable to prevent illegal fishing. Domestic governments can oversee fishing close to landing sites, but are generally unable to monitor foreign vessels operating offshore. Global assistance, in particular from the European Union, can play an essential role in maritime fishing, and regional cooperation can be critical in inland fishing. Developing aquaculture sectors can contribute in the long term to easing the pressure on natural fish stocks in many LDCs, although meeting import requirements is complex and challenging.

The control of industrial fishing requires the assertion of sovereignty over national fishing waters, as Namibia has done successfully (Organization for Economic Cooperation and Development, 2012). Prior to independence in 1990, fishing in Namibian waters by foreign vessels under agreements was not well monitored and often illegal. The main fish stocks, hake in particular, were depleted, and fishing yields dropped dramatically. The Government implemented a policy with a focus on rebuilding fish stocks, and quotas were established and carefully monitored and controlled. Authorities prioritized human resources development, development of a regulatory framework and dialogue with stakeholders.

Controlling artisanal fishing is more difficult, both politically and socially, given the sector's role in subsistence employment and income. Governments in most LDCs have legislation protecting against industrial trawling activity, yet laws regulating fishing practices and equipment for artisanal fisheries are also required.

Regional agreements are important for common resources, for example the transboundary Mekong River and Nile perch in Lake Victoria, shared by Kenya, Uganda and the United Republic of Tanzania. Regional collaboration is also necessary to obtain information and formalize the often large amounts of unrecorded cross-border trade in fish products.

Most attempts to control overfishing in LDCs have had little success or have not been fully implemented. For example, the assigning of private property rights through a commercial lot system worsened the situation in Cambodia. Bangladesh, Cambodia and Uganda have recently initiated projects involving the formation of local fishing communities as a means towards controlling overfishing, namely village surveillance communities in Bangladesh, co-management communes in Cambodia and beach management units in Uganda. The goal is to inform the community and local leaders about harmful practices and authorize the local community itself to monitor the fishing practices of its members.

Transitioning from artisanal to industrial fishing

Transitioning from artisanal to industrial fishing requires the accumulation of human and physical capital. In LDCs with long fishing traditions, such as Cambodia, Mozambique and Myanmar, there are numerous skilled artisanal fishers, but limited or little knowledge of modern fishing and processing technology. In the Comoros, traditional fishing using wood canoes has evolved into artisanal fishing using small, motorized fiberglass boats. Increasing the number and size of motorized boats can boost both productivity and sustainability by enabling them to travel further offshore to where fishing stocks are less threatened, but requires skilled personnel to operate them and investment in building boats. Investment in boats, landing facilities and processing factories, as well as testing laboratories, by domestic entrepreneurs depends on the availability of credit or access to finance. However, financial systems in LDCs are generally relatively unsophisticated and lack the tools to safely generate sufficient credit, and banks may be averse to lending to small artisanal businesses. Artisanal fishers obtain the lowest margins among all stakeholders in typical distribution chains in LDCs, and their ability to repay loans is a source of concern. The development of appropriate credit facilities, along with mechanisms that ensure the repayment of credits, is a problem faced by economic policymakers in LDC. Adequately funded and staffed fishing schools, along with technical assistance from donors, can help raise skill levels.

Moving up the value chain: Processing and aquaculture

LDCs perform little processing. Bangladesh, Mozambique, Myanmar and Uganda are partial exceptions. Uganda banned exports of unprocessed fish to spur domestic processing, but such measures are unlikely to suffice to attract investment in higher value added activities such as canning, and may be counterproductive if they dissuade exports. With regard to canning and freezing, non-LDC developing countries have an advantage in economies of scale and better know-how and logistics. As LDCs improve their business climates and transition towards industrial fishing, foreign and domestic investment is likely to increase.

Aquaculture, as are capture fisheries, may be either small and artisanal or industrial. Industrial aquaculture is currently beyond the reach of most LDCs. Some LDCs, however, including Bangladesh, Mozambique, Myanmar and Uganda, have been successful in boosting small-scale aquaculture to aid food security and incomes in rural communities. Industrial-scale aquaculture is likely to require foreign participation, given the capital and level of technology and organization involved.

Growth in aquaculture may be facilitated by investment in research institutes, as in Bangladesh and Uganda. Bangladesh is now the world's sixth largest aquaculture producer. The Bangladesh Fisheries Research Institute has successfully developed and disseminated genetically modified strains of fish to suit the local ecology, while simultaneously training small-scale farmers in best practices. The Government of Uganda recently established an aquaculture research institute in a joint-venture partnership with China, and efforts are underway to replicate a model similar to that of the Bangladesh Fisheries Research Institute.

Selling fishing rights to foreign countries

A number of LDCs receive foreign exchange earnings by leasing out maritime fishing rights, notably to the European Union and Japan. Advantages to LDCs include fees and technical assistance in exchange for fishing rights and disadvantages include the fact that fish are often not processed locally and that the monitoring of compliance with fishing limits is difficult. Agreements with foreign fleets should be carefully negotiated to ensure that the home country receives adequate benefits. The European Union agreement with the Comoros appears fair to both parties, with the Comoros receiving revenues of more than 10 per cent of the value of the fishing rights, along with substantial technical assistance and assistance in monitoring fishing stocks. However, the extent of fishing and the types of fish captured by foreign fleets are not known and it is difficult to precisely determine the advantages to the Comoros. The situation in Mozambique is more complicated, as there are also non-European Union fleets. Furthermore, foreign fleets put pressure on fish stocks in waters demarcated for artisanal fishers, while export earnings from licence agreements are low relative to actual export incomes earned by enterprises. The effective regulation of foreign vessels and the transparency of agreements is indispensable to the sustainable development of the sector. Agreements should also provide incentives for local landing and processing, where economically efficient to do so.

Improving capacities of LDCs to negotiate and monitor fishing licence agreements

The capacity of LDCs to effectively negotiate and monitor the implementation of fishing licence agreements is low, and LDCs are unable to make full and effective use of their fish resources with regard to fees from such agreements. It is critical to build the capacities of LDCs and small island developing States to negotiate the terms and conditions of fishing agreements, in order that fees received through such agreements contribute to their socioeconomic development. Developed countries should also support LDCs and small island developing States in entering into transparent fishing licence agreements that guarantee fairness with regard to fees based on the market value of fish and take into account the species caught by fishing fleets from countries that dominate the fishing industry.

Priority actions

The following actions are recommended as the highest priorities in order to attain certification to export to developed countries and boost income and employment in fishing in LDCs. A general theme is the need for the various stakeholders to work together.

1. Institutional capacity-building. LDCs should seek assistance from development partners to develop the capacity of Governments to monitor and regulate fishing sectors. They should also establish technical agencies and fishing-related research and development institutions, not only to meet market requirements but also to ensure sustainable fishing
2. Infrastructure provision, as follows:
 - (a) Electricity. The fishing sector, as many others, cannot function without reliable electric power. Governments should resolve the problem of power outages and excessively costly electricity supply
 - (b) Cold storage. Joint investments by the public and private sectors and donors should target the cold chain, which is crucial due to the perishability of fish
 - (c) Chemical inspection laboratories. For example, in Bangladesh and Uganda, the creation of laboratories for testing fish was a key step in obtaining European Union certification
3. Regional cooperation. Several countries share fishing stocks, in both marine and inland waters. Monitoring, control and surveillance should be coordinated, as carried out increasingly successfully in Kenya, Uganda and the United Republic of Tanzania. Regional organizations such as ASEAN and the Indian Ocean Tuna Commission can play a catalytic role in enforcing international and regional rules and regulations, as well as in controlling IUU fishing
4. Aquaculture. LDCs should endeavour to develop their aquaculture sectors as a method of horizontal diversification and a means to generate employment, domestic consumption (food security) and exports, while contributing to the improved management and sustainability of natural fish stocks in the long term. In the short term, the emergence and expansion

of aquaculture depends on, among others, natural stock levels and the availability of improved varieties or species of fish seeds and fish feeds

5. Community-based approaches. Such approaches to fishing conservation, such as the beach management units in Uganda, should be further explored. Such organizations are best placed to balance the use of fisheries as a source of employment with the need to protect fish stocks
6. Fishing agreements. Donors, non-governmental organizations and LDC Governments should ensure that fishing agreements with developed country fishing fleets are transparent and include fair fees and provisions for capacity-building for local governments and fishers. Such agreements should reflect or take into account the prevailing market value of the fish captured. It is important to build the human, institutional and regulatory capacities of LDCs and small island developing States to negotiate, implement and monitor fishing agreements
7. Fish subsidies. Concrete actions should be taken to discipline production and export-distorting fishery subsidies, as well as subsidies that contribute to overfishing and IUU fishing activities, while ensuring the exemption of LDCs from any reduction commitments that are not consistent with the level of their socioeconomic development
8. Harmonization of standards. There is a need to harmonize national and regional food standards, including private and public standards, and realign them with internationally agreed standards.

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