Part 2
Trade in Sustainable Fisheries and Aquaculture

2.1 Fish and World Trade Regimes Towards 2035

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Abstract

The conservation of oceans and seas, including fish and marine species, gained significant impetus with the adoption of new Sustainable Development Goals (SDGs) by the United Nations in September 2015. Goal 14 on the conservation and sustainable use of oceans and seas and marine resources provides strong guidance for action by the international community. Interaction between instruments seeking the conservation of wild fish stocks and marine species on the one hand, and the trade regime on the other, will shape the way in which we harvest, process and trade fish. Fish stocks conservation is an urgent concern that cannot continue unaddressed. This note provides a forecast on how the fish and world trade regimes will look like five years after the implementation of SDGs in 2035. Three main trends are likely to affect the supply and demand of fish and fish products. In the trade realm, these trends point to a selective and incremental incorporation of marine live and fish conservation measures in the multilateral trading system, and regional trade agreements in particular. By 2035, wild marine catch will grow only slightly while aquaculture products will fill the gaps in order to address increasing demand. Moreover, tariffs on fish and fish products will be lower, non-tariff measures will continue to proliferate while some unfair practices such as subsidies and IUU fishing activities will be addressed at the multilateral and regional levels.

Introduction

In 2015, multiple milestones at the multilateral and regional levels have shaped the way in which we harvest, process and trade fish. These milestones provide new directions that will define how the interaction between sustainable fish harvesting and trade regimes might look over the next 20 years. These include:

- The adoption of the 2030 Agenda for Sustainable Development and the SDGs which, for the first time, incorporate a stand-alone goal relevant to the conservation and sustainable use of oceans and seas and marine resources (Goal 14) (United Nations General Assembly, 2015a).
- The development of the First Global Integrated Marine Assessment and its presentation to the United Nations General Assembly (United Nations General Assembly, 2015b).
- The celebration and stock-taking of the 20 years of the United Nations Fish Stock Agreement (United Nations Division for Ocean Affairs and Law of the Sea, 2001) and the FAO Code of Conduct for Responsible Fisheries (FAO,1982).
- The Tenth WTO Nairobi Ministerial Conference, which took a decision to advance negotiations

on the remaining Doha Round issues, including those on rules (WTO, 2015). Efforts deployed by 27 WTO Members (the so-called Friends of Fish) and African, Caribbean and Pacific group of countries was not successful to introduce some minimum transparency and notification standards and to discipline certain forms of subsidies that contribute to overfishing and overcapacity.

- The Trans-Pacific Partnership Agreement (TPP) included, for the first time within an environmental chapter, specific measures seeking to address the conservation of living marine resources (United States Trade Representative, 2015).

It is not easy to predict what international trade regimes and fish governance systems may be like 20 years from now. We do, however, have a number of pointers for the future. It is clear that the world in 2035 will look very different from today. There are three very significant global trends that we cannot ignore. These include: 1) population growth, 2) climate change, and 3) declining level of fish stocks and wild catch. There will also be important changes that could shape how trade regimes enable and regulate fish and fish products trade including: 1) increased demand for fish, 2) a larger share in the production and trade of aquaculture products, and 3) deeper economic integration through trade agreements among participating Members that affect fish trade.

Sustainable Development Goal 14: a road map for the next 15 years

Achieving SDG 14 through the implementation of its fish-related targets will entail a titanic task for the next 15 to 20 years. SGD Goal 14 – to 'conserve and sustainably use the oceans, seas and marine resources for sustainable development' – underlines the importance of sustainably managing and using maritime resources and related ecosystems. SDG 14 and its targets build upon many of the provisions for oceans and fisheries conservation and sustainable use provided in *The Future We Want* (the Rio+20 outcome document), the Samoa Pathway for Small Island Development States (SIDS) and the Istanbul Programme of Action (IsPOA) for LDCs and the Addis Ababa.

Goal 14 Action Agenda provides a catalyst for improving and/or implementing existing treaties and soft law instruments more effectively over the next 15 years, including the United Nations Fish Stock Agreement (1995), the FAO Compliance Agreement (1993), the FAO Code of Conduct for Responsible Fisheries (1995), the FAO International Plan of Action to Prevent, Deter and Eliminate IUU fishing (2001), and the recent Port Measures Agreement (2009 entered into force in June 2016), among others.

Achieving the targets of SDG 14 will be difficult, particularly with regard to thorny issues – such as addressing and removing fisheries subsidies (Target 14.6) – that are stalled in the WTO Doha Round negotiations. Although the 10th WTO Ministerial Conference failed to produce a specific outcome on fisheries subsidies, negotiations on that topic continue within the Negotiating Group on Rules. Progress is slow, however, as illustrated by the difficulties in reaching consensus even in areas such as transparency and notifications.

Taking into account the vital importance of fisheries for many SIDS and LDCs, the SDGs make specific mention of the need to increase economic benefits for these countries (Target 14.7) and to provide market access to small-scale artisanal fishers (Target 14.b). Financial and technical assistance, as well as technology transfer (Target 14.a), will be important to many SIDS and LDCs as they look to create and implement national and regional strategies for sustainability, preservation and protection of their fisheries industries.

Achieving the targets of Goal 14 will also contribute to the realization of other relevant SDGs, such as Goal 2 (end hunger, achieve food security and improve nutrition, and promote sustainable agriculture) and Goal 12 (ensure sustainable and consumption and production patterns). These interlinked goals provide a new framework for advancing sustainable development over the next 15 years.

Global trends on population, climate change and fish stocks

By 2035, world population will have expanded dramatically and the age structure will change significantly. Today, the global population is about 7.3 billion, a figure projected to reach about 8.5 billion by 2035 (UNDESA, 2011). Some 2 billion more people will populate the earth in 20 years from now. It is also expected that, by 2030, the population of the least developed countries will surpass that of the more developed regions (UNDESA, 2011).This represents a huge challenge for the production and supply of food,

natural proteins, fats, vitamins and other nutrients that will be needed by future generations, particularly those whose livelihoods depend on increasingly scarce resources.

The age structure of the global population will also be quite different. Today, most of the world population is less than 29 years old. By 2035, however, the average age is projected to exceed 45 years (UNDESA, 2015) mainly due to a continuous drop in fertility rates in developed countries. This means that there will be a sharp increase in the need for more abundant, high quality, healthier, and perhaps less caloric foods. This trend – already evident in developed markets with changing food consumption patterns of younger generations – is likely to expand to emerging and developing countries within this decade, coinciding with growing income levels.

The second important trend is climate change and its negative effects on fish stocks and marine ecosystems. The health of the oceans is closely linked to the health of the atmosphere. The fifth report of the Intergovernmental Panel on Climate Change reaffirmed its conclusion that global sea-surface temperatures have increased since the late nineteenth century, unleashing phenomena such as “el Niño” and increasing the number of extremely hot days along the world coastline (United Nations General Assembly, 2015b). This situation generates changes in migratory and reproduction patterns.

In addition, higher global temperatures resulting in rising seawater levels, seawater acidification (due to higher levels of carbon in the water) and lower levels of oxygen in seawater are causing worrisome zooplankton mortality, coral bleaching and huge impacts over the marine food chain and ecosystems. Oceans are absorbing more than 26 per cent of global carbon dioxide, generating seawater acidification and affecting the chemistry needed for the formation of many species of shells and skeletons (United Nations General Assembly, 2015b). These factors will adversely affect the future of both fresh-water and marine fisheries (UNFCCC, 2007) since they may impact on fish reproduction patterns and migratory behaviour. Higher temperatures, as well as increased potential for disease spread, may also affect aquaculture operations.

Many of the proposed scenarios on climate change look quite apocalyptic, particularly when we get closer to the end of the century. Indeed, a number of scientists argue that keeping global temperature rise below 1.5 degrees against pre-industrial levels – the target to be achieved in the new climate agreed at COP21 in Paris – is totally unrealistic[1]. For example, according to United States National Oceans Atmospheric Administration, we hit record in high temperatures in both land and sea surface temperature during the first quarter of 2016 (NOAA, 2016).

Progress on cutting emissions reductions through Nationally Determined Contributions, jointly with other mechanisms, will be key to achieving a peak in emissions under the new Paris Agreement (UNFCCC, 2015). It is, however, questionable whether these actions will be sufficient. Oceans have already absorbed enormous quantities of carbon and emissions are not expected to decline before 2035. How much carbon can the oceans absorb before many of its effects become irreversible? Will sensitive marine life forms – the base of the food chain such as plankton or krill – survive additional carbon levels over next 20 years?

In view of these facts, we may just need to adapt to higher temperatures. Many of the foreseen climate change impacts may not be mitigated within the next 20 years due to the already existing accumulations of greenhouse gases (GHGs) in the atmosphere and the lack of strong political action to set effective emissions limits.

The third global trend we cannot ignore is that the level of wild fish catch (including fresh and marine catch) is likely to remain stagnant over the next 20 years. According to the FAO, 87 per cent of the world’s marine fish stocks are fully exploited, overexploited or depleted, a number that has increased steadily until very recently. While the global marine and inland fish catch has remained relatively constant at about 90 million tons since 2007 (of which marine catch accounted for about 80 million tons and inland fish about 10 million) (FAO, 2014), it has been predicted that the current level of catch (90 million tons) may reach 93 million tons by 2030 (World Bank, FAO, IFPRI and AES, 2013). The expected small growth is based on a relatively optimistic scenario. This means that, even with better management, we will not be able to achieve significant stock recovery by 2035. In fact, we may have already reached the oceans’ sustainability boundaries and, unless fish stock replenishment becomes a top priority for States and the global community, ever more fish species will face extinction and entire marine ecosystems may be threatened.

Trade in fish

Model projections indicate that total fish supply will increase from 154 million tons in 2011 to 186 million tons in 2030[2]. Wild catch supply is likely to remain stagnant and aquaculture supply is expected to grow, hence the share of wild catch in the world supply will continue to decline. In contrast, the share of aquaculture in world fish production is likely to expand significantly. Wild catch as a share of total fish supply will decrease from 67.9 per cent in 2009 to 58 per cent by 2030[3]. This would imply that an estimated 62 per cent of all food fish will come from farm-raised sources by 2030, showing an 18 per cent increase from current consumption patterns[4]. With an increased share of farmed products in the market, the nature of production for seafood purposes will be quite different. The business model of aquaculture differs significantly from that of traditional and industrial fisheries as it is more intensive in capital, land and ecosystem services, as well as technology and knowledge. It also allows more control over the final output. However, the risks are similar to those affecting animal-raising businesses, including strong impacts on surrounding ecosystems coupled with occasional disease outbreaks.

In 2014, global exports of fish, crustaceans and molluscs reached a historical peak in value of US$146 billion (FAO, 2016). Developing countries already export 56 per cent of all fish and fish products, while developed countries account for 44 per cent and transition economies for about 2 per cent (FAO, 2016). It is probable that the bulk of wild catch and aquaculture activities will take place in developing countries. If this pattern continues, developing countries will largely dominate trade in fish exports by 2035. The increased concentration of fish harvesting activities in developing countries also suggests a higher level of responsibility by these countries over the future of fish stocks and aquaculture production, particularly since it concerns sustainable management of both species and ecosystems. Fish stock sustainability is a global matter, and the international community has an obligation to assist developing countries in meeting this challenge.

The future of trade regimes

Trade agreements that include clauses on of fish trade regimes will continue to evolve at the multilateral and regional levels. The Multilateral Trading System (MTS) is presently struggling to overcome difficulties in finding consensus in a world that involves significant new Southern players calling for action on reducing tariffs on fish and fish products and addressing harmful subsidies. With the impetus given by the Sustainable Development Goals there is some hope that the difficulties faced in the ongoing Doha Round can be resolved and a more fish-friendly MTS will be in place by 2035.

On the other hand, the number of Regional Trade Agreements (RTAs) will continue to increase, particularly among like-minded partners as record numbers of new RTAs are concluded every year. For example, as of July 2016, the WTO had received some 635 notifications of RTAs (WTO, 2016). Of these, 423 were in force. Both multilateral and regional agreements could increasingly reflect the particularities of sustainable use of marine resources and other sectors of the oceans economy, for instance by introducing rules on fisheries subsides and links to the fight against IUU fishing.

In this regard, it is worth noting that the environment chapter of the recently adopted TPP Agreement includes, for the first time, provisions on living marine resources and incorporates both the CITES[5] and the MARPOL[6] Agreements. It also contains obligations, such as the introduction of fisheries management systems and phasing out certain forms of subsidies that negatively affect overfished stocks and contribute to IUU fishing. All these new obligations are subject to the trade dispute settlement mechanism of the TPP. This development puts pressure on the multilateral trading system to deliver on trade-related targets under the SDGs.

With regard to specific trade measures, it is foreseen that average applied tariff measures will go down to close to zero per cent levels. WTO MFN average applied tariffs for fish and fish products are not particularly high and were estimated at 11.6 per cent by 2014[7]. If the Doha Round finally succeeds in the Non-Agricultural Market Access segment – whether through a Swiss formula approach or a sectoral agreement – the most likely outcome will be close to a zero-tariff arrangement among most developed countries with some Special and Differential Treatment for developing countries. It is also probable that RTAs will bring tariffs down among participant countries. For many countries, this would not only reduce trading costs, but also the loss of potential governmental income and consequent preference erosion for others countries.

In contrast, non-tariff measures (NTMs) will continue to increase as market requirements in both importing and exporting countries are becoming so demanding that they present an actual barrier to trade. In principle, even if they are applied, tariffs tend to be more predictable and measurable. NTMs continuously add new requirements and potential unexpected costs and procedural complexities to production and exporting processes. While many of these measures may be built on science and sound environmental, safety and sanitary concerns, there are cases where WTO adjudicating bodies have found several of them to be inconsistent with WTO law. Surprisingly, or maybe not, many of the historical high-profile WTO NTM-related disputes have been on fish products and the production of certain species, whether caught directly or indirectly (e.g. Tuna-Dolphin, Salmon, Shrimp-Turtle, and Hake).

If this trend continues, we might be creating, albeit with good intentions, a trade minefield that could accumulate hundreds to thousands of measures by 2035 unless we find effective mechanisms for harmonization, risk assessment and mutual recognition. For instance, by September 2015, 732 sanitary and phytosanitary measures (SPS) and 524 technical barriers to trade (TBT) applicable to fish and fish products were notified by WTO Members (UNCTAD, 2016). This represents a significant annual growth of 10.2 per cent and of 12.2 per cent in the number of SPS/TBT measures notified since 2010, which indicates that NTMs have become the new and most relevant barrier to trade for fish and fish products. If the same growth rate continues, it could exceed 10'500 SPS and TBT measures by 2035 (Vivas-Eugui, 2016).

While a more regulated trade regime that seeks sustainability and safety objectives is desirable, a system that allows the creation of unilateral and overly burdensome barriers to trade will also defeat the original purpose since it might simply impede trade regardless of the efforts. We might need a more effective multilateral mechanism to ensure that NTMs do not become just an opportunity for disguised protectionism in the trading system. Also, we need to undertake global NTM mapping applicable to trade in fish to better understand the nature and impact of these measures.

Finally, by 2020 – rather than 2035 – we hope that there will be binding and effective disciplines on fisheries subsidies that contribute to overfishing and overcapacity as targeted under the SDGs. These new goals emphasize the need to prohibit subsidies that contribute to overcapacity and overfishing and refrain from introducing new ones. Today, global fisheries subsidies have been estimated as high as US$15 to 35 billion[8] (UNCTAD, 2014b), worldwide, of which US$20 billion have been categorized as capacity-enhancing (Sumaila, Lam, and Le Manach, 2013). Removing such subsidies could result in global economic gains of US$50 billion (World Bank and FAO, 2009). If we could find enough goodwill at the WTO, there could be a shift in the type of subsidies granted, transforming them from capacity-enhancing to more sustainable ones. We could, for instance, achieve this by redirecting such subsidies toward the establishment of marine management systems, putting in place fish stock conservation plans and restoring ecosystems, creating larger marine protected areas, and improving IUU monitoring.

The new SDG 14 – which seeks to effectively regulate harvesting and end overfishing, as well as IUU fishing and destructive fishing practices by 2020 – is an ambitious one. It is estimated that around 11 to 26 million tons of fish are harvested illicitly each year. Such catches are thought to be worth between US$10 to 23.5 billion (Global Oceans Commission, 2013). While understanding on the relationship between trade and the IUU combat is still incipient, the lack of efforts towards fighting IUU fishing is already having consequences for unilaterally signalled/listed countries (i.e. those that have been listed as not deploying efforts to fight IUU fishing). Consequences for these countries may include difficulties in accessing markets, reputational damage and the need for internal regulatory and administrative reforms. While no country denies the importance of curbing IUU fishing, many developing countries would like to see a more harmonized and transparent risk assessment system and efforts in the fight against IUU that are not based on unilateral regulations or evaluations. Perhaps by 2035, we will have a more comprehensive multilateral IUU fishing regulatory and monitoring system that brings together all principles developed under international law and soft law that is fair, transparent, uniform, effective and predictable for all.

It is expected that with the new SDGs, further and more coordinated global action will be directed towards addressing some of the most important causes of fish stocks depletion, including IUU fishing, subsidies and other unsustainable practices. However,

considering the modest level of achievement of the Millennium Development Goals, and Goal 7 (on ensuring environmental sustainability) in particular, we should focus firmly on achievable results. A proposal for further action is to conduct an annual review of progress in the implementation of SDG 14 on oceans, including realistic targets in terms of fisheries, preferably against previously agreed milestones.

2.2 Fisheries, Aquaculture Utilization and Trade: Challenges and Opportunities

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Abstract

FAO is a leading agency in ensuring sustainable utilization of marine resources for food and nutrition. The organization recently launched its Blue Growth Initiative (BGI) aiming at building resilience of coastal communities and restoring the productive potential of oceans and wetlands by promoting international coordination to strengthen responsible management regimes and practices that can reconcile economic growth and food security with oceans conservation and the ecosystems they sustain. This paper summarizes main basic data, information and recommendations gathered by FAO under the BGI and other initiatives to illustrate emerging issues and approaches. It looks at various prospecting models on what could be future trends and challenges on fisheries and aquaculture over the next 20 years, as well as the role of certain key instruments such as international rule-making, eco-labelling, certification and traceability systems. The paper ends with a set of policy recommendations on how to advance hunger-related global goals.

Introduction

Established in 1945 as an agency of the United Nations, the FAO leads international efforts to eradicate hunger, food insecurity and malnutrition. FAO's vision is: "A world free from hunger and malnutrition where food and agriculture contribute to improving the living standards of all, especially the poorest, in an economically, socially and environmentally sustainable manner."

Three global goals underpin this vision:

- eradication of hunger, food insecurity and malnutrition, progressively ensuring a world in which people at all times have sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life;
- elimination of poverty and the driving forwards of economic and social progress for all, with increased food production, enhanced rural development and sustainable livelihoods;
- sustainable management and utilization of natural resources, including land, water, air, climate and genetic resources, for the benefit of present and future generations.

Fisheries and aquaculture make a significant contribution to food security and livelihoods of millions of people, supplying around 20 kg of fish per capita a year, including essential micronutrients such as vitamins, minerals (zinc, iron, iodine and selenium), omega 3 fatty acids and about 17 per cent of global animal proteins. Around 58 million people were directly employed in fisheries and aquaculture in 2012, providing some 200 million direct and indirect employment opportunities along the value chain from harvesting to distribution, making the livelihoods of 10 to 12 per cent of the global population dependent on the sector. Finally, fish and seafood are one of the most traded food commodities. Some 36 per cent of the production enters international markets, generating a trade value of US$144 billion in 2014, up from a mere US$8 billion in 1976. More than 56 per cent (FAO, 2015b) of this trade originates in developing countries whose net trade income (export minus import), valued at US$38 billion in 2014, is greater than the net trade income of the main agricultural commodities combined.

This places fisheries and aquaculture at the center of an important economic activity that can contribute significantly to providing both food and livelihoods to a global population set to reach 9.7 billion in 2050 (UNDESA, 2015a). Unfortunately, the sector is already under stress from over-exploitation, pollution, declining biodiversity, expansion of invasive species, climate change and ocean acidification. The share of marine fish stocks that are overfished has increased alarmingly, from 10 per cent in 1970 to nearly one-

third in 2011. While 61 per cent of stocks are currently fully fished, the potential economic gain from reducing fishing overcapacity and restoring fish stocks is likely to reach US$50 billion per year. IUU fishing is estimated at 15 to 20 million tons a year. Disease outbreaks have cost the aquaculture industry tens of billions of United States dollars over the last 20 years. Natural disasters, such as the 2004 Tsunami or the 2014 Typhoon Haiyan, caused massive loss of life and severe damage to the physical infrastructure of the affected countries.

Hence, realizing the full potential of the sector requires new approaches to economic development. A more environmentally, socially and economically effective fish and seafood chain can contribute to sustainable growth and food security, pave the way for less pressure on aquatic resources and deliver the potential for people employed in the sector to act not only as resource users but also as resource stewards.

The Blue Growth Initiative

In 2013, FAO launched the Blue Growth Initiative (BGI) in support of food security, poverty alleviation and sustainable management of living aquatic resources. The initiative aims to build resilience of coastal communities and restore the productive potential of the oceans and wetlands by promoting international coordination to strengthen responsible management regimes and practices that can reconcile economic growth and food security with oceans conservation and the ecosystems they sustain.

The BGI supports the post-2015 Sustainable Development Goals and targets that fall within FAO's mandate; in particular Goal 2 (end hunger, achieve food security and improved nutrition and promote sustainable agriculture) and Goal 14 (conserve and sustainably use the oceans, seas, and marine resources for sustainable development). BGI featured prominently at COP21, in particular during the Action Day Lima Paris Action Agenda (LPAA) and other ocean-related events.

The Blue Growth concept has also gained visibility and prominence in the oceanic and freshwater development agendas of international organizations such as UNEP, the World Bank, the OECD, the European Union, and many nations, both developed and developing, in particular the SIDS. The BGI aims to improve the governance and management of aquatic resources, the conservation of their biodiversity and habitats, as well as help vulnerable communities in their adaptation to climatic changes through improving their resilience to cope with natural disasters and crises.

The BGI is organized around 4 major streams of work:

Capture Fisheries:

The aim is to provide policy, technical and institutional capacity-building support to governments, regional fisheries bodies (RFBs) and industry to ensure that an adequate institutional, scientific and legal framework is in place to support and enforce fisheries management and good practices to combat IUU fishing, reduce overcapacity, restore stocks and minimize the impact of fishing on the environment.

Global Aquaculture Advancement Partnership (GAAP):

The aim here is to support a sustainable increase in global aquaculture production to meet increased demand for fish as the world population grows. GAAP will contribute to this aim by providing technical and capacity-building support to governments and farmers to develop national strategies for aquaculture development, disseminate and adopt better management and governance policies and best practices that increase productivity and reduce environmental and disease risks to stimulate investment.

Livelihoods and food systems:

Under this component, FAO will assist governments and private sector to develop policies for value-addition and trade promotion, integrating economic performance, food security, sustainability and social protection. With the transition to more sustainable fisheries management, it will promote public/private partnerships that support investment in infrastructure, technology and practices to increase the value and quality of fisheries. To this end, FAO will promote decent livelihoods, poverty reduction, job creation, social inclusion and community resilience.

Ecosystem Services:

FAO will contribute expertise for conducting and disseminating national and regional studies on carbon-binding possibilities in sea grass beds, mangroves (which act as a defense against coastal erosion and storm and wave damage) multi-cropping (fish & rice, fish & cassava) and seaweed cultivation among other possibilities. This information will be used to assist coastal communities in creating income and livelihoods,

reducing poverty and improving social conditions.

At the global level, the substantive work of the BGI would support the implementation of the FAO Code of Conduct for Responsible Fisheries and International Plans of Action for managing fishing capacity and combatting IUU fishing. It would also support International Agreements and Guidelines (such as those on Securing Sustainable Small Scale Fisheries, the Voluntary Guidelines on Responsible Governance of Tenure of Land, Fisheries and Forests, and the FAO/ILO/IMO instruments on the Safety of Fishing Vessels and Fishers) as well as bycatch management and the reduction of discards, management of deep-sea fisheries in the high seas, and an ecosystem approach to fisheries and improving practices in fishing and aquaculture.

At the regional level, the BGI supports the implementation of the Blue Growth Regional Initiative in Asia and Pacific, which focuses on sustainable aquaculture intensification. In the Near East and North Africa, the main focus is on capture fisheries along the entire fish supply chain. The initiative also supports the network of regional fisheries bodies (RFBs/RFMOs) which are mandated to work towards achieving relevant components of the BGI.

At the country level, FAO supports several pilot countries in the promotion and implementation of the BGI concepts in their national policies and strategies on fisheries and aquaculture. Consultations with other regions are underway to develop synergies with regional initiatives such as those on water scarcity and rice.

Outlook models for understanding future trends and addressing forthcoming challenges

In order to have supporting policies and political commitments that effectively promote food security and good nutrition, it is essential that up-to-date information and statistics are available and accessible. From the perspective of future population growth and a possible increase in demand for fish and fisheries products, there is a need to develop specific projections to help us understand the outlook for fisheries and aquaculture. Outlook studies can be an important tool for international organizations, such as FAO, the OECD, the World Bank and the international community at large. They can facilitate understanding of the impacts of changes in aquaculture and capture fisheries, demand shifts and policy reforms, as well as provide relevant information for developing strategic responses to emerging challenges. Outlook projections can also help FAO, other international organizations and donors to highlight work priorities and develop tailored strategies to support countries in addressing the major challenges facing the sector.

In recent years, specific fish models have been developed in partnership with international organizations. It was considered important that this work would not be carried out in isolation, but be integrated into an overall agricultural analysis aimed to achieve a more comprehensive and consistent examination of the medium- or long-term prospects for fish together with those for food and agriculture. The two main outcomes are: (i) the FAO Fish Model, developed by FAO as a satellite to the OECD–FAO AGLINK–COSIMO Projection System,[9] with medium-term projections (ten years) annually included in the OECD–FAO Agricultural Outlook publication since 2011; and (ii) the *Fish to 2030* publication (World Bank, 2013), which shows the results of the International Model for Policy Analysis of Agricultural Commodities and Trade developed by the International Food Policy Research Institute (IFPRI).

For both models, the main data used are FAO fisheries and aquaculture statistics on production, trade and apparent consumption. Based on key assumptions and uncertainties, the outlook models provide important insights on the likely paths of development, as well as the constraints in supply and demand to determine regional vulnerabilities, changes in comparative advantage, price effects and potential adaptation strategies in the fisheries and aquaculture sector. The results of both outlook models are based on specific assumptions regarding the future macroeconomic environment, international trade rules and tariffs, absence of abnormal fish-related disease outbreaks, fisheries quotas, longer term productivity trends and the absence of market shocks. Should any of these assumptions change, the resulting fish projections would be affected.

The OECD–FAO Agricultural Outlook

The OECD–FAO Agricultural Outlook is an annual publication presenting projections and related market analysis for some 15 agricultural products[10] over a ten-year horizon. The projections are based on the AGLINK–COSIMO modelling system,

which brings together the commodity, policy and country expertise of both organizations and input from collaborating members to provide an annual assessment of prospects for the coming decade for national, regional and global agricultural commodity markets. It shows how these markets are influenced by economic developments and government policies, and highlights some of the risks and uncertainties that may influence market outcomes. The capacity to capture interactions between commodities and countries is a major strength of this model, allowing analysts to assess not only the direction but also the magnitude of market adjustments resulting from economic or policy changes. The agricultural policies of many countries are specifically modelled within AGLINK–COSIMO. This makes the model a powerful tool for forward-looking analysis of domestic and trade policies through the comparison of scenarios of alternative policy settings against the benchmark of the baseline projections.

In collaboration with the OECD, FAO has recently built a dynamic, policy-specific, partial-equilibrium satellite model on fish and fisheries products.[11] The main results of the fish model (included in the "Fish and seafood" chapter of the annual OECD–FAO Agricultural Outlook publication) provide insights on the most plausible scenarios for a ten-year horizon in the fisheries and aquaculture sector. The results describe an outlook in terms of future production potential, projected demand for fisheries products, consumption, prices and key factors that might influence future supply and demand. These trends can guide FAO the OECD and their members in developing plans for the sustainable use and conservation of fisheries and aquaculture resources for economic growth, improved social welfare and development.

The baseline projection should be considered as a plausible scenario elaborated on the basis of specific assumptions regarding macroeconomic conditions, policy settings, weather conditions, longer term productivity trends and international market developments. The main outcomes of the latest fish projections were included in the OECD–FAO Agricultural Outlook 2015–2024 published in July 2015.

Key findings include:

- World fisheries and aquaculture production is projected to expand by 19 per cent between the 2012-14 base period and 2024, to reach 191 million tons.
- The main driver of this increase will be aquaculture, which is expected to reach 96 million tons by 2024, 38 per cent higher than the base period (average 2012-14) level.
- In 2023, aquaculture is set to surpass total capture fisheries (including non-food uses), earlier than projected by previous issues of the Outlook Reports and the WB/IFPRI/FAO *Fish to 2030* report.
- The world's per capita fish food consumption is projected to reach 21.5 kg in live weight equivalent in 2024, up from 19.7 kg in the base period.
- Fish consumption will expand in all continents, with higher increases expected in Asia and Oceania.
- In contrast to previous Outlook Reports, a slight increase is projected for fish consumption in Africa for the first time.
- Since 2014, species raised from aquaculture have become the main source of fish for human consumption. This share is projected to reach 56 per cent in 2024.
- This global picture masks variations between regions. The bulk of the increase in production and consumption will continue to originate from Asian countries. While China will remain the leading producer and exporter at world level, developing countries will be the major drivers in increasing production, trade and consumption of fish and fisheries products.

Fish to 2030

Fish to 2030 is the result of collaborative work between IFPRI, FAO, the University of Arkansas at Pine Bluff, and the World Bank. It builds on *Fish to 2020* (Delgado et al. 2003), which provided a comprehensive global overview of the food fish supply and demand balance. The report uses IFPRI's IMPACT[12] model to generate projections of global fish supply and demand up to 2030. This is a relatively straightforward partial equilibrium global agriculture sector model, covering the world in 115 model regions for a range of more than 40 agricultural commodities, to which fish and fish products were added for the *Fish to 2030* study.

In the 1990s, IFPRI developed the IMPACT model to address a lack of long-term vision and consensus among policy-makers and researchers about the actions necessary to feed the world in the future, reduce poverty and protect the natural resource base. The model serves as a basis for research on the linkage between the production of key food commodities and food demand and food security at

the national level, including scenarios of future change and cutting-edge research results on rapidly evolving topics such as bioenergy, climate change and diet/food preferences.

For the *Fish to 2030* report, the IMPACT model was calibrated and employed to evaluate different policies and alternative events, and to illustrate the likely evolution of the global seafood economy. The results are structured according to a baseline scenario, considered the most plausible one, and six alternative scenarios that investigate potential impacts of changes in the drivers of global fish markets under various assumptions. The publication centers on three main topics: (i) the health of global capture fisheries; (ii) the role of aquaculture in filling the global fish supply/demand gap and potentially reducing the pressure on capture fisheries; and (iii) implications of changes in the global fish markets on fish consumption.

The key findings of the baseline projections are as follows:

- Total fish production is expected to reach 187 million tons in 2030, with an overall increase of almost 45 million tons as compared to 2008.
- While capture fisheries production remains stable, major growth will come from aquaculture, which will continue to expand albeit more slowly than previously.
- By 2030, capture fisheries and aquaculture will contribute equally to global fish production, with aquaculture probably dominating beyond 2030.
- The fastest supply growth is expected for tilapia, carp and catfish including *Pangasius*.
- Aquaculture is projected to supply more than 60 per cent of fish destined for direct human consumption by 2030.
- China is expected to increasingly influence the global fish sector.
- Aquaculture will grow rapidly in South Asia, Southeast Asia and Latin America. Per capita fish consumption is projected to decline in Japan, Latin America, Europe, Central Asia and sub-Saharan Africa.
- Owing to a population growth of 2.3 per cent per year, sub-Saharan Africa will increase its demand for fish for human consumption by 30 per cent by 2030. As its production is projected to expand only marginally, the region's dependence on fish imports will rise from 14 per cent in 2000 to 34 per cent in 2030.

Eco-labelling and traceability in fisheries and aquaculture

Eco-labels for sustainably sourced seafood evolved primarily as a means to use the market power of the most highly traded food commodity to promote sustainable fisheries management. Market access was to be a reward for fisheries managed sustainably according to the certifier's criteria. These market-based measures initially reflected the goals of civil society and consumer groups in industrialized countries who believed that fisheries were not being adequately managed by governments. The first private seafood certification scheme[13] was established in 1997 as a joint project between a large seafood buyer and an international non-profit organisation (Sainsbury, 2008). Since then, there has been a proliferation of private voluntary certification schemes operating in the seafood market, each with different goals, principles and criteria (FAO, 2010 and 2011).

Given the uptake of seafood eco-labels in the major importing markets, governments are increasingly concerned that certification schemes are interfering with fisheries management, an activity usually deemed to be the responsibility of governments at the national level within Exclusive Economic Zones and inland waters, or through multinational action by regional fisheries management organizations. In 1997, members of the FAO Committee on Fisheries requested FAO to develop international guidelines for eco-labelling of fish and fishery products from capture fisheries. A similar request for technical guidelines for aquaculture certification was made in 2006. Certification guidelines for marine capture fisheries were finalized 2009, followed by guidelines for inland capture fisheries in 2010, and aquaculture in 2011. These international guidelines are in the public domain and have been used by various stakeholders to assess certification schemes' claims of conformity with FAO guidelines or for self-assessments. Complexity of the guidelines has led to uncertainty about claims of compliance. The lack of comparability and transparency among the many and diverse certification schemes operating in the seafood market today lead to the launching of a project in 2013 by major players in the seafood industry, the Government of Germany and the FAO, namely the Global Sustainable Seafood Initiative (GSSI).

A group of 17 funding private seafood companies and the German government formed a partnership the GSSI, primarily from Europe and North America,

however, to date there are 32 funding private companies including Asia, with growing interest from Africa, South America and Australia-Pacific. GSSI is modelled after the Global Food Safety Initiative, which has operated successfully for 10 years. The initiative aims to increase transparency in international seafood markets and boost consumer confidence in seafood. Uptake of the GSSI benchmarking tool by the seafood industry is expected to reduce duplication costs. The benchmarking tool was officially launched in October 2015 at an FAO Conference, Vigo Spain. The tool is used to assess certification schemes against a set of baseline requirements, primarily FAO instruments. Certification schemes that meet the requirements will be able to use the GSSI logo. With the logo, private companies will have information about minimum comparability between various certification schemes, while additional GSSI indicators can be benchmarked to evaluate claims by more advanced schemes that will drive future improvements. Schemes have already come forward for benchmarking and GSSI insures that the process is transparent through its Public Consultations (www.ourgiss.org).

FAO joined the GSSI initiative as part of its new public-private partnerships[14] strategy, which aims to engage more closely with private sector and civil society actors by providing corporate strategic advice, developing tools and methodologies, and long-term vision. Within the partnership, FAO has advocated for good geographical representation and reasonable access for developing countries in order to ensure that the global benchmarking tool does not become a potential technical barrier to trade.

The FAO support to the State of Sustainability Initiatives (SSI), namely hosting the first stakeholder meeting at FAO headquarters in 2014, has facilitated the SSI review of seafood ecolabels. The SSI Standards and the Blue Economy review was launched at a joint UNCTAD/COMSEC Seminar on Oceans Economy and Trade, Geneva, 10-12 May 2016. This comprehensive and data-rich analysis investigated certification schemes, both marine capture and aquaculture, looking at the contribution of certified products compared to global production, as well as the potential for eco-labels to become market access restrictions for developing country exports. This report adds significantly to knowledge on the volume and flows of certified products to the major importing markets of the USA, European Union and Japan, as well as identifying advantages and challenges facing seafood certification schemes in promoting sustainable utilization of marine resources, especially for small scale fishers and poorer countries. To assist developing countries in market access, Fisheries Improvement Projects[15] are being piloted for various fisheries, with the aim of raising the level of fisheries management, and thus increasing the availability of sustainably-sourced products for international markets.

FAO and other international organizations, including the WTO, have raised concerns about whether seafood certification schemes act as technical barriers to trade, especially for developing country exporters. This issue has been debated in the SPS Committee on several occasions. Should public certification be interpreted as a technical standard under WTO rules, the number of seafood-related trade disputes is likely to increase in the future.

Faced with a rapid increase in private certification schemes, and their uptake by the global retailers and supermarket chains that control much of the international seafood trade, some governments have developed public certification schemes. While public eco-labels[16] for capture fisheries are based in the three major importing markets, public certification of aquaculture products[17] has branched into some developing countries that produce high-value aquaculture products, such as shrimp and molluscs, for export to industrialized countries.

Although relatively few governments have so far developed public certification schemes for their capture fisheries or aquaculture sectors (Sainsbury, 2008) this trend appears to be on the rise. A number of developing countries have requested capacity-building assistance from FAO to develop their own national eco-labels. The incentive is two-fold: (i) to ensure market access for seafood exports and thus protect the livelihoods of vulnerable small-scale fishers and aquaculture producers, and (ii) lowering the costs of certification. For the small-scale sector, reducing the cost of certification of a fishery can be vital for maintaining access to global and regional markets.

Seafood traceability systems

Despite the adoption of the FAO Code of Conduct for Responsible Fisheries and the progress it has brought, not all fishing activities are conducted in a responsible or legal manner. Some fishers do not respect fishing rules, thus undermining responsible management and trade. IUU fishing can occur in

the high seas, Exclusive Economic Zones and inland fisheries. It has increased significantly over the last two decades. High-value marine species are major targets of IUU fishing. These activities can occur under flags of non-compliance or flags of convenience. Global prevention of IUU is essential for ensuring sustainable fisheries resources for global food security. It is not enough that some countries and regional fisheries management organizations are managing aquatic resources responsibly, if others are not. In addition, criminal activities such as slavery, drugs, and piracy are known to be associated with IUU fishing vessels.

One of the major deterrents to IUU fishing is to deny access to markets for illegal fish products. The FAO Port State Measures Agreement (FAO, 2009) which entered into force in 2006 aims to block entry of IUU fish into the value chains by denying entry into ports of undocumented fish products. Estimates by the World Bank/FAO put the value of illicitly harvested fish at 11 to 26 million tons each year, worth between US$10 and US$23.5 billion (William et al., 2009). Means for stopping IUU fishing can include: monitoring, control and surveillance of known IUU vessels; international cooperation such as sharing information on IUU vessels; denying access to ports; national legislation to allow prosecution of IUU vessels; international coordination of catch certificates to facilitate border control of traded fish; and certification of products from verifiably managed fisheries. This requires an over-arching solution for traceability of traded fish from vessel to final consumer.

Traceability is defined by the Codex Alimentarius as *"the ability to follow the movement of a food through specified stage(s) of production, processing and distribution*". In the case of fish products, the design and implementation of effective seafood traceability systems is both necessitated and complicated by the continuing process of supply chain globalization and expanding global trade networks, which means that fish will often be handled by vessels, farms, wholesalers, processors, distributors and retailers in several different countries before final consumption. These developments have important implications for food safety concerns and sustainability issues, which have led to increasingly stringent traceability regulations in the major import markets, with the European Union as the prime example. In 2014, FAO member countries identified three emerging issues of concern: 66 per cent highlighted traceability requirements; 79 per cent singled out regulations to combat IUU fishing; and 63 per cent called for attention to eco-labels and certification requirements (FAO, 2014a).

In addition to its role in providing retrievable information related to food safety requirements, traceability for fish products is also essential for the development of effective tools to combat IUU fishing. The European Union Council Regulation No 1005/2008 is an important development in this regard. Under the regulation, each shipment of wild-caught seafood traded in the European Union must have a catch certificate issued by the competent fisheries management authority of the vessel's flag state. Likewise, Japan signed a joint statement of agreement to work with the European Union to fight IUU fishing by blocking imports of seafood caught illegally. Sustainability and traceability are also core components of the Action Plan of the United States President's Task Force on IUU Fishing (United States, 2015).

In 2014, FAO prepared a report analyzing current seafood traceability systems using a traffic light approach, both in terms of food quality and safety, as well as IUU fishing (FAO, 2014b). An expert consultation held in Rome in July 2015 was followed by three regional workshops for FAO member countries in November and December 2015 to draft international guidelines on Catch Documentation Schemes (CDS). The draft CDS guidelines were presented to the FAO Sub Committee on Fish Trade in February 2016. It is anticipated that harmonization of these schemes, particularly electronic CDS, will promote transparency and facilitate customs transactions for perishable and time-sensitive fish products. They will also be instrumental in preventing IUU fish from entering seafood value chain. This will contribute to protecting the livelihoods of fishers using legal methods and sustainable management practices. The next step in this process will involve securing approval and uptake of voluntary CDS guidelines by member states and other stakeholders along the seafood value chain.

Policy recommendations

Food security and nutrition represent a global challenge as hunger and malnutrition remain among the most devastating problems facing the world. In light of expected sustained future population growth, the challenge is even more compelling. The fisheries and aquaculture sectors can continue to play a prominent role in world food security, but it requires that capture and aquaculture production grow

sustainably, through effective fisheries management policies and best aquaculture practices. The majority of future fish consumption is expected to depend heavily on aquaculture. However, the prospects of this sector are predicated on numerous interlinked factors, including access and availability of land and water; availability, sustainability and cost of feed; access to technology and finance; control of disease outbreaks; environmental externalities including climate change, pollution and problems that can originate from unguided aquaculture development; fisheries governance; and food safety and traceability issues among many others.

The efforts of civil society and private sector stakeholders through market-based measures (eco-labels) have improved the traceability of fish from responsibly managed fisheries and aquaculture producers, while at the same time raising auditing costs and further complicating the international market for fish and fishery products, particularly for developing countries. In addition, the steady growth of public certification schemes may lead to increased trade disputes between countries as eco-labels cross the line between voluntary business-to-business and business-to-consumer transactions into the realm of technical standards that fall under the agreements of the WTO.

Globalization of the seafood value chain has significantly changed international seafood trade, and the changes are expected to accelerate further. The fishery supply chain is already complex as fish products often cross national boundaries several times before final consumption due to the increasing outsourcing of processing. Trade in fish and fishery products is expected to involve a wide range of product types and participants. While the integration of global fish markets can produce positive results, it may also increase the risk of excluding small-scale producers and businesses. Small-scale producers represent the majority and their role is vital to meet increasing demand. Capacity-building in various areas of market access is key to promoting inclusiveness in global seafood markets.

2.3 Voluntary Sustainability Standards: The Market Opportunity for Certified Sustainable Seafood

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Abstract

Seafood production certified under global sustainability initiatives grew 40-fold from 2003 to 2015 and now represents more than 14 per cent of global production. Notwithstanding this significant accomplishment, certified seafood has developed along very clear and specific boundaries driven and supplied primarily by developed country markets. The ability of voluntary initiatives to deliver on a needs-based approach to sustainable development will require a concerted effort by both supply chain actors and policy-makers toward the facilitation of supply and demand of certified production among developing countries, particularly across Asia.

Introduction

Voluntary seafood standards have come a long way since the tuna-dolphin labels of the 1990s. Following a trend established in other commodity sectors, the seafood sector has witnessed a growing number of voluntary sustainability standards with more than 50 national and international initiatives now being reported as operational (Potts et al., 2016). As these initiatives grow in market importance, policy-makers and other actors in global seafood supply chains are increasingly faced with making decisions on whether such initiatives represent viable policy options for promoting sustainability.

These decisions become all the more important in the context the Sustainable Development Goals. While seafood standards clearly have direct relevance to the realization of targets under SDG 12 (Ensuring Sustainable Consumption and Production Patterns) and SDG 14 (Conserve and Sustainably Use Oceans, Seas and Marine Resources for Sustainable Development), the breadth of the sustainability criteria they contain – combined with their focus on measurement and conformity assessment processes – places them in a privileged position for fulfilling targets across the spectrum of SDGs. However, the ability of seafood standards to fulfill this promise remains largely in question due to a general absence of robust data on market and performance trends.

Voluntary standards: The underlying value proposition

The stated objective of most voluntary seafood standards is to promote or ensure sustainable production and harvesting of seafood.[18] The importance and popularity of voluntary standards is largely founded on their purported ability to leverage market – rather than regulatory – forces in generating sustainable outcomes. Generally speaking, voluntary standards rely on one or more of the following mechanisms for promoting sustainable development:

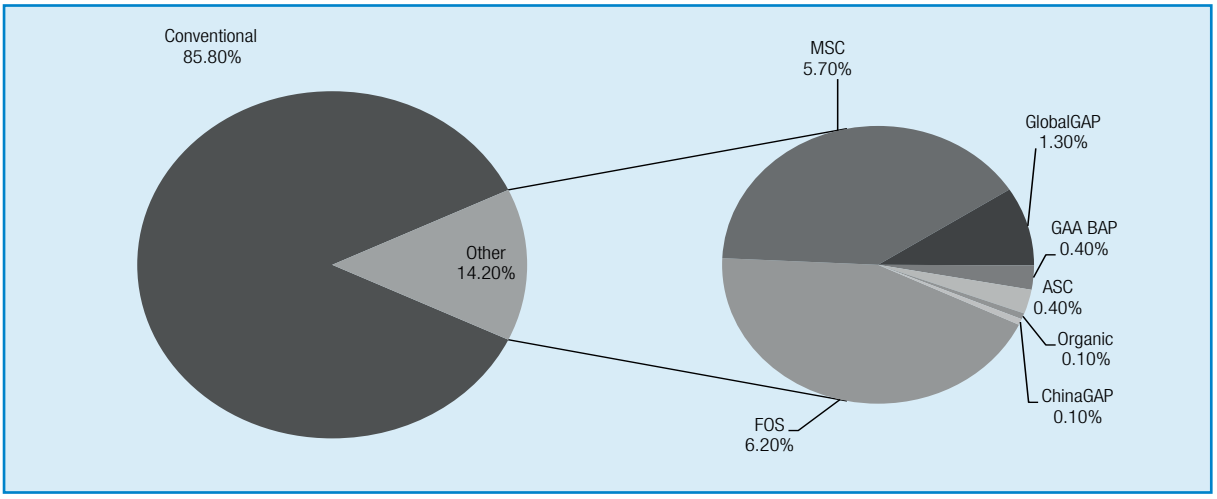
Defining targets:

Voluntary standards can help generate more robust definitions of sustainable practice through their standard-setting and criteria development processes. The very process of standard development forces a reflection about competing sustainability issues among participating market players. Standards can play a unique role in defining global sustainability within specific sectors.

Market efficiency and cost internalization:

By linking physical products to verified claims regarding (non-product-related) production practices, standards can help buyers, and the market more generally, integrate social and environmental considerations in economic transactions and pricing mechanisms.[19]

Figure 1: Certified vs. conventional seafood production, latest year, 2015



Data years: ASC, 2015; BAP, 2013; ChinaG.A.P., 2013; Conventional, 2013; FOS, 2015, GLOBALG.A.P., 2015; MSC, 2015; Organic, 2013[24]
Source: Potts et al., 2016.

Participatory governance:

Voluntary standards rely on private, and often innovative, governance mechanisms for standards elaboration and implementation. Although standards may be governed by a single stakeholder (e.g. a company) or stakeholder group (e.g. retailers), markets are increasingly demanding some form of multi-stakeholder participation, from both developed and developing countries, to ensure credibility. To the extent that these demands are met, standards can bring new levels of participatory governance to international supply chains.

Sustainable investment and economic growth:

The growing market for standard-compliant products represents an important opportunity for producers. By linking opportunities for growth with investment in sustainable production infrastructure and practices, voluntary standards can stimulate both economic growth and sustainable livelihoods.

Standards will vary in the degree to which they emphasize these potential assets. The ability of any given standard to deliver on a given promise depends largely on the initiative's ability to create supply and demand for its system and/or products. A cursory overview of the latest market trends suggests that while seafood standards have succeeded in generating significant adoption at production, distribution remains patchy and does not seem to be closely linked to actual consumer demand.

Market trends

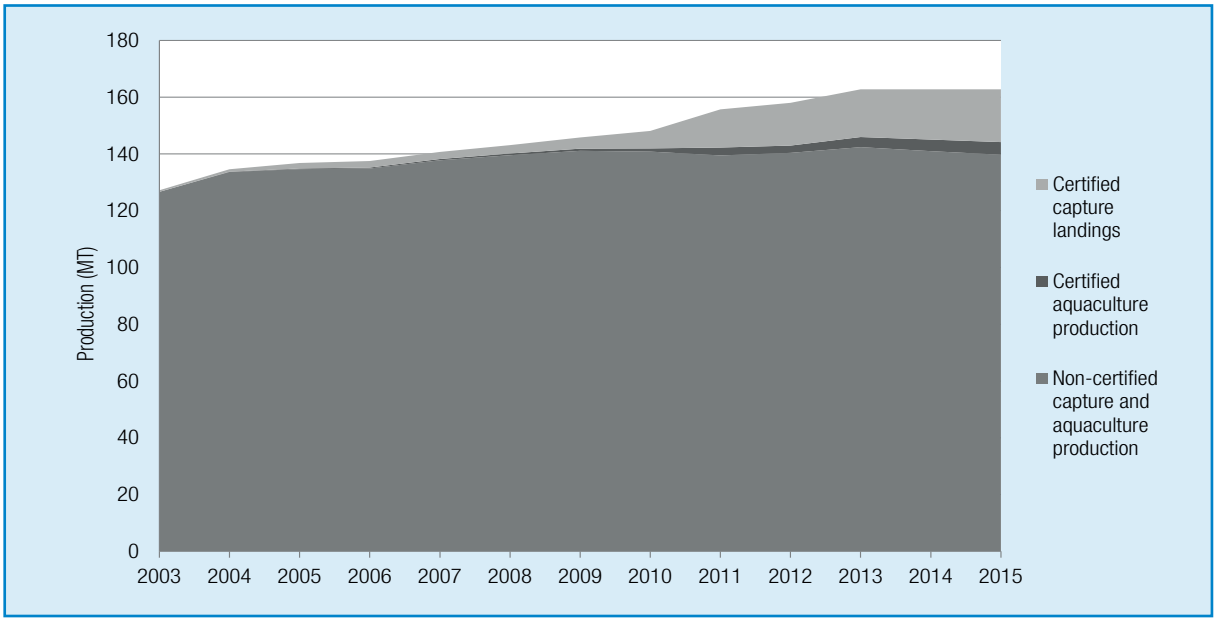
The consumption of certified sustainable seafood products has grown rapidly over the past two decades. Driven by increased awareness among consumers and companies, an ever wider range of certified products has become available to consumers, particularly across North America and Europe.[20] Unlike some other commodity sectors where certification initially focused on supplying niche markets, seafood certification has relied heavily on mainstream buy-in from the outset.[21]

Responding to this context, standard-compliant seafood production has grown consistently and dramatically as a percentage of global production over the past decade. By 2015, certified production reached 23 million metric tons , accounting for 14 per cent of the global total, up from 0.5 million metric ton (or 0.5 percent) in 2003[22], demonstrating a growth rate over 10 times larger than total seafood production.

80 per cent of certified seafood comes from wild catch production. This reflects not only the longer history of certification in wild catch markets, but also the important sustainability challenges in wild catch production due to issues related to stock management which, to date, has been the primary driver behind seafood certification.[23]

Two initiatives, FOS and the MSC, dominate certification for wild catch markets, each accounting for 10 per cent of the total production. As a

Figure 2: Certified and non-certified wild catch landings and aquaculture production, 2003-2015



Source: Potts et al., 2016.

consequence, these two initiatives also lead as a portion of global seafood production (including aquaculture) with FOS accounting for 6.2 per cent and MSC accounting for 5.7 per cent of total seafood production (however, only FOS and Naturland operate in both wild catch and aquaculture). In contrast, GLOBALG.A.P. – the leading aquaculture certification scheme – accounted for 3 per cent of the global aquaculture market and 1.3 per cent of the global seafood market (2015).

While seafood certification as a portion of global production has shown impressive growth, for the most part it has followed very specific markets limited to species with high visibility in developed country markets. In fact, just three species groups – anchoveta, cod[25] and tuna – account for 57 per cent of global certified production. Notably, these species groups account for only 13 per cent of global seafood production.

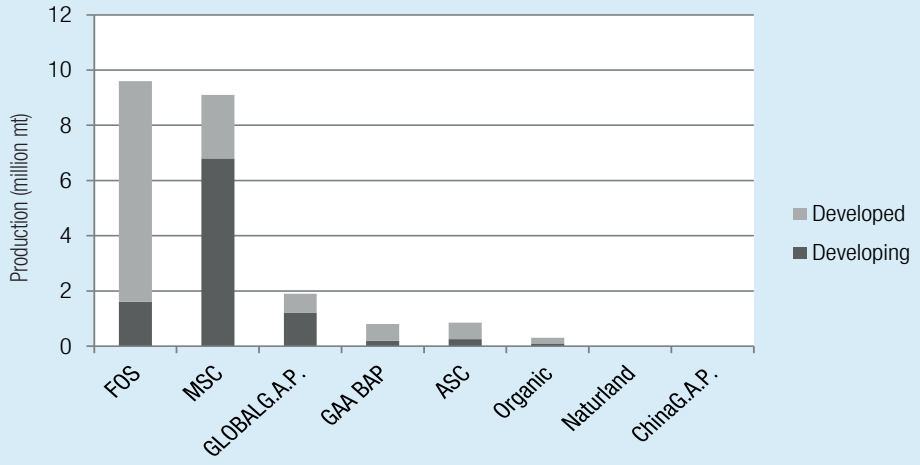
The concentration of production can be traced to a combination of factors principally related to the distribution of seafood certification across a few larger capture fisheries. Although more than 1,000 fisheries are reported as certified by a major global voluntary standard across the aquaculture and capture sectors, the certification of some of the largest capture fisheries in the world (notably Peruvian Anchoveta Fisheries by FOS and United States Pollock Fisheries by MSC has resulted in a high concentration of certified production from these countries. Fishery size is an important factor in determining global market access to certification due to the high fixed costs often associated with the process.[26]

A related factor in determining the distribution of certified production appears to be the pre-certification management practices and capacities. Most major certification schemes require the implementation of specific management structures and plans as well as significant auditing procedures. Clearly, fisheries that already have such plans in place are more likely to seek and receive certification than those that do not. Among the critical questions facing the seafood certification industry is whether certification is ONLY or PRINCIPALLY available to those with an existing management capacity to demonstrate sustainability, and how certification might be used as a vehicle for facilitating the transition to sustainable management systems.[27]

Standards can also be designed in a manner that favors specific regions and/or production systems. The vast majority of the more than 50 voluntary seafood standards currently in operation are tailored to specific supply chains and/or regions. Although there is no indication that the few international

Figure 3: Certified production, by initiative and stage of development, latest year, 2015

Overall, certified seafood displays a relatively balanced distribution between developing and developed country sources. This result is largely due to the exceptional supply of certified Anchoveta from Peru. Production of retail-oriented species under MSC still tends to be dominated by developed countries. This distributional balance may slowly be moving towards a still greater emphasis on developing country sources as Asian certified production comes to market through growth in certified aquaculture production.



Source: Potts et al., 2016.

standards in the sector have been designed to favour specific regions or production systems, it is clear that access to international markets for certified seafood does provide special advantage for some countries (see Figure 4). Most notably, Asia, which accounts for 69 per cent of global seafood production, accounts for only 11 per cent of global certified seafood production. By contrast, Europe and North America, which account for approximately 15 per cent of global seafood production, account for 47 per cent of global certified seafood production.

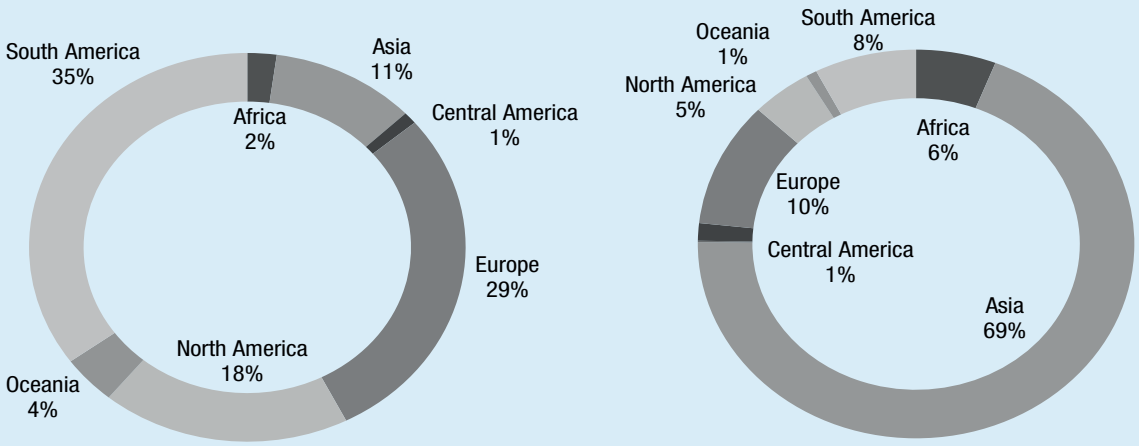
The highly concentrated distribution of certified production across specific economies raises questions about the overall effectiveness of certification in addressing global ecosystem challenges related to seafood capture as well as the potential of certification to operate as a pathway out of poverty for developing country producers.[28] Given that both issues are of central importance to any coherent vision of sustainable development within the sector, the overall distribution of certified production remains a serious issue, which merits the dedicated attention of scheme owners as well as policy-makers.

While the growth of seafood certification has been led to date by the certification of wild catch operations, it seems likely that this dynamic will change in the coming years as aquaculture takes an increasingly important share of global production. Salmon and shrimp/prawns are important sources of certified production in both wild catch and aquaculture. This signals potential for cross-management of supply and demand of sustainable products from these species, including the possibility of transitioning from wild catch to certified aquaculture as a long-term sustainability strategy. Indeed, one of the "solutions" to dwindling wild catch production could be a transition from wild catch to controlled aquaculture production.[29] Regardless, it is clear that aquaculture certification will play a much more prominent role in the supply of certified seafood moving forward.

Overall, the concentration of certified production among a limited number of highly visible species consumed in key developed economies points towards potential limitations on the marketability of seafood certification, which may represent a long-term challenge for the industry. The concentration of certification in species that are sold in European and North American markets is to be expected as demand for sustainable products is concentrated in these markets. However, it remains unclear how much room exists for even these markets to drive further growth in light of the already significant volumes of certified production available. As of 2015, 16.6 million metric tons of retail ready[30] seafood was certified – a volume equal to 87 per cent of total seafood consumption in North America and Europe.[31] Actual demand from

Figure 4: Global distribution of certified seafood production, 2015–versus total seafood production, 2013 (by volume)

Production of certified seafood is concentrated across North America, Europe and Latin America. Latin American production is almost entirely made up certified Peruvian Anchoveta. Retail oriented certified seafood production is dominated by North America and Europe. Asia represents a disproportionately low share of certified production.



Source: Potts et al., 2016.

individual consumers for certified seafood in these markets is, of course, far less. Consumer recognition, to say nothing of actual purchasing decisions, has been reported as averaging 35 per cent for MSC, the single most visible standard, across its most important markets (Marine Stewardship Council, 2015).

Historically, market growth for certified seafood has been driven by retail and manufacturer commitments to certification more than recognition and demand by individual consumers. Although retail commitments are significant, many have reportedly run into barriers in meeting their supply needs on schedule – suggesting potential undersupply along specific species lines.[32] As these commitments continue to roll out, the size of the certified seafood market is expected to grow in the coming years. It should be noted, however, that the barriers to growing certified supply of wild catch seafood are significant in light of the relatively poor status of global stock assessments, which currently represent a long-term concern for the expansion of certification in sector.

Growth in the sector will have to increasingly rely on more demand from developing country markets and/or a more general expectation/requirement of certification from global markets as a price of market entry.[33] Regardless of who actually drives market growth, it is clear that further efforts to supply growing market demand will need to focus specifically on enabling developing country certification, particularly across Asian production.

Policy options

Standards represent an additional tool for policy-makers and other stakeholders to assist in the promotion of a sustainable fisheries sector. However, it is also clear that voluntary seafood standards cannot be expected to achieve significant sustainability outcomes alone. On the one hand, any successful use of voluntary standards in the fisheries sector depends fundamentally on infrastructure that can only be provided by local public institutions. On the other hand, the global nature of many of the public goods at risk through seafood production requires a commensurate response from the international community. Moreover, voluntary standards rely heavily on publicly available data with regard to regulations, data collection and fisheries management systems for assessing the potential sustainability of a given fishery. Finally, voluntary standards are subject to the pressures of an imperfect market and may require targeted public policy support to overcome the additional costs associated with certified production. The need for policy intervention is, perhaps, nowhere more evident than in the context of low-income economies with significant smallholder production where the

certification process may represent a significant barrier to accessing international markets.

Based on our analysis across the capture and aquaculture sectors, we have identified the following major areas of opportunity for improving/strengthening the positive sustainability impacts of voluntary systems:[34]

Policy opportunity 1:

Development and multilateral agencies working with national governments could provide significant and targeted technical assistance to facilitate certification of developing country producers, and smaller producers in particular. Donor countries could consider setting up a global fund for sustainable fisheries. Our data reveals that sustainable production is highly concentrated across a very small number of countries, mostly in the developed world. If seafood certification is to support a needs-based approach to sustainable development, it will need to be complemented by a significant increase in technical assistance for smaller fisheries and fish farmers.

Policy opportunity 2:

Certification schemes could proactively invest in building more equitable representation of developing countries across their governance systems. Although most of the systems reviewed claim to have open democratic governance systems, participation by developing country representatives across such initiatives remains low. More equitable representation will be key to ensuring that criteria and implementation systems are sensitive to the needs of developing country producers.

Policy opportunity 3:

National Governments, in coordination with the World Customs Organization, could establish a Harmonized System of Tariffs and Nomenclature (HST) codes for certified seafood products. One of the challenges facing governments and other stakeholders in assessing the sustainability impact and market opportunities related to voluntary standards relates to the absence of clear trade data on such systems. Promoting fair and equitable access to international markets through voluntary standards requires a better understanding of trade flows, which can only be done through dedicated HST codes for products produced in compliance with recognized and credible certification initiatives.

Policy opportunity 4:

The international community, following the Guidelines example established by the FAO and ILO Conventions, could clearly identify minimum requirements for social sustainability within the seafood sector. While the field of voluntary standards in other sectors has gradually migrated from single issue to multi-pronged sustainability initiatives over the past decade, many voluntary systems in the fisheries sector have not fully integrated social criteria within their systems, leaving a deep vacuum in their treatment of social sustainability.

Policy opportunity 5:

National Governments could establish minimum transparency, conformity assessment and notification requirements on voluntary systems operating within their borders in accordance with the spirit of the Agreement on Technical Barriers to Trade (TBT) Code of Good Practice and in a manner that promotes equal access to such systems. Although private voluntary standards are not formally under the purvey of WTO Agreements, national Governments should nevertheless establish rules that help ensure that such systems operate in accordance with their WTO commitments and do not create unnecessary distortionary effects on trade.

Policy opportunity 6:

Where standards have demonstrated full compliance with the FAO Guidelines, national Governments could consider the implementation of preferential fiscal policies for certified seafood products. Compliance with effective standards inevitably entails additional costs. This can put certified entities at a disadvantage vis-à-vis their conventional counterparts operating in a free market. In order to facilitate sector-wide transition to demonstrably sustainable practices, governments may need to level the playing field through the implementation of preferential taxes and/or tariffs.

2.4 Sustainable and Organic Aquaculture: Boosting Linkages between Sustainable Development and Economic Opportunities

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Abstract

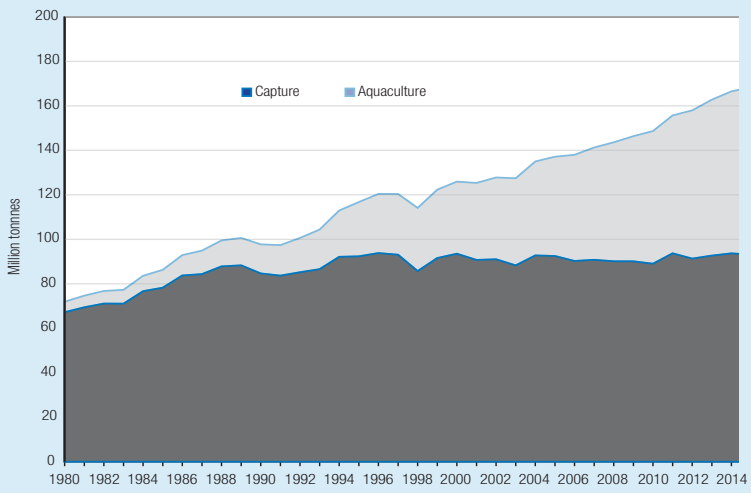
Aquaculture is one of the fastest growing food producing sectors. Recently, environmental and social questions have been raised regarding the potential negative impacts of aquaculture. To address these concerns several private standards have been established to promote minimum environmental and social requirements that producers need to meet to achieve sustainability standards certification. Beyond sustainability standards, many consumers seek additional guarantees to ensure that the fish products they consume are not only sustainably, but also organically produced. This article explores how the market for sustainable and organic aquaculture is evolving. It also examines developments in the sector in three countries – Oman, Morocco and Ecuador – where fisheries play a major role in the national economy.

Aquaculture production and sustainability certification

Aquaculture (or fish-farming) can generate lasting benefits for stabilizing and replenishing global fish stocks over time as well as enhancing global food security, economic growth and job creation. Aquaculture comprises the breeding, rearing and harvesting of aquatic organisms under controlled "farm" conditions, primarily to produce seafood for human consumption but also inputs for the personal care, pharmaceutical and pet industries. Key food-related species cultivated in aquaculture are salmon, tilapia and shrimp. Aquaculture is seen today as perhaps the most important alternative to wild harvesting and meeting global fish and crustacean demand in the near future, as fishing levels in the oceans have reached their maximum yield.

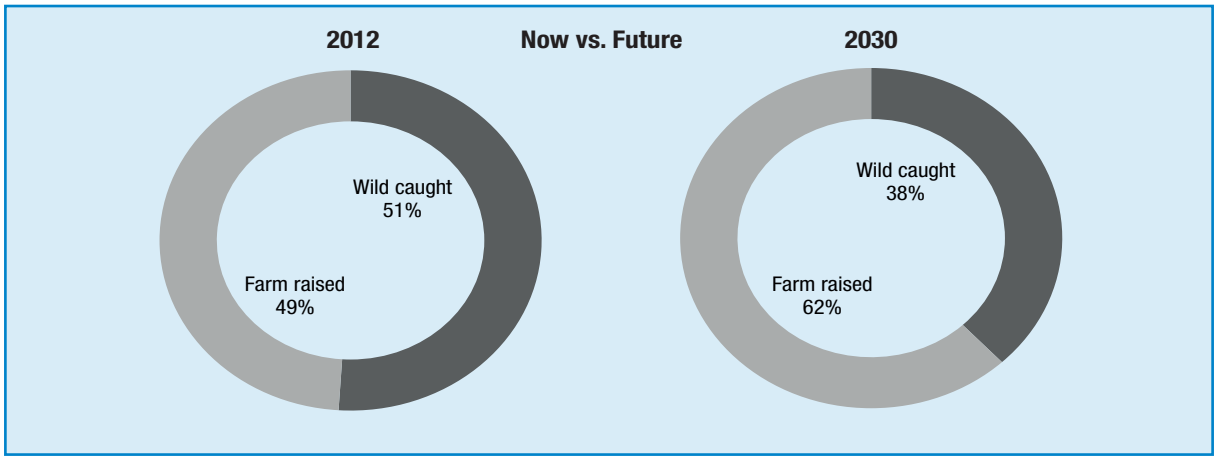
With global food production continuing to grow alongside population growth, aquaculture has

Figure 5: World capture fisheries and aquaculture production



Source: FAO, 2014.

Figure 6: Breakdown of global fish consumption by source; current and projected



Source: FAO, 2013.

emerged as one of the fastest growing food producing sectors. It has an annual growth rate of 8 per cent and provides about half of all fish consumed by humans (FAO, 2014A). As fisheries populations decline due to overfishing (Myers et. al, 1995), global environmental change, and the supply of wild catch fish in markets remains steady, the demand for aquaculture fish products will continue to grow, boosting production levels even further. The market for aquaculture was estimated at US$144.4 billion in 2012; accounting for close to half of the global fish products market (See Figure 5; FAO, 2014). Specifically, aquaculture – which only had an insignificant share of the overall fisheries market in the 1970s – now accounts for more than 42 per cent of the fisheries market worldwide.

As with any rapidly growing economic activity, environmental and social concerns have been raised with regard to the impacts of aquaculture production. Specifically, negative impacts sometimes associated with aquaculture include water pollution, ground water salinization, the enhancement and spread of disease, fish escaping aquaculture farms outcompeting native species, habitat degradation, and poor remuneration and working conditions that have negative social impacts for the surrounding communities. In response to these concerns, the market is making increased use of sustainable production practices that are not only more environmentally sound and socially responsible, but also more efficient and productive.

Several private standards have been established to promote minimum environmental and social requirements that producers need to meet in order to achieve sustainability standards certification. Increasingly, consumers, retailers and distributors seek the assurance of sustainability standards for food products, particularly in high-end markets. When standards are adopted and compliance is verified, aquaculture producers can confirm to markets that negative environmental and social impacts associated with their harvesting/production methods have been minimized. MSC, which deals with wild-capture fish products, and the ASC are the two main standards used today to certify sustainably harvested/produced fish products. These two bodies are widely recognized by both retailers and consumers.

The Global Aquaculture Alliance provides "best aquaculture practice" or BAP certification[35]. This procedure is currently available for farms that raise a variety of finfish and crustacean species, mussel farms, feed mills, hatcheries and seafood processing plants. More than 700 BAP-certified facilities are in operation in Asia, Latin America and other parts of the world. BAP standards developed under the Global Aquaculture Alliance's Standards Oversight Committee go well beyond environmental sustainability to encompass food safety, social responsibility, animal welfare and traceability. FOS is another global certification body. Its sustainable aquaculture criteria require: no impact on critical habitats (e.g. mangroves, wetlands, etc.); compliance with waste-water parameters; reduction of escapes and bycatches to a negligible level; no use of harmful antifoulants or growth hormones; compliance with social accountability requirements; and gradual reduction of carbon footprint[36]. Approximately 150 aquaculture producers worldwide have requested to be audited according to FOS criteria and some

100 of them have achieved certification. In addition to these global certification bodies there are several regional and national certifiers, as well as a multitude of private standards developed by distributors and retailers.

Players in the sustainable fisheries market are focusing on all aspects of aquaculture production, from the use of quality inputs to the efficient use of land, water and energy resources. Sustainable fisheries are an important sector in the economies of all countries, and the SIDS in particular. The Samoa Pathway, an international declaration adopted in 2014 with a focus on SIDS, specifically identified sustainable aquaculture as one of the building blocks of a sustainable ocean-based economy in SIDS[37]. More generally, for SIDS and other developing countries, sustainable fisheries are supported by the adoption of the Sustainable Development Goals (SDGs), including SDG 14, which calls for the conservation and sustainable use of oceans, seas and marine resources for sustainable development. To the extent that they are adopted and implemented, the SDG principles adopted by United Nations Member States to guide their development up to 2030 are expected to align growth in aquaculture production with environmentally and socially sustainable trajectories.

Organic aquaculture

Beyond sustainability standards, many consumers seek additional standards to ensure that the fish products they consume are not only sustainably, but also organically produced. Organic aquaculture is a developing sector involving farmers worldwide producing a wide range of aquatic species – including fish, seaweeds and bivalves – in line with organic agriculture principles that sustain the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. It also seeks to combine tradition, innovation and science for the benefit of the shared environment and promotes fair relationships and a good quality of life for all involved. The combination of aquaculture with organic principles creates a market in which fish consumption could be both environmentally sustainable and healthy.

In response to growing consumer demand, the share of organic aquaculture products in the global market for fish products has increased substantially over the past several years. Consumers seeking healthier lifestyles have a strong interest in certified food products that not only promote environmental and social sustainability, but also reduce potential health risks associated with artificial inputs used in conventional agriculture. This has led to the establishment of a US$72 billion market for organic agriculture products in 2015 (FIBL, 2015). Naturland is a major international organic standard that has been developed for different species and production systems in aquaculture. Today, aquaculture producers in 18 countries in Europe, Latin America and South East Asia produce fish, shrimp and mussels according to Naturland standards.

As organic aquaculture is a relatively new sector, there are still debates on its definition and scope (Biao, 2008). While fish harvested from “natural” environments (fresh and saltwater areas) could be considered organic by default, debate has emerged with regard to this approach. Notwithstanding problems with overexploitation of fish stocks in natural waters, it can be difficult to determine the feed and environmental conditions in which catch-sourced fish has originated, which could directly impact their organic status (Mansfield, 2004).

The main driver for sustainable organic agriculture is the willingness of consumers to pay a price premium for food that protects the environment, promotes equitable earnings for rural fish producers and uses less potentially harmful inputs, such as antibiotics and chemicals. The rationale for aquaculture growth within fisheries is, however, slightly different. Since the world’s inland, coastal and maritime waters offer good examples of the tragedy of the commons due to the often unregulated access to fish stocks, many commercial fish species have suffered depletion to the point where their extraction from their original environments is no longer economically efficient (Grafton et al, 2007). Growing scarcity, coupled with strong government regulations which restrict catches to protect fish stocks, have created compelling economic support for expanding aquaculture production. There is also substantial business interest in organic aquaculture, which commands premiums between 5 to 20 per compare to conventional fish. As such, aquaculture is expected to expand further in the near future. Today, farmed fish account for 49 per cent of global seafood consumption. This demand is expected to increase to 62 per cent by 2030 see Figure 6.

The current trend of aquaculture growth can be seen in a positive light as it may reduce pressure on certain ecosystems due to the controlled farm characteristics of aquaculture. Another advantage is that much smaller areas are required to produce the equivalent amount of protein than vegetable-based protein sourced from farmland (Nijdam et al; 2012).

While experiences with organic aquaculture have taken place in Europe since the early 2000s, it was defined in broader European Union legislation only in 2010 (Defrancesco, 2003; FIS, 2010).

In the United States, according to the United States Department of Agriculture (USDA), the legal status of using the organic for aquatic species as well the future development of USDA certification standards for organic aquaculture products and aquatic species are under review.[38] Several international certifying bodies have developed organic aquaculture standards, including KRAV[39] (Sweden), Naturland[40] (Germany), the Soil Association[41] (UK), and IFOAM[42]. Prein et al (2010) have suggested that there are now some 80 standards for organic fish in the world. Those products have been retailed at supermarkets such as Esselunga (Italy), Tesco (UK), Edeka and Aldi (Germany) and Coop (Switzerland), which often use their own organic/bio brands.[43]

Aquaculture has its drawbacks as well. One of the current discussions concerns the fishmeal given to fish during growth stages, which is often based on animal or seafood sources. This keeps the door open to environmental degradation and further resource exploitation in natural waters (Naylor et al, 2000), especially of small pelagics for fishmeal and oil. There are ongoing efforts – with some degree of success – to produce fishmeal based on vegetable protein or mixes thereof, without sacrificing fish growth and profitability in the process. There is also a growing niche market for organic fishmeal itself, as illustrated by Hayduk in Peru.[44]

Market premiums for sustainably and organically produced fish

The price premium in international consumer markets is small. Many distributors and retailers in developed countries no longer pay a price premium for fish certified as sustainably produced. Instead, they increasingly source sustainably harvested wild-capture fish and sustainably produced aquaculture fish at the beginning of their supply chains. As a result, sustainably produced aquaculture products are becoming a market entry requirement in mainstream international markets rather than products that command a price premium.

Meanwhile, organic aquaculture products continue to attract higher prices in international markets compared to similar products that are not produced organically. Some studies have estimated the price premiums for organic fish. These range from 30 per cent (Organic Services, 2010), to up to 24 per cent (Prein et al, 2010), 10 to 15 per cent according to the FAO (2014B), 14.2 per cent (Ecolabelled, Roheim et al, 2011)[45], and to 30 per cent by the estimation of the Hong Kong-based Fish Marketing Organization (Sean, 2015). A compilation of the average premiums in those studies can be seen in Table 1.

Table 1: Price-premiums obtained by certified organic fish/fish products, when compared to conventional fish (percent)

Species	2006	2007	2008
Carp	38	30	40
Cod	N/A	40	40
Grey mullet	10	10	15
Pangasius	8	10	N/A
Red drum	15	15	15
Salmon	32	32	33
Sea bass/bream	30	40	45
Shrimp	N/A	9	25
Tilapia	46	30	30
Trout	37	31	30
Average	27	25	30

Source: Organic Services 2010.
Observation: The levels of premiums vary depending of the species.

While literature suggests the existence of price premiums for a number of fish species sold as organic, some certified producers in South America and the Pacific argue that certificates and eco-labeling do not always offer a sufficient value in practice. They have even indicated that while certification has become a prerequisite for accessing foreign markets and attracting retail and consumer attention, it is losing its economic appeal. According to interviewees in UNCTAD's 2016 report[46], fisheries certification can be expensive and may not always bring the expected economic returns. Certification of sustainably produced aquaculture products, on the other hand,

remains important as a market entry requirement for these products in major world markets.

Selected countries experience with aquaculture-based exports

Oman

The Sultanate of Oman has identified aquaculture as one of the key pillars for diversifying its national economy. The overall vision of the Ministry of Agriculture and Fisheries (MAF) is to develop a sustainable, competitive and environment-friendly aquaculture sector that meets the need of customers for high-quality fish products. As fish demand increases globally, aquaculture will play a greater role in Oman's agricultural activities. It will also provide an alternative to placing additional pressures on wild fish stocks in Omani waters.

Aquaculture production in Oman is still quite small when compared to its potential. According to the FAO, the total value for the aquaculture production in 2013 was 7.7 million Omani Rial (US$19.2 million)[47]. Current salt-water production is focused on shrimp. For freshwater aquaculture, tilapia is now increasingly farmed in many areas in Oman. This responds to high demand mainly from expatriates living in the country. The majority of the tilapia production is consumed locally, and valued at about US$6 per kilo in the local market.

The MAF[48] has estimated that with the experience gained in the sector over the next decade, the eventual capacity for aquaculture production by 2030-2040 could be as high as 220,000 tons with an estimated market value of US$900 million. This sector employs 11,000 which would contribute US$2 billion to Oman's GDP. With such expectations, Oman seems to have already made substantial progress within its development and food security strategy towards the creation of a world class aquaculture sector.

In 2013, the MAF revealed its plan of investing US$1.3 billion in fisheries development from 2013 to 2020 to help promote sustainable fishing and provide the necessary infrastructure to increase fisheries production in the country. Expanding aquaculture production will be a big part of this plan and will serve as a tool to promote local livelihoods and food security. Additionally, by 2013 the MAF had already issued 19 licenses to investors who had met the technical criteria to set up aquaculture projects. The total private investment in these projects is valued at US$330 million (RO 128 million). Species of interest for aquaculture production include bream, shrimp, cobia, abalone, sea cucumber and some fresh water species.

In 2011, Oman adopted a set of "better management of Omani aquaculture practices". These practices are meant to guide current and future producers in economically and environmentally sustainable production while ensuring consumer safety. In addition to these best management practices, it might be important to introduce regulations for organic aquaculture. Many countries have organic biological agriculture laws but not all of them cover the aquaculture sector. For example, Ecuador has recently implemented a state-of-the-art organic regulation that includes guidelines for the development of the organic aquaculture production. Ecuador is one of the biggest aquaculture producers in the world with a dominant focus on shrimp. It might be of interest to Omani authorities to design and implement similar regulations. So far, no Omani farms that fulfil sustainability or organic parameters have been certified by major organic certification bodies.

Morocco

While aquaculture was introduced in Morocco in the 1950s, it only recorded significant advances over the last 20 years with the apparition of large export-oriented companies in the north of the country. Morocco has considerable untapped potential with a 3'500 km coastline open to both the Atlantic and the Mediterranean, the high quality of its waters, a wide range of species, a competitive and experienced workforce and a geographic proximity to the European market.

Mindful of the potential of aquaculture for enhancing the sustainability of the fisheries sector, Moroccan authorities identified aquaculture development as one of the five high priority projects under the Plan Halieutis, the national strategic framework to advance the modernization and growth of the country's fisheries.[49] Under the Plan Halieutis, exports of Moroccan fishery products are expected to rise from US$1.2 billion in 2007 to US$3.1 billion by 2020. The plan also seeks to expand the country's domestic aquaculture production from less than 500 tons in 2007 to more than 200,000 tons by 2020 for a turnover of Dh 5 billion (US$530 million).

Today, aquaculture accounts for less than one per cent of the of the fisheries production in the country with an

estimated annual output ranging from approximately 300 to 1,189 tons per year according to available estimates[50]. The main fish species include seabass and bream, and shellfish such as mussels and oysters.

The National Agency for the Development of Aquaculture (ANDA) was created in 2011 to promote aquaculture and address the challenges hindering its development such as land availability constraints, expensive startup costs and heavy dependence on export markets. The agency is actively involved in all aspects of aquaculture development from research to investment and regulation. In the short term, ANDA launched a call to tenders for the construction of nine aquaculture farms ranging between 20 hectares and 40 hectares on the Mediterranean coast, which are expected to generate a total investment of more than US$30 million (Dh 295 million).

With regard to the promotion of sustainable and organic aquaculture, Moroccan authorities engaged in the development of a regulatory framework pertaining to the production, certification and labeling of organic aquaculture products. In this context, the promulgation of the 2013 of Law 39-12 on the organic production of agriculture and aquaculture products provided the country with a major enabling instrument for the further development of organic aquaculture.

Morocco's integrated coastal zone management (ICZM) programme, which aims to reduce rural poverty and protect both biodiversity and sensitive environmental areas, provides another example of the efforts of Moroccan authorities to promote sustainable aquaculture. The ICZM program includes two pilot projects on shellfish and seaweed farms with a total expected production of 132 tons, as well as targets for small-scale fishing communities in the country's eastern region.

Finally, in the framework of its bilateral collaboration with the European Union and Japan, Morocco engaged in promoting sustainable aquaculture through technical collaboration projects such as strengthening ANDA's capacities with regard to fish hatchery development, traceability practices, promotion of sanitary safety and the creation of a research center on shellfish breeding technologies. These efforts to advance the development of aquaculture and the Moroccan authorities' focus on sustainable production practices have placed the sector in a position to harness the benefits of the growing demand for sustainable and organic fishery products.

Ecuador

Ecuador is one of the world's leading producers/exporters of fish and aquaculture products. In recent years, its fishery products have consistently represented about six per cent of the country's total exports. Shrimp exports reached US$2.3 billion in 2014, showing an impressive annual growth of 48.2 per cent compared to the previous year[51]. As for the social importance of these sectors, extractive fishing and processing generated about 90,000 jobs, to which aquaculture added a further 180,000 (UNCTAD, 2015).

Ecuador plays a key role in the production and export of aquaculture products, primarily farmed shrimp[52]. The country has farmed shrimp since 1968, and currently accounts for 95 per cent of the total Pacific white shrimp production. Ecuador's strategic location, along with favorable weather, permits shrimp farmers to raise three harvests a year. In 2014, Ecuador was the third largest producer of white shrimp in the world.[53]

More than 95 per cent of Ecuadorian aquaculture activity centers on marine shrimp. The development of shrimp culture has taken place mainly along the coastal region where favorable natural conditions create a propitious environment for the development of aquaculture. In the inland inter-Andean region, freshwater tilapia is increasingly farmed. Other species, such as freshwater fish and non-shrimp crustaceans are cultivated on a small scale.

With the growth of the aquaculture industry since the 1970s, shrimp densities in aquaculture farms continued to rise. However, due to growing health concerns over high-density farming, most Ecuadorian farmers have shifted to a sustainable practice of low-density aquaculture. As a result, Ecuador has become the lowest density shrimp producer in the world, with sustainability credentials recognized worldwide.[54] Increased external demand was met by increased shrimp production by Ecuadorian shrimp farmers, with production rising by nearly 30 per cent in 2014. However, more modest growth is planned for the near future.

Today, some 60 per cent of Ecuadorian shrimp farmers use low-density farming systems which facilitate their ability to attain ASC certification for sustainable aquaculture. In 2014, three Ecuadorian shrimp farms operated by the firm OMARSA became the first in the world to achieve ASC certification.[55] ASC-certified

shrimp farms aim to measurably reduce adverse impacts on the environment and local communities by preserving wetlands and mangroves; addressing the transfer of viruses and reducing disease; bringing cleaner water and ensuring the sustainable use of water; ensuring the responsible use of feed, as well as addressing biodiversity issues.[56]

While OMARSA shrimp are ASC-certified for the firm's use of sustainable production methods, the company also produces organic shrimp at a level of five per cent of its total output.[57] Among the principles followed by OMARSA's organic farms are: (i) larvae are sourced only from organic certified hatcheries; (ii) low-density cultivation with no water pollution; (iii) use of natural food (such as algae) and organic feed; (iv) all production supplies and fertilizers have organic certifications; (v) no chemicals or synthetic materials are used within the perimeters of the organic farm; (vi) no use of antibiotics and minimized adherence of additives and sulfites, and (vii) reforestation at a rate of 20 per cent of the farm's total area every five years.

Another example of sustainable aquaculture in Ecuador can be found in tilapia production. This sector has grown quickly after the appearance of Taura Syndrome Disease in the early 1990s, which sharply affected shrimp production and thus led to opportunities for the uptake of tilapia in the country (FAO, 2005).

Ecuadorian tilapia producers have been at the forefront of the adoption of sustainable production practices in Latin America. In 2012, Aquamar, one of the largest tilapia farming facilities in Ecuador with an annual production estimated to 13,000 tons, became the first tilapia farm in the Americas to receive ASC certification (ASC, 2012).

Two other tilapia farming operations have obtained BAP certification and three BAP-certified feed mills are currently operating in the country. Moreover, a recent UNCTAD study on Green Exports (UNCTAD, 2014) found that no less than seven different sustainability standards had been used to certify Ecuadorian aquaculture products.

Conclusions

Aquaculture is one of the fastest growing food-producing sectors, providing many developing countries with significant export opportunities.

The development of the aquaculture sector in Oman, Morocco and Ecuador relies largely on government policies and incentives, as well as government provision of infrastructure and seed financing. This suggests that national programmes to support aquaculture are a prerequisite for the continued growth of this sector.

Certified sustainable production methods have become a market access requirement in world fish trade. Producers certified as using sustainable production methods are able to export their products to major developed country markets. However, many producers without such certification face growing difficulties in accessing these markets. This suggests that there is a need to increase awareness of the benefits of sustainability certification among exporting producers in the aquaculture sector. In addition, certification could be made more affordable by pooling producers in order to achieve economies of scale, reduce costs and narrow market access gaps.

Organic certification remains a niche market. A relatively small but growing segment of international consumers seeks additional standards and certification to ensure that the fish products they consume are not only sustainably, but also organically produced. Certified organic producers are able to capture a price premium in the organic market segment although for some producers higher margins appear to be largely offset by higher production costs.

Developing country producers should be encouraged to produce sustainably and acquire certification in order to access major world markets. However, going one step further towards certified organic production may not be worthwhile for most producers due to higher production and certification costs and the need to rely on a significantly smaller organic segment of the market. At the same time, if many developing country producers seek organic certification in large numbers, growth in organic production levels carries the risk of outpacing growth in the global organic consumer market, which could result in substantially reduced price premiums.

2.5 Nature's Benefits: Latin America's Valuable Marine Fisheries and Aquaculture

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Abstract

Marine and coastal ecosystems provide valuable resources and investment opportunities throughout Latin America. Mangrove forests, coastal wetlands, estuaries, coral reefs, seagrass beds, macroalgae assemblages and upwelling areas all contribute to fisheries production, providing generous opportunities for social cohesion, leisure and economic activities in the region. In addition, these coastal and marine habitats provide ecosystem services that benefit local and national economies. They contribute to culture and identity, support agriculture, mitigate the effects of climate change, provide educational opportunities and safeguard sacred sites. Their contribution to fisheries production is significant – and cannot by substituted.

Worldwide, fish – one of the most traded commodities in the world – accounted for a record US$146 billion in 2014. In Latin America and the Caribbean, fisheries exports alone generated nearly US$15 billion in 2011 – making fisheries one of the economically most important sectors in the region. Fisheries and aquaculture also support, and indeed increase, the profitability of other drivers of economic growth, such as marine-oriented tourism and agriculture. Especially in the Latin American region, fisheries and, to some extent, aquaculture, provide livelihoods, food security and cultural identity for thousands of coastal communities on the islands and coasts of the region. Coastal and marine policies that protect and restore the coastal habitats which underpin this sector could safeguard not only the fisheries industry, but also the very basis for human wellbeing in Latin America.

Oceans, fisheries, livelihoods and food security in Latin American and the Caribbean

Latin America and the Caribbean (LAC) is an ocean-dominated region. The vast majority of its countries and the bulk of their populations are coastal, with economies inextricably tied to the health and productivity of marine ecosystems. This region's seas and coasts are filled with valuable assets that generate substantial revenues for economic development, support livelihoods, improve the wellbeing of local communities and visitors, and have a key role in climate change mitigation. Healthy marine and coastal ecosystems are vital for maintaining the marine fisheries and aquaculture sectors in the LAC region. They are likely to be increasingly important as populations grow, land becomes scarce, the climate changes, and new markets for seafood and marine products emerge. While Latin Americans have already capitalized on the existence of the marine resources that these ecosystems have provided, there are many new opportunities for investment in the green and oceans economies.

In the LAC region, as in the rest of the world, fisheries are an engine of economic growth. Fish is one of the most highly traded commodities worldwide. In the record-setting year of 2014, global exports reached US$146 billion (FAO 2016). Although a regional assessment of fisheries has not yet been completed, FAO data shows that in LAC countries (excluding Cuba, for which data is unavailable) export values for fisheries products (including wild capture and aquaculture) reached US$14.5 billion in 2011 (see Table 2). Fisheries are a significant contributor to the economies of LAC nations (see Table 2 showing LAC GDP at purchasing power parity and fisheries export figures for 2011). Additionally, LAC regional exports accounted for nearly a quarter of all fish traded from developing countries worldwide. The seafood value chain is long and lucrative; with additional earnings generated by value-added industries that process both domestic and imported seafood products.

Table 2: Indicative relationship between 2011 GDP and fisheries exports for trading nations in the LAC Region ($ thousands)

Country	GDP (PPP)	Fisheries exports	Fisheries: GDP %
Brazil	2 615 234 935	242 543	<1.0
Mexico	1 169362 160	1 122 897	<1.0
Argentina	557 890 204	1 471 838	<1.0
Colombia	335 415 157	188 791	<1.0
Venezuela	316 482 191	23 566	<1.0
Peru	170 564 249	3 164 417	1.9
Chile	250 832 363	4 630 913	1.8
Ecuador	79 276 664	2 496 615	3.1
Dominican Republic	58 361 929	14 783	<1.0
Guatemala	47 654 787	106 199	<1.0
Panama	33 270 500	126 122	<1.0
Costa Rica	41 237 294	132 369	<1.0
Uruguay	47 962 439	234 559	<1.0
El Salvador	23 139 000	79 151	<1.0
Trinidad and Tobago	24 409 842	14 786	<1.0
Honduras	17 710 315	144 222	1.0
Nicaragua	9 755 620	132 992	1.4
Jamaica	14 396 817	11 991	<1.0
Haiti	7 516 834	10 116	<1.0
Suriname	4 422 277	71 548	1.6
The Bahamas	7 889 750	75 293	1.0
Guyana	2 576 598	53 619	2.1
Barbados	4 358 000	536	<1.0
Belize	1 487 005	25 408	1.7
Antigua and Barbuda	1 129 918	899	<1.0
Grenada	778 649	5767	<1.0
Saint Kitts and Nevis	728 051	719	<1.0
Saint Vincent	676 129	270	<1.0
Dominica	501 481	12	<1.0
Latin America / Caribbean	5 845 021 158	14 582 955	<1.0

Source: World Bank database /FAO Statistical Summary.

The economy of the LAC region is uneven, with five countries (Brazil, Mexico, Argentina, Colombia and Venezuela) accounting for more than two-thirds of the region's economic output. Chile and Peru are the top fisheries exporters in the region, accounting for more than half of the fisheries exports in LAC. The contribution of fisheries exports to the overall GDP also varies significantly. While LAC fish exports represent less than 1 per cent of the regional GDP, their contribution in terms of food security, jobs and livelihoods are far more important for the region as a large share of the harvest and processed products are kept in local and regional markets.

While the total fisheries export values of Caribbean Island States represent just 1 per cent of regional exports, they have vibrant, ocean-based societies with great cultural diversity. Both fisheries and aquaculture are expanding rapidly in the region, and even in its most developed countries fish consumption is increasing both per capita and in absolute terms, with implications for food security, trade and social stability.

Fisheries play a key role in ensuring food security, which may be even more important than their export value or direct economic output to GDP. Seafood, whether procured through capture fisheries or via aquaculture, is a major component of food security in Latin America as local populations are highly dependent on these resources. Per capita fish consumption is significantly higher in the Caribbean than the global average. In addition, food for subsistence and much-needed

cash provide social benefits in areas where coastal communities are marginalized or in rural locations (FAO, 1996). In the less developed countries of the LAC region, and particularly in remote coastal areas, fish is not only the major source of animal protein, it is also a critical source of micronutrients essential to people with otherwise deficient nutrition (Pauly and Zeller, 2016). For these reasons, it will be increasingly important to bring together governments, companies and local communities to engage in sustainable and innovative fisheries exploration practices, where ecosystems restoration and sustainable fisheries harvesting go hand in hand.

Seafood and fishing are also culturally important to the region, with millions of people engaged in artisanal fishing as part of traditional and alternative urban occupations. From a cultural perspective, seafood has played a central role in the development of traditional gastronomy, which has become a fundamental part of cultural pride and identity. Regional seafood dishes range from “muqueca” in Brazil, “ceviche” in Ecuador and Peru, conch chowder and fritters in the Caribbean, to other local specialties. This supports not only cultural identity, but also the growing marine and cultural tourism trade.

The fisheries and aquaculture sectors provide employment as well as a source of livelihoods in coastal and island nations across the LAC region. As a mainstay of many coastal communities, small-scale fisheries and aquaculture play an important role in the social fabric of society (FAO, 2014). In other parts of the region, especially in the Humboldt Current area (Pacific), large-scale commercial fisheries are targets for business investment and major contributors to GDP. These fisheries are the focus of much scientific study and stock assessments. This research and subsequent quota determinations to maintain catch at a maximum sustainable yield is accomplished by national fisheries ministries and regional fishery organizations and arrangements in LAC, including the Western Central Atlantic Fishery Commission, the Regional Fisheries Advisory Commission for the Southwest Atlantic, the Organization of Eastern Caribbean States, the Caribbean Community and Common Market, the Latin American Organization for Fisheries Development and the Permanent South Pacific Commission. However, most of these organizations deal only with migratory species such as tuna and sword fish.

In some places competition over access to resources between large-scale commercial fisheries and small-scale artisanal or subsistence fisheries has generated rivalry and conflict. This trend will remain throughout the region as stocks become overexploited and perverse subsidies drive overcapitalization that can result in even more overexploitation. This leads to the degradation of fisheries habitats and the ecosystems associated with them.

Latin American and Caribbean nations are taking steps to mitigate these conflicts through formal regional environmental agreements such as the Cartagena Convention for Caribbean Regional Seas, as well as informal regional discussions on combatting IUU fishing (FAO, 2015). Several countries, including Mexico, Ecuador, Peru and Chile, are also making efforts to address IUU by revising their regulatory and administrative measures. While these measures are positive, much remains to be done, especially when it comes to the fisheries industry’s adoption of benchmarks and best practices from other industries that have emerged from the intensive overexploitation of natural capital.

With the adoption of more ethical and sustainable practices, there are good possibilities that the conflict between local communities and mainstream fisheries will be minimized. Direct fisheries management (controlling catch) goes hand in hand with the protection of habitats that maintain this resource. Fisheries management organizations are utilizing tools such as Marine Protected Areas (MPAs), green financing mechanisms (for instance, payments for ecosystem services) and certification schemes to ensure that management is more committed to eco-efficiency and a holistic ecosystem-based approach (Potts et al. 2016). Good business practices increase benefit sharing along the value chain and revenue flows to operators, investors and governments.

Aquaculture operations are also improving, due in part to the 2009 establishment of the ASC and its standards for the 12 most commonly farmed fish and shellfish species. Many Latin American aquaculture operations have already moved to get ASC or Best Aquaculture Practices (BAP) certification. For instance, in January 2015, Makro Supermayorista SA – a major Latin American wholesaler with operations in Argentina, Brazil, Colombia, Peru and Venezuela – moved to get BAP certification for its farmed seafood as part of a company-wide sustainability initiative. Schemes such as these provide measurable standards and third-party verification in order to ensure that their

aquaculture operations adhere to best practices and are attractive to the industry due to the marketing opportunities that certification can provide. Several Latin American countries, such as Ecuador, have already developed strategies for sustainable seafood and aquaculture (UNCTAD, 2015). Nonetheless, there is scope for improvement, both to increase efficiency and net benefits to society, and to ensure that economic development in the fisheries sector does not constrain other maritime industries and benefits in the long run.

Specific fisheries of value to Latin American and Caribbean countries

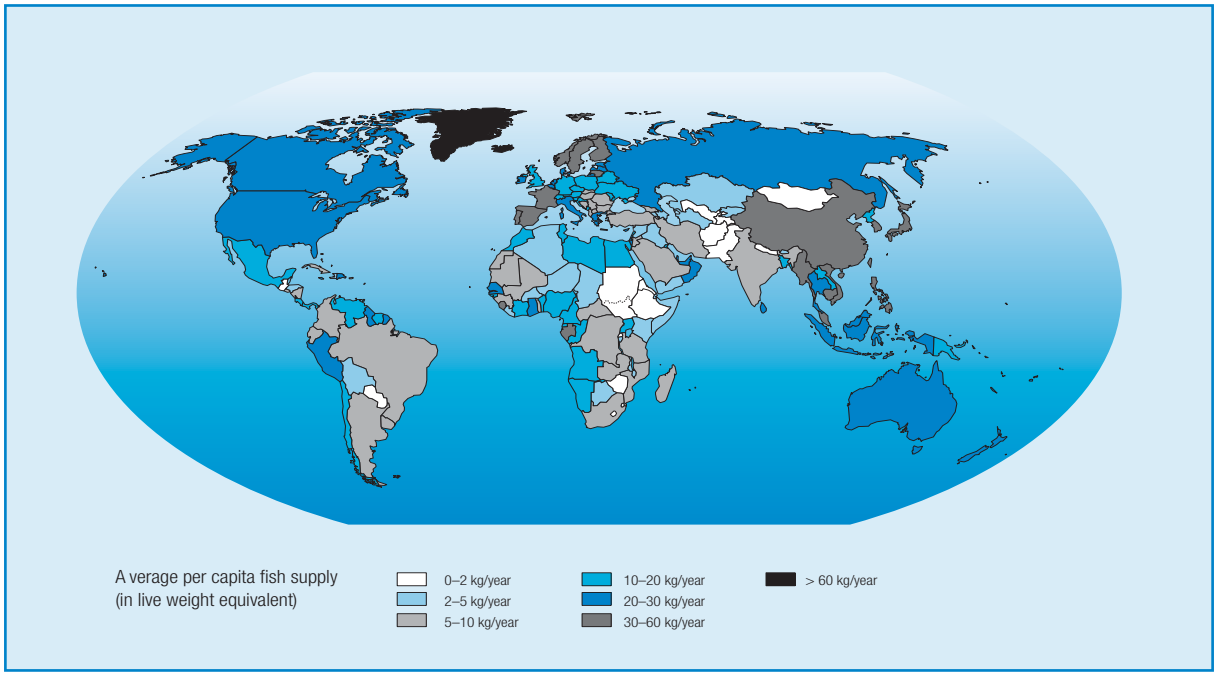
Fish products provide essential proteins for human consumption globally, with regional variations (see Figure 7). While the proportion of food protein provided by fish is significantly smaller than that provided by meat and dairy products (see Figure 8), its share is increasing rapidly around the world as global populations grow from 7.4 billion to 9 billion by 2050. The importance of some fisheries products for food security is larger than it appears. For instance, the Peruvian anchovy fishery is a crucial component of both animal feed and crop fertilizers. As technologies for sustainable agriculture improve in both scale and effectiveness, industries should reduce the use of fish for feedstock (indirect human consumption) and the production of fertilizers, substituting them by more effective and less strategic natural resources. Through development and industrialization, LAC countries may shift progressively from exports of fish commodities to emerging and more attractive fisheries-related markets.

Historically, much of this sector's economic value lies in international trade. The main seafood products driving this trade are high-value commodities such as farmed salmon and shrimp, wild-caught shrimp, snapper, lobster and conch, and high-volume small pelagic fish such as anchovies, sardines, and larger pelagics like mackerel and tuna. Approximately two-thirds of the region's landings are small pelagics, which represent a volume of roughly three-quarters of the global catch of these species. This context brings important inputs for a better understanding of fisheries economics in LAC and the region's potential as a driver for new and more innovative applications for fisheries output.

Latin American trade in fisheries products has increased steadily, generating a rising surplus over recent years (see Figure 9; FAO, 2014).

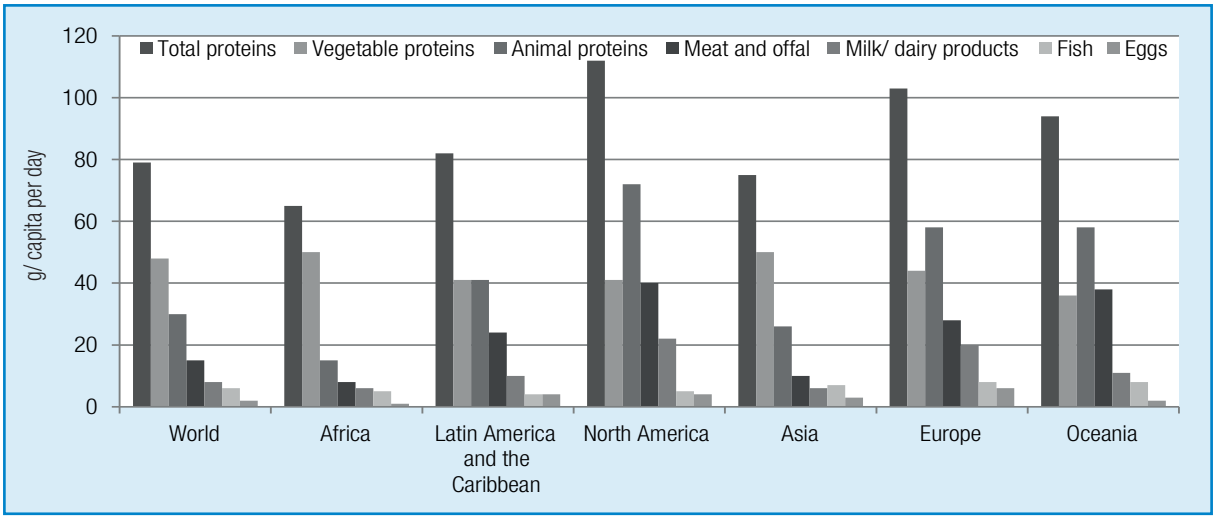
The huge variation in export figures among Latin American and Caribbean countries belies several complexities inherent in assessing the value of marine

Figure 7: Average per capita fish supply (average 2008-2010)



Source: FAO, 2014.

Figure 8: Derivations of global protein supply (averaging 2008-2010 data)



Source: FAO, 2014.

fisheries. Countries where fisheries (and aquaculture) account for a significant proportion of GDP are economically reliant on consistent catches and market demand. Paradoxically, many of the most lucrative fisheries are also the most dynamic, exhibiting boom and bust cycles tied to oceanographic phenomena such as the El Niño Southern Oscillation (Cashin et al., 2015).

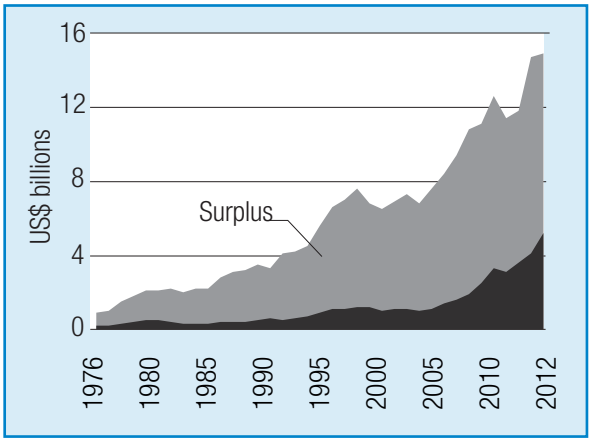
LAC countries are well aware of the value of oceans in providing resources for lucrative fishing operations. For instance, Peru and Chile tap the highly productive upwelling systems like the Humboldt Current. Ecuador and Chile practice large-scale aquaculture of shrimp or salmon, while the Bahamas and Mexico export high-value commodities, including conch and lobster.

While smaller countries such as the Caribbean Island States are largely invisible in terms of international trade statistics, they are nonetheless reliant on fisheries. Taking Dominica as an example, Boyd (2010) shows that local reef fisheries provide employment to no less than 11 per cent of the working population – a significant engine of economic wellbeing for which there is no readily available substitute.

Fisheries are becoming increasingly important to LAC countries. Since 1973, their contribution to GDP has increased steadily due, in part, to growing efforts of small pelagic fisheries (especially Peru and Chile) and the expansion of the sector into other products such as demersal fish, crustaceans, mollusks (primarily squid) and large pelagics, as well as aquaculture (see below). Fisheries contracted slightly between 1984 and 1990, but have since rebounded in terms of both value and their contribution to employment (FAO, 2014). Since 1991, the value of regional exports has grown faster than world value (FAO, 1996; FAO, 2015).

In recent decades, aquaculture has expanded in response to new market demand and a spate of new investors. Chile, Ecuador, Mexico, Brazil, Colombia and Cuba account for the bulk of production. Shrimp and salmon aquaculture targeting markets in the United States, Japan and Europe account for more than 80 per cent of regional aquaculture production (FAO, 1996; FAO 2014). In Ecuador, shrimp production has topped 300,000 metric tons, with exports generating some US$2.6 billion in 2014 (The Fish Site, 2015). This growth is largely driven by strong and increasing

Figure 9: Latin America trade in fish products, 1976-2012 ($ billions)



Source: FAO, 2014.

United States demand for shrimp, combined with a drop in Asian shrimp production due to the early mortality syndrome. In addition to Ecuador, other major shrimp producers in the region include Mexico, Colombia, Honduras and Panama. In contrast, Chile is the sole large-scale developer of salmon farming, accounting for more than 10 per cent of the world salmon supply. As in other parts of the world where industrial aquaculture is practiced, farming operations are vulnerable to disease outbreaks. Many of these operations have been the source of large-scale habitat destruction (especially the destruction of mangrove forests for shrimp ponds, see UNEP, 2014) and degradation tied to the release of fishery waste products, antibodies and other medicines as well as nutrients into local waters. However, the situation has improved considerably through the application of international certification, emerging regulations, and the rising government interest in the protection and management of coastal and marine ecosystem services in more environmentally sound ways (Gunther, 2012).

At the opposite end of the commodities spectrum, fisheries targeting small pelagics for fishmeal represent high volume but low value. These fisheries account for nearly three-quarters of the LAC's production in the sector. While they cause less concern over environmental effects than do shrimp and salmon farming operations, the large-scale harvest of small pelagics does have destabilizing effects on marine food webs, especially in periods of El Niño. In addition, bycatch (i.e. catch of non-targeted fish, shellfish, marine turtles, marine mammals and seabirds) in these and other wild capture fisheries can have profound effects on marine biodiversity although this pressure is abating as LAC countries take measures to reduce bycatch and increase efficiency.

Trade in fisheries and aquaculture products originating in Latin America flows across the globe. According to 2014 FAO statistics, approximately 13 per cent of South American marine fisheries products are exported to North America, 11 per cent to Asia, 8 per cent to Europe, 6 per cent to Africa and 4 per cent to Australia. Intraregional trade in South America accounts for 61 per cent of exports. This represents one of the highest rates of intraregional fish trade in the world, explained in part by canning operations and fish processing occurring in countries other than the country of origin throughout the region.

However, these figures do not tell the whole story. Export values – the most easily obtained metric for fisheries valuation – do not indicate the true contribution to GDP, since neither the sum of private and government consumption, nor capital formation, employee compensation, insurance or subsidies are included in the calculation (World Bank, 2012). Regrettably, import/export figures shed no light on domestic commercial markets, small and informal markets, or subsistence reliance on marine resources (including fisheries products not only used directly for food, but also as bait as well as fertilizer for household crops and feed for fish ponds). According to the FAO, fisheries contribute nearly 10 per cent of the food supply in Latin America (FAO, 2014, see Figure 8). In addition to this direct value, there are spin-off effects down the value chain. In Peru, for instance, fisheries support 269,000 jobs, of which 35 per cent are found in restaurants (Christensen et al. 2014 and FAO, 2014).

In addition, fisheries can boost the revenues of other industries in Latin America and the Caribbean. Across many localities, tourism drives demand for local fishery products. When seafood is made available it is not only sold at a premium, benefiting fisheries businesses, it can also allow for more high-end, profitable tourism. For instance, fishers often take visitors onboard their boats when they are not fishing. This provides additional employment and diversifies livelihoods thus reducing risk. In this context, fisheries spin-off impacts on jobs at the base of the pyramid are probably as significant, if not more, than those of mainstream fisheries.

There are marked differences between and within countries in terms of the quantity and variety of fisheries products consumed per capita, depending on availability, cost, alternatives, income and cultural factors such as food traditions and tastes (FAO, 2014). Nonetheless, fisheries and aquaculture combine to form an undeniable mainstay in Latin American culture, trade and economy.

Nature's role in providing these resources is obvious: without healthy and productive oceans, marine and coastal fisheries resources would not be available for harvesting. But nature does more than provide living resources for today – coastal and marine habitats also maintain the potential for food, livelihoods and contributions to GDP in the future. Critical habitats for fisheries – without which there would be no fisheries production and thus no fishing industry – include not only the marine areas where fishing takes place, but also nursery areas in mangroves, seagrass, estuaries, spawning grounds and migration

corridors (UNEP, 2014). Coastal habitats provide space to support fisheries infrastructure, habitats that stabilize shorelines and safeguard fisheries capital investments from storms, as well as maintain the ports and shipping routes that allow transport of fisheries products to markets. Coastal habitats also provide waste management for fish processing and space and waste management for fish and invertebrate aquaculture operations. Finally, coastal and marine habitats support other growth industries in Latin America, such as tourism, which in turn creates more demand for fisheries products and, potentially, more profitability.

Fisheries and, by extension, aquaculture are major economic drivers in Latin America and the Caribbean. However, based on minimal industrial value-added and low investment in applied research as well as protection of natural habitats to enhance production, fisheries' contribution to regional wealth is well below its potential.

The challenges

Among the major challenges facing the Latin American fisheries industry are (i) lack of an adequate assessment of the current situation of marine fisheries and aquaculture, (ii) the inability to form an accurate picture of the condition of fish stocks, (iii) how the sector benefits society, and (iv) what additional potential exists for investment in the sector. The last regional appraisal of the sector was conducted using data now half a decade old (Salas et al., 2011). One of the main messages of that assessment was that information on fisheries, and smaller scale fisheries in particular, was sorely lacking for the LAC region.

As in other regions of the world, significant challenges remain for the management of marine fisheries even in areas where a scientific stock assessment has been performed and a framework exists for joint management through RFMOs. Many stocks are overexploited, and IUU fishing remains a challenge even in countries with strong fisheries regulations (Pauly and Zeller, 2016). Developing countries have even greater challenges than developed nations in building capacity for monitoring and enforcing regulations, especially in offshore areas.

Some of the fisheries of greatest commercial value in the region are also those facing significant ecological pressures, particularly with regard to straddling and migratory stocks in the high seas, including the tuna fishery in the Eastern Pacific, the Peruvian/Chilean anchovy fishery in the Humboldt Current, and the southern ocean tooth-fish and squid fisheries (World Bank and FAO, 2009). The high degree of unpredictability concerning population sizes challenges fisheries managers and governments alike. In addition, the fact that many stocks are transboundary in nature, and that shared threats need to be addressed collectively makes the situation even more challenging (UNCTAD, 2014b). In the Caribbean sub-region, fisheries are characteristically shared between localized small-scale fishers (Hoffman, 2010).

As fisheries expand in the region, the potential for intrasectoral conflicts increases. This includes competition between operators, displacement of fisheries due to conservation-related protections or allocations made for other interests (tourism, energy development, etc.). With the expansion of large-scale commercial fisheries, conflicts between industrial and artisanal fishers can only increase (Jarroud, 2015). For marginalized coastal communities, these conflicts can exacerbate poverty and further disenfranchise societies. All evidence points to the fact that the adoption of ethical and science-based best practices is fundamental to the fisheries industry.

Asymmetry in the capacity to develop or expand businesses by different actors in fisheries value chains leads to further inequities. Well-financed businesses, whether domestic or foreign, can gain access more easily to capital and the knowledge investments needed for efficient processing facilities. They can also invest in marketing/advertising, as well as establish the most efficient modes of delivery to markets. In contrast, many developing countries lack the capacity to comply with environmental, safety and trade regulations and standards, which limits their ability to access markets. The MSC, FoS and other sustainable marine certifications can help in this regard. Many Non-Governmental Organisations (NGOs) also offer assistance in getting community-based fisheries products certified. Yet, even in cases where training and technical assistance increase this capacity, well-financed investors can "corner the market". In the worst case, the economic and social benefits flowing from commons property such as marine fisheries stocks may end up in the hands of only a few.

A final challenge is the uneven treatment of opportunities for improving and investing in the sector. Growth in fish and seafood products certified as sustainable has occurred throughout the world, and there is great

potential to amend operations to conform to best practices, as well as expand and diversify industries as new markets emerge. One important way in which Latin American countries (and the investors they hope to woo) can increase production and profitability is to invest in the marine and coastal ecosystems themselves, thus ensuring continued production of wild stock and food for aquaculture operations, as well as the myriad ecosystem services that nature provides.

The opportunities

Latin America has a great opportunity to take full advantage of nature's potential to deliver fisheries-related benefits and promote more equitable benefit sharing. These opportunities occur in both the supply and the demand side. Throughout the region, there are possibilities to increase production and profitability in five related ways: (i) improvement of management in order to increase fisheries efficiency and profitability, (ii) enhancement of production through protection or restoration of spawning and nursery habitats, (iii) development of fisheries businesses that generate profits through certification, utilization of bycatch and value-added processing of specialty products, (iv) expansion of export and domestic markets, and (v) implementation of policies on land and marine use that maximize fisheries value alongside other benefits provided by nature, including the carbon sequestration needed for climate mitigation (blue carbon), flood control and disaster risk mitigation, and tourism as well as support to regional and global biodiversity.

Donor interest in the region is strong. Conservation funding has been available for fisheries-related work, especially in the Caribbean sub-region (Hoffmann, 2010). Multilateral support for fisheries reform and projects in the form of loans and grants has been provided by development banks and the OECD, as well as bilateral funding from USAID, DIFD (UK overseas development agency), GIZ (German development agency), WWF and others. These grants have supported assessments of local and sub-regional fisheries issues and studies related to the livelihoods of fishers, including their contributions to households and general wellbeing. Other project funding has allowed the identification of Ecologically and Biologically Significant Areas (EBSAs) under the Convention on Biological Diversity, as well as priority areas for Marine Protected Areas (MPAs) and other spatial management measures specifically aimed at maintaining or enhancing fisheries. These grants have helped communities to better manage their fisheries businesses and the attendant impacts on the environment, including through MSC certification. Private sector and foundation funding has also supported the development of rights-based fishing in the region, including the use of Territorial Use Right Fisheries (TURFs) in Chile and Mexico, and Individual Transferable Quota systems (ITQs) throughout the region. The Development Bank of Latin America (CAF) is currently evaluating opportunities for invention and support for conservation and sustainable use of marine ecosystems and fisheries.

Despite this historical aid, many more opportunities to enhance fisheries and benefit sharing in the LAC region seem to have been overlooked. Outcome-oriented investments could facilitate access to capital, training and technology transfers focused on gear improvements, bycatch reduction devices, closed aquaculture systems, as well as net-cage fish mariculture and seaweed farming, capital for improving processing/packaging efficiencies, fisheries and marine planning and management training, including Marine Protectd Area (MPA) design and management. In addition, there are numerous opportunities to improve oceans space/marine spatial planning and integrated management using comprehensive ocean zoning, as well as the marketing of fisheries products to expand existing markets or create new ones (e.g. Shortte, 2013). Trade policies should be evaluated and possibly revamped, with an emphasis on measures that reduce IUU fishing, decrease reliance on fisheries subsidies, and address tariffs that disadvantage small-scale or local fishers (for global recommendations and greater detail, see Sumaila, 2016).

Many Latin American countries are already investing in improving the management and efficiency of increased fishing and aquaculture (World Bank, 2005; Wiefels, 2003). More effective management can generate revenues for individuals and businesses, as well as increase the economic standing of coastal communities and their ability to contribute to GDP. In addition, improved management can enhance the sustainability of revenue generation by allowing foreign fleets to fish within the Exclusive Economic Zones of coastal nations. Finally, improved management can increase regional fisheries' productivity through strengthened regional management organizations as well as bilateral or multilateral agreements that

pool resources for fisheries research and harmonize fisheries legislation.

A shift from low value-added commodity fisheries used for animal feedstock and fertilizers to other applications better able to capture more of the economic output for the benefit of producer countries presents an opportunity to improve food security and climate change mitigation provided that adaptation funds are available. This leap from quantitative to qualitative output in the fisheries value chain could have a significant impact on restoring ecosystems capacity to perform in the long term.

One management tool that has gained traction in recent years is the establishment of marine reserves – a form of MPA – where extractive uses are prohibited. Fisheries managers have utilized marine reserves to protect spawning stock, increase recruitment and catalyze spillover in which fisheries productivity outside the reserve is enhanced by production that "spills" over the border. The FAO has helped countries develop marine reserves and networks by providing guidance in the form of publications and training workshops (see for example FAO, 2011; Sanders et al., 2011). The most effective protected area measures are those embedded in wider-scale marine spatial planning and ocean zoning (Agardy, 2011; Agardy et al., 2012; and UNCTAD, 2014b). These measures are particularly effective when they are placed within multilateral agreements that protect shared marine regions (UNCTAD, 2014b).

Other management measures that can enhance productivity and maintain the sustainability of fisheries include rotating harvest schemes and seasonal closures, regulations requiring bycatch reduction and efficiency enhancement gear, size or slot limits that protect spawning stock, and property rights schemes such as TURFs and ITQs. Interestingly, Latin America lags behind many other regions of the world in adopting measures for improved fisheries management and increased efficiency.

Efficiencies can also be improved post-harvest as exemplified by new initiatives aimed at utilizing currently wasted fisheries byproducts. For instance, the Iceland Ocean Cluster has launched a program that trains fishing businesses to utilize 100 per cent of their catch – not only producing high-quality fish for human consumption, but also turning fatty tissue byproducts into fish oil for medicinal use, and scales and organs into fish meal. Other fisheries utilize unwanted bycatch (low-value fish species, invertebrates, jellyfish, seaweeds) in addition to targeted fisheries stocks. In 2015, the FAO and the Global Environment Facility (GEF) launched a five-year project to promote the sustainable management of bycatch in LAC trawl fisheries involving Brazil, Colombia, Costa Rica, Mexico, Suriname and Trinidad & Tobago (GEF allocation US$5.8 million; total budget of nearly US$23 million). This project will support the implementation of the 2015 International Guidelines on Bycatch Management and Reduction of Discards as well as the Voluntary Guidelines for Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication. Together, they provide another international instrument of high relevance to the trawl fisheries in the LAC region (GEF, 2015).

There are even greater opportunities if one considers the international context and the many policies and initiatives that are catalyzing improvements in fisheries (Deere, 2000). For instance, Goal 14 of the recently adopted Sustainable Development Goals (SDGs) commits United Nations Member States to: "conserve and sustainably use the oceans, seas and marine resources for sustainable development" (UNCTAD and Commonwealth Secretariat, 2015). Under the CBD, EBSAs have been identified for the region. These will receive special attention aimed at ensuring that the fisheries within EBSAs are sustainable. Parties to the CBD have also committed to the Aichi Targets on conserving biodiversity. Target 11 calls specifically for the establishment of MPAs and other effective area-based conservation measures that will enhance fisheries productivity once Target 11 implemented.

Latin America and the Caribbean countries have a great opportunity to unlock their vast potential for blue growth and maximize the profitability of their fisheries while at the same time safeguarding biodiversity and the marine environment that supplies all this potential wealth. Targeted investment and trade policies will help achieve this. Subsequent returns on this investment and increased trade will accrue not only to investors but, most importantly, to the Latin American and Caribbean communities as a whole.

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Notes

1 See http://scientificamerican.com/article/little-chance-to-restrain-global-warming-to-2-degrees-critic-argues/
2 See World Bank, FAO, IFPRI and AES, 2013.
3 Ibid.
4 Ibid.
5 Convention on the International Trade in Endangered Species of Wild Fauna and Flora, 1973.
6 International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978.
7 Ibid.
8 UNCTAD, 2014.
9 More information on the AGLINK–COSIMO modelling system, and on the OECD–FAO Agricultural Outlook publication is available at www.agri-outlook.org/.
10 Agriculture, including fisheries and aquaculture.
11 At present, the fish model is not fully integrated in the overall AGLINK–COSIMO modelling system.
12 More information on the IMPACT model is available at: www.ifpri.org/sites/default/files/publications/impactwater2012.pdf.
13 The MSC, a joint project between Unilever and WWF, certified its first capture fishery for the MSC label in 1999.
14 FAO Office for Partnerships, Advocacy and Capacity Development (OPC).
15 Information about Fishery Improvement Projects is available at: http://fisheryimprovementprojects.org/.
16 For example: Iceland Responsible Fisheries, Marine Eco-Label Japan, Alaska Seafood, U.S. Dolphin Safe label.
17 For example: Vietnamese Good Agriculture Practice (VietGAP) is mandatory for aquaculture producers; ThaiGAP is a voluntary private standard whose development was supported by government.
18 Some seafood standards also address issues related to health and safety of seafood products. Standards including health and safety requirements will typically include requirements applicable to the entire supply chain rather than primarily or only for production.
19 Differential treatment of products based on non-product related production and processed related methods (PPMs) has been a long standing point of contention in international trade circles. Conformity assessment technologies developed by voluntary standards offer an invaluable starting point for identifying non-discriminatory approaches for distinguishing between products based on non-product related PPMs. See Potts, 2008.
20 MSC the leading capture fishery certification initiative reports having more than 26,000 unique fish products in 2014 (Marine Stewardship Council, 2015).
21 MSC, the oldest and largest seafood certification initiative was initially launched as a partnership between WWF and Unilever—with both organizations seeking an approach that could be adopted by mainstream supply chains.
22 See Potts et al., 2016.
23 Seafood certification to date has been almost entirely driven by global recognition of the need to preserve finite stocks of wild species, hence the domination of wild catch production in certified seafood markets.
24 Note: data source years apply to all graphics and calculations in this chapter.
25 Including Alaska Pollock.
26 Although some fees like auditing fees and producer fees can vary depending on size of farm and quantity of production, there are also fixed costs such as licensing fees and membership fees. Beyond these costs there is also the need for administrative and technical expertise that small production units may not necessarily be able to afford.
27 Fishery Improvement Plans represent an important vehicle for building capacity to become certified among fisheries. Several examples exist of public and private institutions working through FIPs to enable certification. See Potts et al., 2016.
28 It is worth noting, however, that South America has managed to secure a favorable portion of the certified market (accounting for only 8% of global seafood production but 36% of global certified seafood production) due primarily to FOS certification of the Peruvian Anchoveta fisheries. This is likely an aberration from the overall trend and due to the massive size of the Peruvian fisheries.
29 As it stands, most seafood certification initiatives focus on certifying aquaculture OR capture fisheries making it somewhat challenging for individual initiatives to manage “cross-sectoral” strategies. In this regard, FOS

certification, with active aquaculture and capture fishery certification offers a special opportunity in promoting sustainable stock management.

30 E.g. certified seafood excluding certified fishmeal products.

31 Certified fishmeal, on the other hand, currently accounts for an estimated almost half of global fishmeal production—based on the certification of Peruvian and Chilean Anchoveta alone. The actual international market for certified fishmeal is predominantly limited to aquaculture and livestock products seeking their own form of certification but in any event can be assumed to be vastly less than actual supply. As such, it seems unlikely that growth in certified fishmeal is likely to be a source of growth of certified production more generally.

32 For example, Walmart which had originally committed to only sourcing from MSC certified sources by 2011 had still not fulfilled this commitment by 2015 allegedly due to a lack of sufficient certified supply. See Walmart (2015).

33 It is possible, for example, that growing restrictions on the trade of IUU seafood products (for example as a consequence of the Trans-Pacific Partnership Agreement's commitments) could result in a greater reliance on certification to prove non-IUU sourced products.

34 See Potts et al., 2016.

35 See Global Aquaculture Alliance: http://gaalliance.org/.

36 See Friend of the Sea: http://www.friendofthesea.org/aquaculture.asp.

37 See United Nations: https://sustainabledevelopment.un.org/samoapathway.html.

38 See: https://afsic.nal.usda.gov/aquaculture-and-soilless-farming/aquaculture/organic-aquaculture.

39 See: http://www.krav.se/krav-standards.

40 See: http://www.naturland.de/en/certification.html.

41 See: http://www.soilassociation.org/LinkClick.aspx?fileticket=pM14JxQtcs4 percent3d&tabid=353.

42 See: http://www.ifoam.bio/en/sector-platforms/ifoam-aquaculture.

43 See:www.organic-services.com/fileadmin/files/05publications/presentations/100506_OMF_VortragUdoCenskowsky_Aquakultur.pdf.

44 See: https://www.undercurrentnews.com/2014/04/24/hayduk-aims-to-quadruple-premium-organic-fishmeal-production/

45 Limited to Alascan pollock.

46 UNCTAD (2016). Sustainable fisheries: International, Trade and Regulatory issues.

47 See FAO, National Aquaculture Sector Overview of Oman, updated annually: http://www.fao.org/fishery/countrysector/naso_oman/en.

48 See MAF, Investment Guidelines for Aquaculture Development in the Sultanate of Oman, 2011: http://www.raisaquaculture.net/uploads/media/Investment%20Guidlines.pdf.

49 See Plan Halietus: http://www.maroc.ma/en/content/halieutis.

50 Estimates from the Moroccan Agency for Aquaculture Development and the FAO Global Aquaculture Production Database available at: http://www.fao.org/figis/servlet/TabSelector.

51 See El Universo (2015). Camaron supera levemente a banano en exportaciones, 15 of January, 2015.

52 See: http://www.fao.org/fishery/countrysector/naso_ecuador/en.

53 See: https://www.shrimpnews.com/FreeReportsFolder/ewsReportsFolder/EcuadorUSDAReportOnEcuador2014.html.

54 See : http://fishfarminginternational.com/keeping-shrimp-sustainable-in-ecuador/.

55 See: http://www.blueyou.com/dropbox/First_Shrimp_Farms_ASC_Certified.pdf.

56 See : http://www.asc-aqua.org/index.cfm?act=update.detail&uid=195.

57 See : http://www.omarsa.com.ec/index.php/en/organic-shrimp-2/organic-farming.html.