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Preparation of this document

This publication highlights the main conclusions of the Fishing for Development joint meeting, held in Paris in April 2014. The meeting was organized by the Food and Agriculture Organization of the United Nations (FAO), the Organisation for Economic Co-operation and Development (OECD) and the World Bank (WB) to initiate a dialogue between the fisheries and development policy communities from member and partner countries and organizations of the OECD. It brought together delegates to the OECD Fisheries Committee and OECD Development Assistance Committee, representatives of partner developing countries invited by FAO, as well as experts and representatives from FAO, WB, non-governmental organizations and regional organizations. The meeting focused on issues central to promoting sustainable fisheries and aquaculture in developing, emerging and developed countries alike.

This publication also includes the background papers originally prepared to provide context for the issues addressed. It identifies questions for a future work agenda on policy coherence in fisheries and aquaculture, and makes evident the strong need for further dialogue between the fisheries and development communities at global and regional scales.

The organization of the Fishing for Development joint meeting and the preparation of this report were coordinated by Claire Delpuch and Carl-Christian Schmidt, OECD, with substantive contributions from Frank Meere, FRM Consulting, and Rohana Subasinghe and Jai Cuning, FAO. The report was edited by Michèle Patterson, OECD, and Tina Farmer, FAO.

Abstract

The Food and Agriculture Organization of the United Nations (FAO), Organisation for Economic Co-operation and Development (OECD) and the World Bank organized the Fishing for Development joint meeting, which was held in April 2014 at OECD headquarters in Paris. The meeting was convened to initiate a dialogue between the fisheries and the development policy communities from OECD and FAO Members and partner countries on key issues of shared interest. It addressed four topics high on the international fisheries and aquaculture policy agenda: the challenges of rebuilding fish stocks while securing the integrity of ecosystems and the livelihoods that depend on them; the potential for green growth in aquaculture; combating illegal, unreported and unregulated (IUU) fishing; and the role of regional fisheries management organizations (RFMOs) in the management of high seas fish stocks and in developing cooperation between States that share fish stocks in several exclusive economic zones (EEZs).

The meeting reached a number of conclusions and flagged questions for a future work agenda on policy coherence in fisheries and aquaculture. In particular, it highlighted the need to investigate and publicize the role of fisheries and aquaculture for economic development and food and nutritional security, and the opportunity cost of political inaction. It noted the lack of appropriate data, which results in the lack of tangible evidence on the sector's contribution to economic development and poverty reduction, and how this also prevents improvements in efficiency.

The meeting also agreed on the need to investigate low-cost management options and techniques tested in developing countries, such as co-management of fisheries and participatory surveillance systems. It recommended that further investigation of such options should focus on identifying the necessary preconditions for a successful outcome and how to apply them on a larger scale and in different socio-economic contexts.

Another conclusion was that there is a need to improve the resilience of coastal populations. The fisheries sector is often a last resort or buffer for marginalized populations, and there is an urgent need to develop alternative livelihood means (e.g. in ecotourism, aquaculture or fish processing) and social safety nets.

The meeting also highlighted the need to leverage development cooperation in fisheries and aquaculture and that a major element for efficient cooperation is the sustainability of project impacts.

In addition, the meeting stressed the importance of ensuring that domestic fisheries policies of OECD member countries are coherent with long-term global development objectives and do not harm development prospects in developing countries. The meeting noted that developing countries do not always have the resources to monitor their EEZs effectively and suggested that OECD countries should manage and regulate their fleet's activities outside their own EEZs more effectively.

Participants at the meeting also agreed on the need to strengthen the fight against IUU fishing. They underlined the role of development cooperation in building capacity in developing countries and discussed the potential impacts of trade restrictions and consumption decisions. However, there were several viewpoints on import bans given the risks associated with establishing technical barriers to trade. Because some illegal fishing activities contravene international laws and may be linked to other criminal activities, such as human trafficking, participants agreed on the need to combat these transnational activities using appropriate tools, such as the Interpol network. The meeting made a strong call for countries to ratify the FAO Port State Measures

Agreement as soon as possible.

In addition, the meeting concurred on the need to promote green growth in aquaculture, for example, through investment in productive capacity, research and infrastructure. Topics such as certification and licensing systems were also discussed.

Last, the meeting emphasized the need for developing countries to be better integrated in regional cooperation fora. Several regions suffer from a lack of coherence in actions taken by regional fisheries bodies and regional economic organizations, with overlapping competencies and a lack of political impetus. The OECD countries can help developing countries to build the necessary capacity to participate in RFMOs.

Contents

| | |
|---|------|
| Preparation of this document | iii |
| Abstract | iv |
| Abbreviations and acronyms | viii |
| Foreword | ix |
| | |
| 1. Key messages of the meeting | 1 |
| 2. The role of fisheries for sustainable development, poverty reduction and food security | 7 |
| 3. Rebuilding fisheries for development | 15 |
| 4. Green growth in fisheries and aquaculture | 23 |
| 5. The challenge of combating illegal unreported and unregulated (IUU) fishing | 31 |
| 6. The role of regional fisheries management organizations | 43 |
| Bibliography | 53 |
| Appendix | |
| Fishing for development programme | 57 |

Abbreviations and acronyms

| | |
|-----------|---|
| BGI | Blue Growth Initiative in Support of Food Security, Poverty Alleviation and Sustainable Management of Aquatic Resources |
| DWFN | distant-water fishing nation |
| EEZ | exclusive economic zone |
| FAO | Food and Agriculture Organization of the United Nations |
| FNS | food and nutrition security |
| GDP | gross domestic product |
| IATTC | Inter-American Tropical Tuna Commission |
| ICCAT | International Commission for the Conservation of Atlantic Tunas |
| IMF | International Monetary Fund |
| IMO | International Maritime Organization |
| IOTC | Indian Ocean Tuna Commission |
| IUU | illegal, unreported and unregulated (fishing) |
| MEY | maximum economic yield |
| MPA | marine protected area |
| MSY | maximum sustainable yield |
| NGO | non-governmental organization |
| OECD | Organisation for Economic Co-operation and Development |
| OECD COFI | Fisheries Committee (OECD) |
| OECD CTPA | Centre for Tax Policy and Administration (OECD) |
| OECD DAC | Development Assistance Committee (OECD) |
| PCD | policy coherence for development |
| PSMA | FAO Port State Measures Agreement |
| RFB | regional fishery body |
| RFMO | regional fisheries management organization |
| UNCLOS | United Nations Convention on the Law of the Sea |
| UNDESA | United Nations Department of Economic and Social Affairs |
| UNEP | United Nations Environment Programme |
| UNFSA | United Nations Fish Stocks Agreement |
| WB | World Bank |
| WCPFC | Western and Central Pacific Fisheries Commission |

Foreword

Fisheries and aquaculture make a vital contribution to the food security, nutrition and livelihoods of hundreds of millions of people. They are a source of healthy food and animal protein, providing essential micronutrients such as vitamins, minerals and fatty acids. In addition to the tens of millions of people engaged directly in the sector, hundreds of millions more, many of them women, are employed in the value chain from harvesting to distribution. Indeed, the livelihoods of more than one-tenth of the global population are dependent on fisheries and aquaculture. They also generate significant government revenue and foreign currency. However, both fisheries and aquaculture require good governance and careful management to be sustainable.

The ocean functions as a single ecosystem, and fish is one of the most-traded food commodities. The health of ecosystems and fish stocks and the availability and affordability of fish products in one part of the world are thus all influenced by fishing, production and consumption practices in other parts of the world. In addition, fishing activities are mobile and transnational, with fishing fleets from many nations operating in other countries' waters and on the high seas. As such, any policy that affects fish production, consumption or trade is likely to have a significant impact on the development prospects beyond the borders of the countries that implement them.

Aquatic ecosystems are already under stress from overexploitation, pollution, declining biodiversity, expansion of invasive species, climate change and ocean acidification. More effective governance is needed at all levels across the sector in order to address these and other issues such as illegal, unreported and unregulated (IUU) fishing, which remains a major threat to marine ecosystems.

Countries have a responsibility, therefore, to ensure their fisheries and aquaculture resources are efficiently monitored and regulated. It is important that policies – including financial support to the sector, fishing agreements with third countries, and trade policies – do not contribute to overfishing or deprive local inhabitants of their livelihoods and food sources. Implementing these priorities and supporting regional and global collaboration has a cost, however: scientific surveys and coastguards are needed to control the quantity of fish harvested, and investments are needed to support efficient fishing and fish farming and to facilitate the transition, where necessary, to alternative activities such as tourism or seafood processing.

How can fisheries and aquaculture best contribute to economic development and food security? How can governments promote policy coherence between domestic sectoral production objectives and broader development objectives? How can development assistance to the sector support sustainable development and contribute to blue growth?

To initiate a dialogue between the fisheries and development policy communities from member and partner countries and organizations of the Organisation for Economic Co-operation and Development (OECD), the OECD Fisheries Committee (OECD COFI), the OECD Development Assistance Committee (OECD DAC), and the Food and Agriculture Organization of the United Nations (FAO) organized the Fishing for Development joint meeting, held in April 2014 at OECD headquarters in Paris. It brought together delegates to the OECD COFI and OECD DAC, representatives of partner developing countries invited by the FAO, as well as experts and representatives from the FAO, the World Bank, non-governmental organizations (NGOs) and regional organizations.

The meeting focused on four issues that are central to promoting sustainable fisheries and aquaculture in developing, emerging and developed countries alike:

- the challenge of rebuilding fish stocks while securing the integrity of ecosystems and the livelihoods that depend on them;
- the potential for green growth in aquaculture;
- the challenge of combating IUU fishing;
- the role of regional fisheries management organizations (RFMOs) in the management of high seas fish stocks and in developing cooperation between States that share fish stocks.

This publication highlights the main conclusions of the meeting and includes the background papers that were originally prepared to provide context for the issues addressed. It identifies questions for a future work agenda on policy coherence in fisheries and aquaculture, and makes evident the strong need for further dialogue between the fisheries and development communities at global and regional scales.

We would like to thank all participants for their contributions, the Government of Norway for its financial support, and Eric Tromeur, Stefanie Milowski and Nathalie Ellisseou Leglise, OECD, as well as Florence Faivre, FAO, for their assistance, and Gloria Lorient, FAO, for the layout design of this publication.

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1. Key messages of the meeting

How can fisheries and aquaculture best contribute to economic development and food security, particularly through more coherent policy-making? How can the synergies between fisheries and aquaculture and development assistance policies be exploited to support sustainable development and contribute to green growth? How can governments better balance divergent domestic fisheries and aquaculture objectives with broader development policies that avoid or minimize having potentially detrimental effects in developing countries? These questions are central to developing sustainable fisheries and aquaculture policies. They were investigated during the Fishing for Development meeting, held in April 2014 at the headquarters of the Organisation for Economic Co-operation and Development (OECD) in Paris.

Organized by the OECD Fisheries Committee (OECD COFI), the OECD Development Assistance Committee (OECD DAC), the Food and Agriculture Organization of the United Nations (FAO) and the World Bank (WB), this meeting initiated a dialogue between the fisheries and the development policy communities from OECD and FAO Members and partner countries on key issues of shared interest.

Fisheries and aquaculture contribute significantly to reducing poverty and food insecurity worldwide. The FAO estimates that this sector, including secondary activities, provides livelihoods for 10–12 percent of the world's population. Fish is also an important source of protein, fatty acids and micronutrients that are fundamental to the development of humans, especially in the poorest parts of the world. At the macro level, fisheries and aquaculture have important economic multiplier effects and can generate significant government revenues and foreign currency when sustainably managed and responsibly traded.

Sustaining the capacity of world fisheries and aquaculture to provide food and jobs requires sensible and effective fisheries management and ecosystem preservation. As fish stocks are often shared, this can only be achieved through regional and multilateral cooperation. In addition, given that the ocean functions as a single ecosystem, that fish is one of the most traded food commodities, and that fishing activities are mobile, policies that affect fish production, consumption and trade in one country will affect the development prospects of other countries. They will indeed have an impact on the demand for fish, including imported fish, on global prices for fish products and thus availability and affordability of fish products globally, on fish stocks and on ecosystem sustainability.

There are many issues where policy coherence is at stake. Four topics high on the international fisheries and aquaculture policy agenda were addressed during the Fishing for Development meeting: the challenges of rebuilding fish stocks while securing the integrity of ecosystems and the livelihoods that depend on them; the potential for green growth in aquaculture; combating illegal, unreported and unregulated (IUU) fishing; and the role of regional fisheries management organizations (RFMOs) in the management of high seas fish stocks and in developing cooperation between States that share fish stocks in several exclusive economic zones (EEZs). This chapter highlights the main conclusions of the meeting as well as questions that emerged for a future work agenda on policy coherence in fisheries and aquaculture.

INVESTIGATE AND PUBLICIZE THE ROLE OF FISHERIES AND AQUACULTURE FOR ECONOMIC DEVELOPMENT AND FOOD AND NUTRITIONAL SECURITY AND THE OPPORTUNITY COST OF POLITICAL INACTION

The role of fisheries and aquaculture in development, poverty reduction and food and nutrition security needs to be acknowledged more broadly, and notably outside fisheries policy circles. This would help direct development cooperation and assistance to the sector, demonstrate the need for increased resources to better manage fisheries at the government level, give greater consideration to fisheries in national development strategies, and integrate fish into nutritional programmes.

While the nutritional importance of fish is well known, the overall economic contribution of this sector to the economy in general is less well understood and more research is needed.

The economic valuation of fish stocks and ecosystem goods and services is considered crucial for greater transparency in the management of fisheries by making explicit the benefits of conservation and the opportunity cost of insufficient regulation. This is especially important in cases where decision-makers find it politically costly to engage in fisheries regulation or where they find it interesting financially to accept unsatisfactory status quo situations. Making information on the economic value of fisheries publicly available would encourage an increase in fines on IUU vessels, for example, or the disclosure of the terms of fishing agreements between governments and private firms.

One of the difficulties in undertaking and publicizing such a valuation is the lack of appropriate data, which results in the lack of tangible evidence on the contribution of fisheries production, trade and secondary activities to economic development and poverty reduction. Data collection is a major challenge for developing countries, notably because of the small-scale nature of many fisheries. Governments often do not have reliable information on the status of the sector, including the size of fishing capacity, the number of people active in the sector, and the volume and value of the harvests. In addition, this lack of data prevents improvements in efficiency through better resource management and value-chain handling, which are central to green growth.

INVESTIGATE LOW-COST MANAGEMENT OPTIONS AND TECHNIQUES TESTED IN DEVELOPING COUNTRIES

In many developing countries, fisheries continue to have open access with no effective controls on the quantities of fish harvested or the techniques used. In addition to questions related to political will and data needs, the lack of financial and human resources is often blamed for deficient fisheries policies and management systems.

Investigating the cost and benefits of alternative management initiatives taken in developing countries could provide cheaper options to policy-makers. Such initiatives include co-management of fisheries, participatory surveillance systems as in Senegal and Indonesia, community-managed marine protected areas (MPAs), or simple registration systems for pirogues and small boats and assessing fishing and fisheries capacities. Further investigation of these options should focus on identifying the necessary preconditions for a successful outcome and how to apply them on a larger scale and in different socio-economic contexts.

IMPROVE THE RESILIENCE OF COASTAL POPULATIONS BY DEVELOPING ALTERNATIVE ECONOMIC ACTIVITIES AND SOCIAL SAFETY NETS

Representatives from the developing countries stressed that the fisheries sector is often a last resort or a buffer for populations marginalized by conflicts, climatic events, poverty or unemployment. This makes it politically and economically difficult to restrain access to resources as it could result in placing vulnerable populations in an

even more precarious situation. Thus, developing alternative livelihood means or social safety nets are urgent measures that underpin more efficient management of fisheries and tackle IUU fishing.

The need for developing alternative activities in coastal regions, e.g. in ecotourism, aquaculture or fish processing, makes the use of marine spatial planning methods increasingly important.

LEVERAGE DEVELOPMENT COOPERATION IN FISHERIES AND AQUACULTURE

The contribution of institutional development cooperation in the fisheries and aquaculture sector is not well documented. However, the scarce evidence points to disappointing effects reflected by the increasing role of non-governmental organizations (NGOs) in this sector. A major element for efficient cooperation is the sustainability of project impacts, which require funding over longer time frames than those of today's development assistance approaches.

Avenues for improvement include:

- impact assessment as much as possible;
- a better understanding of the particularities of the fisheries and aquaculture sectors when elaborating development cooperation;
- better streamlining of the sector in partner countries requesting development cooperation;
- longer-term cooperation aligned with domestic fisheries management policies and objectives and with regional initiatives.

ENSURE THAT DOMESTIC FISHERIES POLICIES OF OECD MEMBER COUNTRIES ARE COHERENT WITH LONG-TERM GLOBAL DEVELOPMENT OBJECTIVES

The OECD countries, many of which are major fish importing and consumer countries and distant-fleet nations, have a responsibility to make sure their domestic fisheries policies do not harm development prospects in developing countries. This includes, for example, making sure that decommissioned capacity is not transferred to developing countries' waters and that fishing agreements are sustainable and development-conducive. Transparent access agreements should not lead to or exacerbate overfishing and crowding-out of local fishing activities.

It was noted that developing countries do not always have the resources to monitor their EEZs effectively. In this respect, it was suggested that OECD countries should manage and regulate their fleet's activities outside their own EEZs more effectively. For example, in Spain, an agreement has been made between the government and industry that imposes Spanish regulation of vessels owned by Spanish capital but flying foreign flags.

STRENGTHEN THE FIGHT AGAINST IUU FISHING

Three avenues were discussed to improve the fight against IUU fishing. First, it was underlined that development cooperation has a role to play in building capacity in developing countries both in terms of surveillance and in terms of legal prosecution of IUU fishers.

Second, in light of suggestions that significant amounts of the fish consumed in OECD countries would come from IUU fishing, participants discussed the role that trade restrictions and consumption decisions based on labels could play in combating IUU. The European Union (Member Organization), for example, recently banned imports of products fished by vessels flagged in three developing countries owing to a lack of or inadequate action taken by these countries to combat IUU. However, there were several viewpoints as to the effectiveness of imposing import bans based on IUU suspicion *vis-à-vis* the risks associated with establishing technical barriers to trade.

Third, because some illegal fishing activities contravene international laws and may be linked to other criminal activities, such as human trafficking or drug smuggling, participants agreed on the need to combat these criminal activities as a global organized criminal activity. The transnational nature of these criminal activities and networks calls for appropriate tools to combat them, such as the Interpol network or the United Nations Convention against Transnational Organized Crime. Another issue of concern is that some IUU activities can be linked to tax crimes in fisheries, which hamper growth more broadly by depriving governments of much-needed financial resources. Participants supported the continuation of these endeavours and called for greater collaboration between the OECD COFI and the OECD Centre for Tax Policy and Administration (OECD CTPA). It was also noted that only 11 parties have ratified the FAO Port State Measures Agreement (PSMA), but that 25 ratifications are necessary for it to enter into force. The meeting made a strong call for countries to ratify the PSMA as soon as possible.

PROMOTE GREEN GROWTH IN AQUACULTURE

Aquaculture growth has fundamentally changed the fish market, allowing for greater availability of fish at reduced prices. However, this growth is concentrated geographically and, in many regions, the potential for aquaculture production remains largely unexploited, notably in sub-Saharan Africa

A promising avenue for sustaining long-term growth is to investigate regulations that have successfully spurred sectoral development while minimizing negative impacts on the environment. Lessons can be learned from Asia, where the fastest growth in aquaculture has taken place in recent decades, on areas such as the integration of agriculture and aquaculture (notably with rice production), identifying the right fish species for aquaculture particularly through the valorization of indigenous fish species, the use of solar power and solar water pumps, improving the supply chain infrastructure to minimize waste and maximize value, and finding alternative feed. Development cooperation can play an important role through technical assistance and transfer of technologies and legal advice to support the formulation of adequate fisheries and aquaculture laws.

A key challenge, particularly for small-scale operations in developing countries, is investment in productive capacity, research and innovation, and in basic infrastructure such as transport and storage to improve market access and reduce waste.

Certification can also play a key role by improving confidence regarding the sustainability of production processes. This would promote the view that aquaculture can be a stable and predictable activity to invest in, notably by ensuring that the biosecurity risk is minimized. However, doubts remain as to the market barrier effect that such certification might have on small-scale producers. It was suggested that impact on food security could be introduced as an additional criterion to such certification schemes. In addition, it was suggested there should be more investigation into how investors' toolboxes could be developed to address small-scale investment needs.

The importance of licensing systems as a key determinant in investment decisions and insurance possibilities in the aquaculture sector was clearly stated. This is evident, for example, in the experience of countries where aquaculture has boomed recently. The OECD COFI will work to identify good practices in this respect. Development cooperation also has a role to play in helping set up aquaculture licence systems.

Discussions on the growth of aquaculture production raised a number of questions on the role of smallholders. The share of small-scale producers in global aquaculture production is important. Their role is therefore crucial. It was suggested that policy-makers in developing countries need more evidence to better understand the potential role of small-scale producers versus larger industrial production units in terms of

production, employment, food security and poverty reduction, and how much governments should intervene to influence that balance. To support such strategic political decisions, more research is needed in order to better assess the scope for small-scale producers to be competitive, given the important economies of scale occurring in aquaculture production systems.

BETTER INTEGRATE DEVELOPING COUNTRIES IN REGIONAL COOPERATION FORA

Several regions suffer from a lack of coherence in actions taken by regional fisheries bodies and regional economic organizations, with overlapping competencies and a lack of political impetus. National policy objectives that are better defined and backed by strong political commitment should help to enable better engagement in regional cooperation.

In this respect, the role of OECD countries in development cooperation is also important in helping developing countries to build the necessary capacity to participate in RFMOs. Governance improvements in RFMOs, especially regarding allocation issues and facilitating the entry of developing countries, were considered important.

2. The role of fisheries for sustainable development, poverty reduction and food security

Frank Meere and Claire Delpeuch

SUMMARY

- Fisheries and aquaculture provide livelihoods for hundreds of millions of people, about one-tenth of the world's population, and contribute to reducing poverty and food insecurity. Fish is an important source of protein, fatty acids and micronutrients that are fundamental to human development. At the macro level, fisheries and aquaculture have important multiplier and spillover effects, and can generate government revenues when sustainably managed.
- Future growth in fish production is expected to come mostly from aquaculture, with developing countries producing the vast majority of stock.
- Sustaining the capacity of world fisheries and aquaculture to provide food and jobs requires sensible and effective fish stock management and ecosystem preservation.
- Individual countries acting to put in place sound fisheries management policies in their EEZs is a necessary first step, but it is not sufficient to secure the future of global fishing. Because the ocean functions as a single ecosystem and many fisheries resources are transboundary, conservation of global fish resources can only be achieved through regional and multilateral cooperation.
- Fish and fishery products are among the most-traded food commodities worldwide, and developing countries are major producers and exporters. Fisheries markets are thus particularly interdependent through effects on fish stocks and ecosystem sustainability.
- There is potential to develop synergies between development assistance and fisheries and aquaculture policies to support sustainable development. A promising avenue is investment in institutional and research capacity to manage stocks and control fishing.
- While providing development assistance to the fisheries and aquaculture sectors benefits the recipients, there may be important side-effects owing to the natural renewable resource nature of these sectors. In the absence of strong governance and management regimes, support to fisheries may lead to unsustainable fishing.
- The important role that fish can play in poverty reduction and ensuring food security must be better documented and mainstreamed into international debates on food security and nutrition and sustainable development.

QUESTIONS

- Recognizing the important role of fisheries and aquaculture in poverty reduction and food and nutrition security, how can this contribution be sustainably enhanced given the ecological, economic and governance constraints faced by these sectors?
- How can trade-offs between environmental conservation and food and nutrition security or employment perspectives be resolved where they arise, especially in poor coastal areas, in both the short and long terms? Can development assistance be efficiently targeted to ease such processes?

- How can better management at the national and international levels help to enhance the contribution of fisheries in poverty reduction and in improving food and nutritional security (e.g. by maximizing interactions between different types of fishing, different uses and destinations for the catch, and allocation of resources between capture fisheries and aquaculture)? Can development assistance be efficiently targeted to facilitate such processes?
- How can development assistance contribute to creating efficient transportation, storage, processing and packaging facilities to enable the development of fish marketing in developing countries?

INTRODUCTION

Fisheries and aquaculture provide livelihoods for hundreds of millions of people. FAO estimates that almost 60 million people were directly engaged in primary fish production in 2012. More than 80 percent of them lived in Asia. While aquaculture production is growing rapidly (Box 1), about two-thirds of global direct employment originates in the capture sector (FAO, 2014), although the number of people employed in aquaculture may be significantly largely underestimated, as suggested by recent case studies (Phillips, Tran Van and Subasinghe, 2013).

The fisheries and aquaculture sectors also generate many secondary jobs, such as in processing and distribution, manufacturing and maintenance of equipment, boats and gear, and research and administration. When dependents are added, the sector is estimated to support the livelihoods of about 10–12 percent of the world's population (FAO, 2014).

Small-scale fisheries¹ are of particular importance to jobs in developing countries as they employ about 90 percent of the world's capture fishers, of whom almost half are women. They are estimated to contribute to about 40 percent of the world total catch (World Bank, 2012).

At the macro level, fisheries and aquaculture have important multiplier and spillover effects and generate government revenues when sustainably managed.

The sector is also key in terms of food and nutrition security (FNS). Fish is the main source of animal protein for about one billion people worldwide, the large majority of whom are poor and food deficient (Karawakuza and Béné, 2011). The role of fisheries in this respect is particularly important in least-developed countries where fish is often the cheapest and most easily accessible source of protein, and is available year-round including when other sources of protein are at a seasonal low.

Fish, especially when eaten whole, is also an important source of essential fatty acids and micronutrients, which are an essential complement to the predominantly carbohydrate-based diets of many poor people. These micronutrients include vitamins A, B and D as well as iodine, iron, zinc and calcium (FAO, 2012).

Fisheries can contribute to reducing poverty and improving FNS through different channels, including the income received from fishing activities and the assurance of fishers receiving proper nutrition by consuming a part of their own catch. Consumers also benefit through the trade engendered, both domestic and foreign.² How fisheries are exploited, in terms of who is allowed to fish and how the catch is used will depend on the local context; for example, national vs foreign fishers, industrial vs small-scale fishers, human consumption vs animal feed, or self-consumption vs fish for cash. It is

¹ While it is difficult to define small-scale fisheries at a global scale because of context specificities, some characteristics can be outlined: low capital input and investment, equipment- and labour-intensive, generally low productivity, and often of a semi-subsistence, family-based nature (FAO 2012). Their contribution is difficult to estimate due to limited availability of statistics.

² According to the 1996 World Food Summit: "food security exists when all people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life".

also important to determine who benefits from such gains, and whether the situation of some can be improved without compromising the situation of others.

These trade-offs are poorly documented and continue to be debated, in particular the relationship between fish trade, poverty reduction and FNS. Whether it is efficient for developing countries to transform small pelagic fish rich in fatty acids into fishmeal, for which there is an export market, or whether these fish would contribute more to FNS and poverty reduction by being available for local human consumption is a hotly debated issue. Similarly, the development of some aquaculture projects aimed at high-value exports (such as prawns) raises questions as to their overall effect on poverty, FNS and sustainability.

Fish stocks are a renewable natural resource, and as such they have a distinct advantage over non-renewable resources – with appropriate management they can contribute to sustainable development in the very long term. In this regard, an important consideration is that fish resources should not be used as a non-renewable resource. Sustaining the capacity of world fisheries and aquaculture to provide food and jobs requires sensible and effective fish stock management and ecosystem preservation.

BOX 1

Fish production and trade

Global fish production reached almost 160 million tonnes in 2012, growing by more than 3 percent annually since the early 1960s.¹ It has undergone major changes, with the share of production originating from aquaculture rising to more than 40 percent, of which almost 90 percent originated in Asia (in volume). This has affected the geography of production, with an increasing role for Asia owing to booming aquaculture in the region and stagnating or declining capture catches, notably in Europe and North America. Future growth in fish production is expected to come mostly from aquaculture and not capture fisheries, with developing countries producing the vast majority of supplies.

Overall, global capture fisheries production has been stable at about 90 million tonnes since the early 1990s. This total catch, however, masks variations in terms of fishing areas, countries, and species. The Northwest Pacific is by far the most productive fishing area. Asia accounted for more than 53 percent of marine capture fisheries in 2012 (FAO data www.fao.org/fishery/statistics/software/fishstatj/en [cited 17 October 2014]).

Many of the most-valuable fish stocks occur close to shore and in areas under the jurisdiction of coastal States. This applies to higher-value tuna stocks, which often move vast distances in search of food. Some of the most productive coastal waters occur off eastern and western Africa and in the waters surrounding the small Pacific island nations in the central and southern Pacific Ocean.

Fish is among the most-traded food commodities worldwide. It is estimated that almost 40 percent of global fish production was exported in 2012.¹ Sustained demand, open markets, technological innovation (notably in terms of processing) and the globalization of food markets have contributed to this trend.

A large and increasing share of fish consumed in OECD countries consists of imports, in particular from developing countries, which have a share of more than 50 percent of world fish exports (in value). China is the leading exporter, accounting for 14 percent of global exports in 2012. A number of developing countries are net exporters.

¹ FAO. 2014. *The State of World Fisheries and Aquaculture 2014*. Rome. 223 pp. (also available at www.fao.org/3/a-i3720e/index.html).

WHY AND HOW ARE FISHERIES MANAGED?

A global common

The oceans are the last great global common belonging to everyone but owned by no one. As open-access renewable resources, fisheries pose significant economic and governance challenges for policy-makers and governments. Experience and many studies have shown that unregulated fisheries very often suffer from overcapitalization, that is, excessive investment in gear, vessels or human capital, which results in excess harvesting capacity compared with sustainable catch potentials. This has given rise to overfishing (Box 2), which results in severe pressure on target stocks and the ecosystems that support them. It also leads to underutilization of fishing capacity, with falling productivity, social and economic pressure on fishing communities and heavy economic losses for society (World Bank and FAO, 2008).

The socio-economic consequences of overcapacity and overfishing create incentives that encourage dangerous fishing practices, in particular IUU fishing and related activities that have had adverse consequences on fish stocks worldwide, including in developing countries' waters (see Chapter 5).

BOX 2

The state of marine fishery stocks

The exploitation of fisheries resources has gradually increased since 1974 when the first FAO assessment was completed. Growth has slowed since the early 1990s, but remains excessive.

Almost 29 percent of assessed global fish stocks are estimated to be overfished.¹ These stocks produce lower yields than their biological and ecological potential, and this has a negative environmental impact and socio-economic consequences. Fish stocks are potentially at risk if no efforts are made to restore their full and sustainable productivity. At the same time, the proportion of underfished stocks, where productivity could increase, has dropped to less than 10 percent.

This implies that prospects for sustainable growth in fish production are most likely to occur through rebuilding of overfished stocks (with reduced harvest in the short term, but increased harvest after a rebuilding period), through efficiency gains and innovation in value addition rather than through increased fishing.

¹ FAO. 2014. *The State of World Fisheries and Aquaculture 2014*. Rome. 223 pp. (also available at www.fao.org/3/a-i3720e/index.html).

Overcapacity and overfishing occur because individual fishers are not confronted with all the costs generated by their activity (notably the increase in harvesting costs for other fishers who have to use more effort to catch the same amount as each individual's harvest reduces the stock left for others). As a result, fishers do not receive the right incentives from the market. Because fishers compete with one another, they have an incentive to catch as much fish as they can before their competitors take these fish. Fishers have no incentive to conserve fish stocks if they have no guarantee that other fishers will do the same and that they can reap benefits in the future. What is optimal for one rational fisher in an unregulated fishery (also known as an open-access fishery) is not optimal for all fishers combined, or for society as a whole and the environment. In economic jargon, this is known as a "market failure". As a result, the allocation of goods and services by the free market is not efficient in an open-access fishery.

Solving the problem of resource depletion requires understanding and adjusting fishers' interests and actions by way of fisheries policy. As such, governments, and local or multilateral public authorities as well as private cooperative bodies, become involved in fisheries management owing to the nature of the market and the way fishers respond to it.

Fisheries management

The fisheries manager's most important responsibility is stock management through sustainable, scientifically based, and prudent stock-objective-setting and effective enforcement and monitoring. If the stock is not maintained at a healthy and sustainable level, the fishery will be less able to contribute to public objectives. Moreover, a collapsed fishery can mean significant social costs resulting from dislocation, crisis and rebuilding costs.

Stock management can be achieved through input controls such as limitations on effort (e.g. in terms of days at sea, number and size of vessels, engine size, gear characteristics), output controls (i.e. limitations on the amount of fish that can be harvested, for example, in terms of total or individual catch quotas), or through restrictions on the areas where fishing is permitted. The *OECD Handbook for Fisheries Managers* discusses these options and identifies pathways to stock management that have proved to be successful (OECD, 2013a).

While stock management is a necessary objective of fisheries policy-makers, maximizing social welfare is the ultimate objective. Indeed, if the common property problem in fisheries necessitates management to control harvest or effort, it does not tell the fisheries manager what the right level of control is for the fishery. Policy objectives depend on political choices. As a management target, scientists and fisheries managers often use the maximum sustainable yield (MSY). However, other targets are increasingly being used as well, for example, to maximize profits instead of production, under stock conservation constraints.³ Alternatively, policies sometimes aim at rebuilding stocks, reducing the risk of collapse or at imposing particular social or environmental norms.

In developing countries, the challenge of defining sustainable fisheries management objectives is made more complex by the lack of outside opportunities for many fishers and the limited resource at the disposal of policy-makers to smooth transition. Coastal populations in developing countries sometimes have little other option than fishing in terms of both alternative employment and food security. As countries develop and the agriculture sector sheds labour, excess labour moves to the cities in search of employment. Where jobs are not available, people frequently settle in coastal areas and take up fishing. This creates competing policy objectives related to poverty and food-insecurity reduction or regional development as developing countries' governments have limited or no resources to implement social safety-net policies. Thus, the pressures on the inshore stocks are often substantial and the potential to implement sound long-term sustainable management arrangements slim (see Chapter 3 for further details).

Fisheries management is a complex and expensive process. It requires well-developed fisheries research capability as well as efficient control and surveillance systems, all of which are onerous. Human and financial capacities for both are often limited in developing countries.

³ Maximum sustainable yield (MSY) can be defined as the maximum annual catch that can sustainably be taken from a fish stock without compromising the productivity of the fish stock. The MSY therefore maximizes production in the long run. The maximum economic yield (MEY) can be defined as the catch that maximizes profits without compromising the productivity of the fish stock. Thus, the MEY should never exceed the MSY, but could be lower if the size of the catch affects the price of the fish.

Governance

An additional difficulty concerns developing an efficient governance framework in a country that has weak institutions, e.g. a judiciary with poor contract enforcement capacity. Successful fisheries management requires sound governance frameworks to enable legally binding management arrangements that can be developed, implemented and enforced. The difficulty in eradicating IUU fishing, even in wealthy developed countries, illustrates the challenges involved.

Challenges also arise from the combination of different characteristics: the cost and difficulty of estimating the state of resources and the remaining uncertainty in this regard; the migratory and unstable nature of fish stocks, which requires transboundary cooperation and constant adaptation over time; and the political economy considerations related to managing a sector of high socio-economic importance to particular regions and communities.

In some instances, domestic issues that are not directly related to fisheries objectives indeed push the successful management of fisheries to a lower priority. These may include: a politically strong fishing industry that does not wish to see its activity reduced; the lack of alternative employment for those who might be displaced as more rigorous arrangements are implemented; or regional development policies that seek to maintain fishing ports, onshore activity or surrounding regions, without sufficient regard to the sustainability of the resource.

These factors create continuing trade-off problems regarding the implementation of management rules and the governance institutions that produce them. The central trade-off is between (i) flexible rules that adapt rapidly and at low transaction costs to ever-changing and partly unpredictable conditions, with the risk of arbitrariness in decision-making, and (ii) well-defined, detailed, stable rules that provide long-term guidelines to actors, thus reducing arbitrariness but with the risk of creating rigidities that generate high adaptation costs.

Successful governance frameworks vary widely. In many countries, they rest on: the rule of law and a capable judiciary; the best possible understanding of the resources to be managed (through scientific knowledge) and of those currently accessing the resources; the financial and human resources to develop the necessary fisheries management arrangements; and the financial and human resources to enforce the law (including enforcement assets such as surveillance vessels and human resources or satellite tracking).

In other instances, successful governance arrangements have been devised on a less-formal self-regulation basis. Self-regulation has a long history in fisheries, and Ostrom (2005) has shown how important (and often successful) it has been and remains in communities tied together through dense social networks. However, such arrangements are effective only at a very local scale.

Fish do not recognize lines on the water

Fisheries management is particularly difficult with regard to straddling fish stocks and highly migratory fish stocks. As the name implies, these are fish stocks found on both sides of a maritime boundary (straddling) or they are fish stocks that move not only from within a country's waters to the high seas or vice versa, but also which often travel vast distances in open water (e.g. highly migratory species such as tuna).

Managing fisheries on the high seas or stocks that straddle the high seas and different countries' waters requires a high degree of cooperation. A number of international agreements, notably within the context of the United Nations and voluntary guidelines within the framework of FAO, bind and guide governments in their management of fisheries.

The most usual way in which States cooperate in the management of these stocks is through RFMOs and regional fishery bodies (RFBs). The RFMOs are international

organizations formed by countries with fishing interests in an area. Some of them manage all the fish stocks found in a specific area (the convention area), while others focus on particular stocks such as tuna. The organizations are open both to countries in the region (“coastal States”) and countries with interests in the fisheries concerned. All the key high seas RFMOs have management responsibilities and the power to implement management arrangements, such as set catch and fishing effort limits (see Chapter 6 for further details).

WHAT ARE THE ISSUES IN POLICY COHERENCE FOR DEVELOPMENT AND WHAT CAN BE DONE?

While the knowledge on and approaches to fisheries management continue to develop over time, there are some key issues to be kept in mind when considering fisheries development and policy coherence.

Well-managed sustainable fisheries can secure ongoing income, employment and food

This is fundamental. If fisheries are managed properly, the benefits can be substantial. As a renewable natural resource, fisheries potentially offer an ongoing stream of benefits and income to developing countries. As the most productive fish stocks (other than tuna stocks) generally occur in shallower waters and within EEZs, this is very much something that individual States can control.

Fisheries management is complex and intensive in terms of human and financial resources

Fisheries are probably the most difficult of all natural resources to manage. The lack of knowledge about target stocks, associated and dependent stocks, the food web and the marine environment that support them makes the task significant. Other areas of human activity also have a direct impact on fisheries resources; for example, climate change, land-based sources of pollution and coastal zone degradation all have a direct impact on fish stocks.

Ensuring the ongoing sustainability of stocks and the ecosystems that support them requires careful planning and the use of regulatory tools. In the absence of such arrangements, the chances of successful resource management are slim. In developing countries, the challenges are much more complex. Many developing countries have high levels of artisanal or subsistence fishing. In most cases, these fisheries are not managed at all or, if they are managed, this is at a very low level compared with that necessary to ensure sustainability of the stocks and minimal damage to near-shore ecosystems. The key is to ensure that a range of tools is developed in order to address not just the fisheries management questions, but also how to deal with the displaced fishers. In other words, there is a need for alternative employment policies and funding to support these policies for those who have to leave the fishing sector.

Sound domestic governance is critical

Without sound governance and the political will to make and enforce the laws required for the effective regulation of fisheries, the successful development of marine resources through contemporary fisheries management is almost impossible. The challenge for developing countries is substantial, but there are examples of where this has been done successfully and provided significant benefits to the country in question; Namibia is frequently cited as one such example.

It takes much more than training and capacity development

While training and capacity development opportunities are essential to the upskilling required to meet the governance and fisheries management challenges faced by

developing countries, history suggests that this needs to be provided in a way that can be integrated into broader fisheries management and governance development (Cunningham and Neiland, 2010). The output of training and capacity development needs to be embedded in the day-to-day operations of officials and agencies. All of this is rarely achieved, with reports prepared and placed on shelves, and training courses attended with little tangible long-term benefit. As fundamental changes will take time, planning and implementation of training and capacity development need to have a long-term focus. This has important implications for development aid.

It is all interconnected, and global coherent approaches are essential

Regardless of the specific aspect or issues examined in managing fisheries resources, whether it be within individual countries' waters or on the high seas, by a wealthy developed country or by a developing country, the actions of individuals and States are all interconnected. What an individual fisher does within a fishing zone will affect other fishers within that zone. What a State does or does not do to regulate fishing will affect others fishing the same stock.

Policy coherence for development in fisheries and aquaculture is very important and will benefit developing, emerging and developed countries alike. There is potential to increase governments' capacities to balance sometimes divergent domestic fisheries and aquaculture objectives with broader global development objectives and help them to avoid or minimize negative effects of fisheries and aquaculture policies. Equally promising is the prospect of exploiting the synergies between fisheries and aquaculture and development assistance policies to support sustainable development.

3. Rebuilding fisheries for development

Frank Meere and Claire Delpuech

SUMMARY

- Rebuilding fisheries is a broader approach than rebuilding fish stocks and encompasses the social, economic and environmental dimensions of fisheries.
- There are huge economic losses in current fishing operations, which have an impact on fish stocks, the broader environment and on communities. “Business as usual” is not an option.
- Without reform and fisheries rebuilding, the economic contribution of fisheries will diminish with clear consequences: poorer fishing communities.
- Rebuilt fisheries will have a positive effect on food security, ongoing economic well-being and broader development.
- Rebuilding challenges cut across all areas: developed and developing countries and high seas fisheries. There are different but equally difficult challenges in each area.
- Broad stakeholder involvement is an essential element in developing rebuilding plans.
- The development of long-term alternative employment and livelihood opportunities for fishing communities is an essential prerequisite for successful fisheries rebuilding.

QUESTIONS

- How can the necessary preconditions for a successful rebuilding of fisheries be established and how can development cooperation contribute to these efforts?
- What role must developed distant-water fishing nations (DWFNs) play to reduce their excess fishing capacity, fishing effort and catches domestically, on the high seas, and in other coastal States’ EEZs?
- How can domestic decision-making be influenced in support of fisheries rebuilding? What role can development cooperation, the private sector and NGOs play in this respect?
- How is the broader consensus necessary to implement rebuilding plans to be established?
- How can long-term alternative employment and livelihood opportunities for displaced fishers be established?

INTRODUCTION

The world’s catch from marine fisheries increased significantly from about 17 million tonnes in 1950 to a peak of 86.4 million tonnes in 1996, and then declined before stabilizing at about 80 million tonnes in 2012 (FAO, 2014). The Pacific Ocean is a major contributor to this production, providing 47 million tonnes in 2012, with the northwest, western-central and southeast areas providing about 21, 12 and 8 million tonnes, respectively.

This spectacular rise in production corresponded with an equally spectacular degradation in the status of the stocks being harvested. The percentage of assessed stocks fished at biologically unsustainable levels (overfished) increased rapidly, from 10 percent in the early 1970s to 26 percent in the late 1980s. It then continued to

increase, albeit more slowly, and peaked at 32.5 percent in 2008 before falling again since then. Underfished stocks have gradually decreased over time, while fully fished stocks have slowly increased as well. *The State of World Fisheries and Aquaculture 2014* (FAO, 2014) provides the following information on the status of stocks in 2011:

- overfished: 28.8 percent;
- fully fished: 61.3 percent;
- underfished: 9.9 percent.

Fully fished stocks are producing catches that are very close to their MSY, theoretically the largest yield (or catch) that can be taken from a species' stock over an indefinite period. This means there is no scope to increase production from these stocks without running the risk of declining catches and stock collapse owing to poor management or environmental perturbation. Effective management must be in place to sustain their MSY. Most stocks of the top ten species, which account for about 30 percent of the world marine capture fisheries production by volume, are fully fished.

Overfished stocks are stocks fished at a biologically unsustainable level, which results in lower catches than their biological potential. They require rigorous rebuilding plans and must be monitored closely to ensure that abundance reaches the level that can produce the MSY. Only when they are rebuilt will they be fully productive and sustainable.

Underfished stocks are generally under lower pressure and often have scope to increase production. These stocks have a biomass considerably above the MSY level. However, these stocks have two characteristics that may limit their potential: they may be of little/less interest to consumers and may not be highly productive (for example, because they are slow-growing, long-lived and not highly fecund). In view of this, they need to be carefully managed if fished (OECD, 2012a).

The above figures may underestimate the extent of the problems faced in wide-capture fisheries as they rely on a formal assessment being available to determine the state of the stock. To the extent that this is not available, then the situation is unknown; similarly, where there are limited biological data on a species or a stock, this may limit the quality (and hence reliability) of a stock assessment. Moreover, IUU fishing also directly limits the information available on stocks as catches are not recorded and, hence, generally not part of any formal stock assessment.

It is against this broader backdrop of static catches and declines in status of fish stocks that the World Summit on Sustainable Development agreed in 2002 to "maintain or restore stocks to levels that can produce the maximum sustainable yield with the aim of achieving these goals for depleted stocks on an urgent basis and where possible not later than 2015." While this is unlikely to be achieved for a number of reasons, it highlights that for more than a decade it has been acknowledged that overfishing is causing serious losses and that fish stocks and fisheries more generally need to be rebuilt.

WHY REBUILD FISHERIES?

The environmental and economic impacts of overfishing have been widely studied. Fisheries that are overfished are less productive, less resilient and, if overfishing persists, prone to collapse. The economic and social consequences of further declines in or collapses of fish stocks are significant, particularly for those developing countries heavily reliant on the fisheries sector for food security and broader economic activity.

The quantitative study of direct relevance to this chapter is the joint World Bank and FAO study *The Sunken Billions* (World Bank and FAO, 2008). This substantial study examines the losses from current fisheries management failures and looks at potential pathways to reform and improve economic and ecological outcomes. The study concludes that marine fisheries are an underperforming asset and calculates that the difference between the potential and actual net economic benefits from these

fisheries is in excess of USD50 billion annually. This figure does not include losses associated with illegal fishing nor the economic contribution of associated activities such as fish processing and distribution, and the study makes no attempt to value biodiversity losses. As such, the study suggests that losses to the global economy could substantially exceed USD50 billion per year.

This is not to say that these losses are solely due to depleted fisheries, but the study identifies two key factors:

- Depleted fish stocks: There are fewer fish to catch and, therefore, the cost of catching is greater than it should be.
- Fleet overcapacity: There are too many boats chasing too few fish, meaning that the potential benefits are dissipated through excessive fishing effort.

The message is that, just as the depletion of a country's fish stocks is a loss of national wealth, the depletion of global fish stocks represents a loss of global natural capital. Eliminating these losses and building healthy and economically sustainable fisheries can deliver an ongoing flow of economic benefits and avoid causing an economic drain on individual countries or the global community more generally as is the case currently. To recover the losses identified by the study, the report recommends:

- a reduction in fishing effort to increase productivity, profitability and net economic benefits from a fishery.
- rebuilding fish stocks, which will lead to increased and, if well managed, sustainable yields and lower fishing costs.

Other studies have come to similar conclusions. A 2012 study by Sumaila *et al.* (2012) found that restoring fish populations to optimal levels through stock rebuilding would increase the annual value derived from fisheries by USD66 billion. Rebuilding would involve reducing global fishing fleets to sustainable levels and ending harmful subsidies, which contribute to excessive fishing capacity. They estimated that this would result in an increase in catch value (from the current level to USD100 billion), a reduction in fish catching costs (down from USD73 billion to USD37 billion; more fish, hence easier to catch), and a decrease in subsidies (from current levels to about USD10 billion).

The study estimates that such reforms would cost about USD200 billion, which would include buyback schemes and adjustment payments to fishers to leave the industry. It concludes that the improved profitability would exceed the cost of rebuilding after about 12 years. Employment and total returns on capital from fishing would decline, but the remaining fleet would become more profitable, produce more food, and generate more tax revenue.

As in the World Bank study, Sumaila *et al.* (2012) do not account for associated benefits in the estimated USD66 billion benefit mentioned above. These would include activities in related sectors (e.g. fish processing), associated ecotourism activities (e.g. recreational fishing and diving), and food security (Sumaila *et al.* estimate that rebuilt fisheries could eliminate the food deficit for an estimated 20 million people in the world's poorest countries).

Undertaking the necessary stock rebuilding would thus offer a range of benefits, including more resilient and productive stocks, better catches and improved food security for those who rely directly on these resources. For developing countries, where this rebuilding is accompanied by the development of robust fisheries management, it would enable them to maximize the returns from their EEZs and produce an ongoing flow of economic benefits.

HOW CAN FISHERIES BE REBUILT?

Reform design

Rebuilding Fisheries: The Way Forward (OECD, 2012a) develops a set of practical and evidence-based principles and guidelines for designing and implementing rebuilding plans while preserving the livelihoods that depend directly or indirectly on fisheries. These principles and guidelines are based on a broad analysis of rebuilding fisheries that goes beyond just the rebuilding of fish stocks. “Rebuilding fisheries” refers to programmes (government-sponsored or otherwise) that seek to improve the stock status and to secure the integrity of ecosystems and livelihoods that depend on fisheries. An improved understanding of the economic, social and institutional issues that underlie successful rebuilding efforts increases the likelihood that fisheries rebuilding programmes will meet their objectives.

Therefore, the rebuilding of fisheries needs to be addressed as an undertaking that encompasses all facets, be they direct fisheries adjustment, fisheries governance, local employment, including those in the processing and marketing sectors, regional impacts and/or the need for alternative employment and livelihood opportunities, and food security. What needs to be taken into consideration will vary depending on the particular country/region and circumstances. Nevertheless, wholesale reform is often needed to address the underlying problems that initially led to overfishing.

The OECD’s key principles for rebuilding include the idea that such plans should be based on social, biological and economic principles that are incorporated throughout the design and implementation process in an integrated fashion, as opposed to sequentially or in isolation. Addressing risk and uncertainties should also be explicitly incorporated. Efforts to rebuild fisheries should aim to restore a sustainable fishery with the potential to generate profits and employment with careful consideration to costs and benefits and their distribution. Finally, rebuilding fisheries should take into account relevant international fisheries instruments, as well as environmental and ecosystem considerations, and the interactions between the fishing activity and other industries. These principles as well as more specific guidelines can be found in the Council Recommendation adopted by the OECD in April 2012 (OECD, 2012a).

The World Bank and FAO (2008) also endorse an approach that rebuilds both fish stocks and fisheries (the economic, governance and social issues associated with managing fisheries). It finds that successful reforms require the strengthening of tenure systems, the equitable sharing of benefits from fisheries, and the curtailing of illegal fishing.

For all rebuilding programmes, an important question will be: What is the appropriate target? Traditionally, fisheries managers and scientists providing advice on stocks have focused on the MSY as an appropriate target; that is, the maximum annual catch which can sustainably be taken from a fish stock without compromising the productivity of the fish stock. However, there will be stocks for which reliable assessments are not available, or where there are limited data. In these circumstances, current thinking suggests where there are limited data and/or environmental changes are being observed, a more precautionary target may be appropriate. The downside with such an approach is that it may take longer to reach an agreed target and that it will involve greater short-term costs.

A management challenge in any rebuilding programme will be the impact on related stocks, i.e. stocks that may not need to be rebuilt but which are caught in association with the stock subject to the rebuilding programme. Unless the fishery being rebuilt is based on a single stock with little or no interaction with other stocks (these fisheries exist but are not common), then managing the rebuilding will involve managing the related stocks and fisheries. This has implications for the scope of the rebuilding programme and may increase short- and medium-term costs.

A final but important question is: What happens when the fishery or stocks do not respond in the way predicted? Sometimes, this is a result of data deficiencies, changes in understanding of the biological characteristics of the stock, refinements in the models used to predict rebuilding pathways, or just broader environmental changes, e.g. climate change. However, it may also be due to the fundamental change caused to the ecosystem from overfishing and depletion of the target stock. It is important to understand that this may occur and to build it into the rebuilding programme.

Another key challenge is to understand the complexity of what is being done and the time horizons involved in measuring success. There are many examples of rebuilding programmes that have failed to reach targets owing to exogenous factors, some of which have not been identified and others that can only be attributed to environmental changes. The lesson learned in most cases is that it is likely to take longer than originally anticipated. Funding agencies must view these projects as long-term projects (10+ years) and be prepared to support them for the life of the project.

Reform implementation

Implementing the proposed reforms involves substantial short- to medium-term adjustment costs, whereas the benefits will be realized only in the longer term. Reforms will require not only political will (something frequently lacking), but also broad-based social acceptance.

Major fisheries reforms are often politically difficult, and history suggests that the longer it takes to make the necessary adjustments, the more difficult they become. Reforms cause pain to voters in sensitive electorates and provoke unrest among local lobby groups. This is not surprising as, depending on the circumstances, such adjustments may involve fundamental issues such as basic food security, career changes, loss of identity, worries about future possible employment or retirement, substantial changes to regional communities, and significant changes in potential local employment opportunities. Politicians with short-term horizons have often opposed reforms.

Depleted fish stocks are the result of this inability to deal successfully with such pressures. In many cases, the failure to implement the necessary reforms is due to the impact they will have in other areas, be they regional development issues or local unemployment. It may also be a result of established ideology or due to an entrenched ruling party, or bureaucrats or politicians with vested interests. The result is that fish resources bear the adjustment pressures.

The OECD (2012a) and World Bank and FAO (2008) studies both highlight that this is not just a fisheries problem, but concerns the political economy of reforms, which requires broad-based political will supported by social consensus. Building consensus around substantial changes in individual and regional employment is a difficult task. It is one that many well-resourced developed countries have struggled, and continue to struggle, with, as witnessed, for example, in the European Union (Member Organization) and Canada. To ensure a broad consensus on proposed actions, it is important to establish exit strategies and funding for alternative employment opportunities, early retirement, schooling, and necessary safety nets for those affected early in the process so that all concerned can make informed decisions on their future. The World Bank and FAO (2008) note that such a consensus takes time to build and needs long-term vision and “champions” to ensure that momentum is not lost with changes in governments.

WHAT ARE THE ISSUES IN POLICY COHERENCE FOR DEVELOPMENT AND WHAT CAN BE DONE?

OECD countries have an important role to play in rebuilding efforts

The benefits and costs of rebuilding fisheries affect the global community. To the extent that excess fishing capacity results from failure to adjust in developed country fleets, it imposes significant costs on those countries (assuming they subsidize these fleets) and on the resources they have access to. It also imposes costs on the broader global community via depleted fish stocks in third countries' EEZs where excess capacity is exported to and on the high seas and via the uneven playing field that unsubsidized fleets have to compete against. In addition, where this fishing capacity is used to undertake IUU fishing activity, it results in further losses to the global community or specific countries where this activity occurs.

In implementing fisheries rebuilding programmes in developing countries or high seas fisheries, developed countries with significant high seas capacity or having access agreements with developing countries need to consider the extent to which their domestic fisheries policy may be in conflict with rebuilding goals. It may be that they can enhance rebuilding outcomes by further refining domestic policies to reduce overcapacity and fishing effort while also supporting the third country or high seas rebuilding effort. This will be more relevant for discrete stocks or where the rebuilding involves stocks subject to access agreements, as the potential negative effects of other parties cannot be quarantined.

More broadly, the problem is that one country or even a grouping of like-minded countries cannot meet the rebuilding challenge unless they are all committed to the goal. Martin Stuchtey recently presented a study undertaken to value the oceans (IntraFish, 2014). According to this study, 65 percent of high seas catches come from just 12 nations, with 25 percent coming from just 5 nations. In total, of all high seas catches, 85 percent are taken by developed nations. On the face of this evidence, significant fleet reductions are needed, first and foremost, in developed country fleets. While there is progress in some countries in addressing this, clearly more needs to be done.

A key issue in the joint management of shared or migratory fish stocks is that of blatant national self-interest. This is particularly evident in the operations of RFMOs. Chapter 6 explores the issues associated with these operations in more detail. The point here is that the deliberations of RFMOs are all too frequently dominated by developed countries, many of which are DWFNs that do not want to see their fleets fishing opportunities diminished (Chapter 5). This has two potential effects in rebuilding stocks managed by RFMOs. First, RFMO member States are frequently reluctant to agree to the catch reductions needed to rebuild fish stocks, often in an effort to delay the inevitable by arguing that the scientific evidence does not support the need for such reductions. Second, regardless of which country may have caused the decline in fish stocks, RFMO members often propose that the pain of rebuilding should be shared equally. This is somewhat at odds with the argument frequently advanced by the same countries that long-term catch allocations for these fisheries should be based on catch history, as RFMO members frequently have the largest catch history.

Particular challenges for developing countries

History suggests that even well-resourced developed countries have struggled to implement successful fisheries rebuilding. This has tended to be a result of not being able to deal with the challenges associated with the political economy of reform, particularly direct political challenges. Developing countries are likely to face additional challenges to those experienced by developed countries, particularly those

associated with governance but also directly associated with short-term requirements, for example, food security concerns.

A fundamental requirement for the rebuilding of fisheries is to have an effective fisheries management regime in place. In many developing countries, this is likely to be either inadequate or in need of further development. An initial fisheries rebuilding requirement, if other political economy requirements have been met, is to reduce fishing activity and harvest rates. To do this requires a management regime that limits access to the fishery, sets and monitors harvest rates, and provides ongoing access rights with security of tenure.

In countries with large artisanal or subsistence fisheries, there is likely to be immediate tension when limiting access and restricting harvest in order to meet the long-term goal of a sustainable fishery. An effective governance structure and social support to deal with the employment and food security needs of those who are removed from these fisheries will be essential. The ongoing need for alternative employment and livelihoods for displaced fishers must be a priority. In the absence of effective fisheries enforcement, those displaced will seek to re-enter the fishery (Fox and Sen, 2002; Palma and Tsamenyi, 2008). Where necessary, integrated government policies must be developed to provide long-term alternative employment opportunities, and acknowledge that these will not necessarily be marine-based. These schemes will need to provide appropriate education and training. There is an important support role for development cooperation in this respect.

Where developing countries have provided access to foreign fleets, it is unlikely that the relatively low access fees paid have gone into developing more effective fisheries management arrangement and improved enforcement capability. They have more likely been used to supplement general government revenue. Fisheries access agreements have in the past effectively provided highly subsidized access for the foreign-flagged vessels while providing little real benefit to the local industry and few improvements in domestic fisheries management capacity (Le Manach *et al.*, 2013; Mbithi Mwikya, 2006). Where these agreements have resulted in overfished stocks, it could be argued that those who had access should be required to fund the rebuilding of these stocks. In reality, many of these access agreements involve highly migratory fish stocks and, as such, other countries fishing the same resource on the high seas have contributed to the state of the stock.

Salayo *et al.* (2008) analysed approaches to the management of fishing capacity in small-scale (non-commercial) fisheries in Cambodia, the Philippines and Thailand, including effort reduction, gear, area and temporal restrictions and alternative livelihoods. In relation to alternative livelihoods, they conclude that “there was an overwhelming consensus that alternative (providing more than 50 percent of income) and supplemental livelihoods are needed by the fishers to exit from the fisheries”.

In the developing country context, it will be important to target scarce financial and human resources, both national and from development cooperation, and to identify the most important aspects that require support. The following should thus be taken into account:

- Is there broad-based understanding across government and political will to act?
- Is there stakeholder understanding and engagement?
- Are there fisheries management/governance arrangements?
- Are there immediate food security issues?
- Are there alternative employment and livelihood opportunities?
- If the country has participated in foreign fishing access agreements, how can these be managed without an additional income stream?
- How can the different requirements of subsistence and artisanal fisheries be managed as compared with those of larger-scale industrial fishing?

These issues become more complex in the high seas as each nation fishing these resources will need to also deal with these issues. To the extent that one or more countries are not prepared or able to address these issues, they will be unlikely to support an RFMO rebuilding strategy. Where non-parties to the RFMO also fish the stock, the situation becomes more complex. It is unlikely that individual fisheries or development agencies can significantly influence these decisions.

Role for development cooperation

Development cooperation has potentially an important role to play in rebuilding projects. The modalities of such cooperation will need to be further explored. To assist in this process, development cooperation should be directed to building ongoing fisheries management and enforcement capacity. Indeed, assisting developing countries to develop and implement robust domestic management arrangements, with appropriate tenure provisions, will not only assist them in the ongoing management of resources within their EEZs, but will provide an essential building block for successful fisheries rebuilding projects. In the long term, productive, sustainable and economically efficient fisheries will provide greater food security and an ongoing stream of economic benefits that can only assist in overall development.

The potential benefits from reducing excess capacity and rebuilding fish stocks will be spread across all countries and regions. The costs and time to recoup these benefits will vary. The important point is to acknowledge that there will be adjustment costs and these will essentially be short to medium term, but the benefits will be realized only in the longer term. The timing of the flow of benefits will vary depending on the extent of the rebuilding required and the biological characteristics of the stocks being rebuilt.

4. Green growth in fisheries and aquaculture

Rohana Subasinghe and Junning Cai

SUMMARY

- Aquaculture is the fastest-growing food-producing sector in the world.
- Fifty percent of global fish consumption currently originates from aquaculture. Its contribution to food and nutrition security, income generation and poverty alleviation is understood, and many countries are embarking on strategies to harness the potential of aquaculture for the well-being of their people.
- To meet the demand for food fish of an increasing and wealthier global population by 2030, it appears that aquaculture production will need to increase significantly, as capture fisheries production is expected to stagnate.
- There are many challenges to producing enough healthy fish safe to eat in a socially and environmentally sustainable manner. Some key challenges include:
 - improving the contribution of aquaculture to alleviate poverty and improve food and nutrition security;
 - reducing the environmental impacts and associated costs of aquaculture production;
 - managing the impact the changing environment has on aquaculture;
 - managing the health of farmed fish, with regard to antibiotics treatments, etc., strengthening biosecurity and improving food safety.
- The means to meet these challenges include:
 - improving sustainable income opportunities for small-scale fishers;
 - increasing feed, promoting farming of non-carnivorous species and energy efficiency, notably by using carbon-friendly renewable energy sources, and minimizing waste.
 - improving sector governance.
- While development assistance to the aquaculture sector benefits the recipients, there may be important side-effects owing to the natural renewable resource nature of these sectors. In the absence of strong governance, support to aquaculture may lead to unsustainable practices.

QUESTIONS

- How can development cooperation agencies help improve the contribution of aquaculture towards poverty reduction and food and nutrition security at the global level?
- What practical actions are necessary at the level of development cooperation agencies to ensure better aquaculture sector sustainability over the next decade?
- What should be done to address the fact that some resources required for the sustainable development of aquaculture are likely to become limited? Would intensification and integration be practical and viable ways forward? What would be the repercussions?
- How can cooperation between stakeholders such as private sector, governments, development cooperation agencies, international organizations and academia be enhanced towards better sector sustainability and responsibility in the coming years?

INTRODUCTION

To feed the world in 2050, agricultural output must increase by more than 60 percent (FAO, 2014). Meeting this target is a formidable challenge for the international community, considering that many people, mostly in developing countries, still suffer from hunger and poverty.

Finding opportunities to alleviate poverty and increase food security is thus vital and timely, and agriculture, fisheries and aquaculture will play a central role. This will be particularly true of foods derived from aquatic resources given their link with ecosystems, economic development and human well-being. In view of the levelling off of the contribution of capture fisheries to global food fish supplies, aquaculture production has become the major supplier of fish products.

Aquaculture makes valuable contributions to local, national and regional economies through goods and services sold on the domestic and export markets. Generally, subsistence and small-scale aquaculture contribute directly to the alleviation of poverty and achievement of food security. In addition, small-scale and large-scale commercial aquaculture, as practised in many developed and developing countries with species such as shrimp, salmon, tilapia, catfish, grouper and carps, can enhance the production for domestic and export markets and generate employment opportunities in the production, processing and marketing sectors.

Indirectly, tax revenues from commercial aquaculture enterprises and foreign-exchange export earnings allow governments to invest in sectors that add to food security. Moreover, planned development of aquaculture (such as zoning and the cluster approach) could lead to improvements in infrastructure such as roads, bridges and electricity, thereby boosting local economies. In many countries, aquaculture's contribution as a proportion of total gross domestic product (GDP) is small, but its importance to the national economy in terms of poverty alleviation and nutritional benefits is significant, particularly in developing countries. At the regional level, aquaculture's contribution to the economies of many countries in the Asia-Pacific region is relatively higher – its share of GDP is highest in Viet Nam at 16 percent.

As aquaculture production continues to grow, it is important for policy-makers to ensure against any negative environmental impacts, as externalities from aquaculture production are many and varied, depending on the species, production techniques and intensity. A 2012 OECD COFI report, *Green Growth and Aquaculture*, shows that many developed and developing countries are conscious of this and improving their green growth policy frameworks and governance with a focus on aquaculture production externalities (OECD, 2012b).

GLOBAL FISH SUPPLY FROM AQUACULTURE⁴

World food fish production from aquaculture increased almost 12 times between 1982 and 2012, at an average annual rate of 8.6 percent. Global aquaculture production has continued to grow, albeit more slowly than in the 1980s and 1990s.

World aquaculture production attained an all-time high in 2012, at 67 million tonnes (excluding aquatic plants and non-food products), for an estimated total value of USD138 billion. When farmed aquatic plants and non-food products are included, world aquaculture production in 2012 was slightly more than 90 million tonnes, worth USD144 billion, including 24 million tonnes of aquatic algae (mostly marine seaweeds), and 22 000 tonnes of non-food products such as pearls and shells.

⁴ The data in this section originate from FAO (2014) and World Bank (2014).

On average, global aquaculture provided 9.4 kg of fish per person for consumption in 2012, although production distribution is extremely uneven across the globe. It contributed 42 percent to world total fish production in 2012 (158 million tonnes), up from 26 percent in 2000 (Table 2).

TABLE 2
Contribution of aquaculture to total fish production

| | 1990 | 1995 | 2000 | 2005 | 2010 | 2012 |
|---------|--------------|------|------|------|------|------|
| | (Percentage) | | | | | |
| Africa | 1.6 | 1.8 | 5.6 | 7.8 | 14.3 | 15.3 |
| America | 2.3 | 3.2 | 5.2 | 8.0 | 12.8 | 14.7 |
| Asia | 23.4 | 34.9 | 39.5 | 46.8 | 51.9 | 54.0 |
| Europe | 7.6 | 8.4 | 11.2 | 13.4 | 15.5 | 18.0 |
| Oceania | 5.3 | 8.5 | 10.1 | 9.2 | 13.3 | 12.7 |
| World | 13.4 | 20.9 | 25.7 | 32.4 | 39.9 | 42.2 |

Source: Estimation by FAO Fisheries and Aquaculture Department.

Projections published in the *OECD-FAO Agricultural Outlook 2013-2022* (OECD and FAO, 2013) foresee major increases in future fisheries production from aquaculture. By 2022, world fisheries production is expected to reach 181 million tonnes (compared with 147 million tonnes in 2010), of which 161 million tonnes will be destined for direct human consumption. As capture fisheries production is projected to increase by 5 percent only, most of the additional fish is expected to come from aquaculture. Aquaculture production should reach about 85 million tonnes in 2022, with an overall growth of 35 percent in the period 2013–2022. By 2022, products derived from aquaculture will represent 47 percent of global fishery production and 55 percent of total fish destined for human consumption.

The recent projections proposed in *Fish to 2030* (World Bank, 2014) give a similar scenario. By 2030, they predict that aquaculture production will increase to the point where it equals global capture production and contributes 62 percent of the global supply by 2030. However, according to these projections, annual production growth for aquaculture is expected to slow. This is also reflected in the *OECD-FAO Agricultural Outlook 2013-2022* (OECD and FAO, 2013), which predicts an average growth rate of 2.5 percent per year between 2013 and 2022, compared with more than 6 percent of the previous decade (2003–2012).

Aquaculture production is concentrated in Asia and will continue to be so. According to the World Bank (2014), China's share in global aquaculture production will decline slightly, from 63 percent in 2008 to a projected 57 percent in 2030. While all regions are expected to increase their aquaculture production, the largest expansion is expected in India (121 percent in 2010–2030), Latin America and the Caribbean (120 percent), and Southeast Asia (107 percent).

South Asia (excluding India) and the Near East and North Africa are also projected to experience significant growth in 2010–2030, 91 percent and 76 percent, respectively. It is expected that sub-Saharan Africa will show substantial growth over this period, but starting from much lower production levels in 2010 compared with other regions.

More than 600 aquatic species, including animals and plants, are cultured in almost 200 countries for production in farming systems of varying input intensities and technological sophistication. These include hatcheries that produce seeds for restocking, particularly in inland waters. Of the large number of farmed species, about 100 animal species accounted for 80–90 percent of total food fish production, and fewer than 10 species of marine macroalgae were farmed as aquatic plants.

Of the 67 million tonnes of farmed food fish produced in 2012, two-thirds were finfish species grown from inland aquaculture and marine aquaculture. Farmed

crustaceans accounted for 10 percent and molluscs for 23 percent of food fish aquaculture production in 2012. Other aquatic animal species, grown in both freshwater and seawater mostly in Asia, are low in production volume but include some high-value species such as sea cucumbers (Table 3).

TABLE 3

World production of inland and marine aquaculture and major farmed species groups

| | Inland aquaculture | Marine aquaculture | Species group total | Share in total food fish production |
|-----------------------|--------------------|--------------------|---------------------|-------------------------------------|
| | (1 000 tonnes) | | | (%) |
| Finfish | 38 599 | 5 552 | 44 151 | 66.3 |
| Crustaceans | 2 530 | 3 917 | 6 447 | 9.7 |
| Molluscs | 287 | 14 884 | 15 171 | 22.8 |
| Other aquatic animals | 530 | 335 | 865 | 1.3 |
| Total | 41 946 | 24 687 | 66 633 | 100.0 |

Source: Estimation by FAO Fisheries and Aquaculture Department.

In summary, inland aquaculture of finfish is by far the most important subsector of world aquaculture in volume terms, followed at a distance by other forms and types of aquaculture production of food fish. Finfish culture in freshwater, especially herbivorous and omnivorous species such as carps, tilapias, *Pangasius* catfish and milkfish, makes the greatest contribution to the supply of affordable protein food for direct consumption in a number of populous developing countries in Asia, Africa and Latin America. This subsector of aquaculture production is expected to be the lead player in providing long-term food and nutrition security worldwide and to meet the increased need for food fish supply by the growing population in many developing countries in the coming decades. It is expected that this development will be achieved in a sustainable manner.

The percentage of non-fed species (e.g. filter-feeding carps and bivalves) in world production has declined gradually, from more than 50 percent in 1980 to 33 percent in 2012, reflecting the relatively faster body-growth rates achieved in the culture of fed species and increasing consumer demand for higher-trophic-level species of fishes and crustaceans. In Africa, the potential of non-fed aquaculture production is virtually untapped.

According to the World Bank (2014), the production of tilapia is projected to more than double between 2008 and 2030. Production of some high-value species, such as shrimp and salmon, is expected to grow by 50–60 percent in this period. Production of some low-value species, such as carp, is also likely to grow fast. Overall, there is no evidence for a substantial shift in the major players in global fish markets; Southeast Asia is expected to take some of China's share in the global shrimp supply, while Latin America is likely to account for one-third of global salmon supply by 2030.

As with agriculture, aquaculture production is vulnerable to adverse impacts of disease and environmental conditions. Disease outbreaks in recent years have affected farmed Atlantic salmon in Chile, oysters in Europe, and marine shrimp farming in several Asian, South American and African countries, resulting in partial or sometimes total loss of production. In 2010, aquaculture in China suffered production losses of 1.7 million tonnes caused by natural disasters, diseases and pollution. Disease outbreaks virtually wiped out marine shrimp farming production in Mozambique in 2011. A new wave of diseases in marine shrimp farming is currently affecting major shrimp aquaculture countries in Asia and Latin America.

GLOBAL FISH DEMAND FROM AQUACULTURE

Considering the projected total fish supply from both capture and aquaculture of 187 million tonnes by 2030 (World Bank, 2014), if fish consumption patterns do not

change significantly, fish prices should not significantly increase by 2030 and may even decrease. Therefore, if countries maintain the aquaculture production growth trend of recent years, there would be enough fish to feed the growing population.

However, as people tend to consume more fish as their incomes grow, per capita fish consumption is unlikely to remain constant at the 2007 level. To account for the potential impact of income growth on fish consumption, FAO developed an econometric model using historical fish consumption and income patterns by country to estimate “income elasticity” of fish demand by measuring the percentage change in fish demand caused by a percentage change in per capita income. With the estimated income elasticity of fish demand, the potential impact of income growth on per capita fish consumption can be further estimated based on expected future income growth. As data on household income are rarely available for most countries, per capita GDP was used as a proxy of household income. The World Economic Outlook database of the International Monetary Fund (IMF) provides data on historical and projected per capita GDP for most countries.

Based on these data, per capita fish consumption in 2030 has been estimated for most countries. Combining the estimated per capita fish demand and population projection together gives an estimated total fish demand for the growing and wealthier population of 261 million tonnes for 2030 (Table 4). It appears that should this additional demand of 74 million tonnes, as compared with the World Bank (2014) estimate, have to be satisfied solely by aquaculture production, the future food fish supply from aquaculture would need to increase significantly. Even if aquaculture in every country continued growing according to recent trends, which would double the aquaculture production during 2010–30, the resulting 211 million tonnes of expected global fish supply in 2030 would be insufficient to satisfy the 261 million tonnes of expected future fish demand. If the supply and demand gap is not bridged, the price of fish will increase and thereby reduce access to fish. To satisfy future demand, world aquaculture production would need to triple in 2010–30. This is a daunting task.

TABLE 4
Fish demand driven by population and income growth

| Fish demand | 2007 (baseline) | 2030 (projection) |
|---------------------------------|-----------------|-------------------|
| (million tonnes) | | |
| Africa | 9.0 | 18.7 |
| Asia | 86.4 | 186.3 |
| Europe | 19.4 | 23.4 |
| Latin America and the Caribbean | 15.2 | 18.3 |
| Northern America | 9.1 | 12.9 |
| Oceania | 1.1 | 1.8 |
| World | 140.3 | 261.2 |

Source: Estimation by FAO Fisheries and Aquaculture Department.

CONDITIONS FOR GREEN GROWTH IN AQUACULTURE

A variety of drivers has contributed to aquaculture’s spectacular growth in recent decades. While presenting a list of the most commonly recognized drivers, such as increased market demand, improvements in infrastructure and access to improved and cost-effective technology, Muir *et al.* (2010) report that the relative importance of the growth factors or drivers varies with location and context and that, while each has a definable influence, positive features of all are usually required.

The aquaculture sector is indeed remarkable for its diversity in operations, encompassing a very wide range of farming practices, species, environments and production systems, often with distinct resource-use patterns. The sector is also highly fragmented, ranging from smallholder ponds or cages providing a few kilograms of fish

per year to international companies with annual turnover in excess of USD1 billion. This situation offers a wide range of lessons that are context-specific and location-specific and, accordingly, appropriate strategies need to be crafted in order to address green growth.

All forward projections anticipate a need for increased supply of fish protein to meet the health needs and general aspirations of society. Moreover, this increased supply will need to be at affordable levels in relation to income and other proteins. However, the challenge goes beyond the need for growth. Indeed, despite having achieved good progress in terms of expansion, intensification and diversification, the aquaculture sector is confronted with a set of key issues and challenges that need to be proactively addressed in order to contribute to green growth.

TABLE 5
Factors in the development of the aquaculture sector

| Factor | Implications |
|----------------------|---|
| Market demand | Good demand and high prices for selected species in traditional markets offering initial targets for producers; steadily growing developed markets for major species. |
| Environments | Initial availability of inland waters, lagoons and sheltered bays, with suitable water quality, production temperatures, nutrient supply for shellfish and other systems. |
| Infrastructure | Available or improving transport, power, communications, access to major markets, and good information systems; scientific support structure. |
| Technical capability | Emerging and rapidly establishing techniques for hatchery production, husbandry, feeds, ponds, cage and other culture systems; improvements to traditional systems. |
| Investment | Local, national and regional private, commercial and institutional investment; incentives and support schemes for development, and technical research. |
| Human resources | Initial nucleus of primary technical skills, developed through pioneer companies and development centres; increasing level of management skills in core groups. |
| Institutional system | Generally positive and proactive environment, providing strategic research inputs, adapting to changing needs of industry, development of legal and regulatory systems. |

Source: Muir *et al.* (2010).

The challenge is to produce sufficient quantities of aquatic food, particularly in regions where demand is high, using resource-use efficient and low-carbon technologies that strengthen sector sustainability while conserving the critical habitats during the process of expansion and intensification of systems and practices. In doing so, the sector needs to pay particular attention to most countries in the sub-Saharan Africa, Asia and the Pacific, Central and Eastern Europe, and North Africa regions, which are relatively underdeveloped in terms of human and technical resources compared with advanced countries in Europe and North America. This daunting task calls for a concerted effort by all interested parties.

The growth of aquaculture is increasing pressure on natural-resource inputs, notably water, energy and feed. Indeed, as with terrestrial animal proteins, production of fish protein is more ecologically expensive than production of plant protein owing to the higher trophic level, although some systems (such as enriched polyculture ponds) compare very well. Bivalve shellfish should also not be overlooked as an animal protein already well ahead in terms of sustainability criteria.

There is also the question of the use of, and impact on, environmental services, particularly for the dispersion and treatment of farm effluents. Improved optimization of freshwater production systems with respect to water and feed management could triple production without increasing freshwater usage. Given the increasing pressures on freshwater supplies, future aquaculture development should be expected to utilize

more abundant brackish-water resources. However, environmental issues are no less complex.

The energy cost of aquacultural activities and the implications of carbon emissions are receiving greater attention. A distinction needs to be drawn in any analysis between direct energy use (e.g. fuel and electricity consumed directly in the production process) and the more comprehensive approaches that also audit energy used for producing inputs. The use of renewable energy must also be considered. Aquaculture affects climate change, and climate change will affect aquaculture. To minimize this interaction, energy consumption should be as low as possible, and new aquaculture enterprises should not be located in regions that are high in sequestered carbon, such as mangroves, seagrass or forest areas.

Disease is a major constraint to efficient production in some intensive aquaculture systems. Major improvements in the understanding of the aetiology and epidemiology of fish diseases have been made in recent years, and aquaculture producers in many countries have dramatically improved their husbandry practices by placing greater focus on fish welfare. Control of many serious infectious diseases has been achieved through new medicines and vaccines, particularly for bacterial diseases. However, new diseases are emerging, and previously rare diseases are becoming more prevalent; thus, continued vigilance and solution development are required.

Moving aquaculture systems farther offshore removes several challenges faced by near-shore systems, such as visual and local environmental impacts, and space constraints. In most cases, predation issues and disease risks could also be substantially reduced. Expansion of the offshore industry would allow increases in the scale of project and could therefore also improve efficiency. However, the requisite governing structures, policies and regulatory frameworks for the establishment of offshore maritime aquaculture remain scarce. There is time to develop these given that new technology requirements for offshore aquaculture will entail large capital requirements; without such investment, the use of such technologies will be restricted until farms and companies reach a scale of operations where offshore investment becomes feasible.

Governments need to actively support the growth of the aquaculture sector and stimulate private sector investment. Among measures that policy-makers can take are: providing support to innovative and technological developments; ensuring a suitable regulatory framework that captures environmental costs within aquaculture processes; building capacity to enable monitoring and ensure compliance; and encouraging research on supply and demand for fish and fish products.

Since 1976, three global milestone events in aquaculture have contributed to the progressive development of strategies for the sustainable development of this sector. The events are: the 1976 FAO Technical Conference on Aquaculture, Kyoto, Japan; the 2000 Conference on Aquaculture in the Third Millennium, Bangkok, Thailand; and the Global Conference on Aquaculture 2010 – Farming the waters for people and food, Phuket, Thailand. The strategic elements adopted at these conferences have been useful in assisting States to position their aquaculture sector to achieve national goals and objectives. In particular, the 2010 Phuket Consensus, which stated a re-affirmation of commitment to the Bangkok Declaration, continues to guide the development and management of aquaculture beyond 2010 to 2025.

FAO'S NEW BLUE GROWTH INITIATIVE

In November 2013, the FAO Corporate Programmes Monitoring Board endorsed the Blue Growth Initiative in Support of Food Security, Poverty Alleviation and Sustainable Management of Aquatic Resources (BGI).

Fisheries and aquaculture are vital in the transition towards blue socio-economic growth owing to their interconnectivity with and reliance on aquatic ecosystems and the potential for people employed in them to act not only as resource users but also as

resource stewards. Hence, realizing the full potential of the oceans and wetlands will demand responsible and sustainable approaches to their economic development.

A more effective and socially and environmentally responsible seafood chain can contribute to sustainable growth, social cohesion and food security, reducing the pressure on marine and land resources. In particular, it can influence the governance and management of these resources, the conservation of biodiversity and habitats, and the empowerment of concerned communities, including through better adaptation of vulnerable communities to climatic changes and improved resilience to natural disasters and crises.

The BGI is based on the following components:

- capture fisheries, both marine and freshwater;
- the Global Aquaculture Advancement Partnership;
- livelihoods and food systems;
- economic growth from ecosystem services.

For the medium and long term, the BGI is promoted as an important vehicle to mobilize resources and advocacy in international fora. In the global arena, the BGI allows FAO to align with major global initiatives such as the Green Economy in a Blue World (United Nations Environment Programme [UNEP], International Maritime Organization [IMO], FAO, United Nations Department of Economic and Social Affairs [UNDESA], International Union for Conservation of Nature [IUCN], WorldFish), the Global Partnership for Oceans (World Bank), the Coral Triangle Initiative, the Oceans Sustainable Development Goal, Fishing for the Future (World Fish/FAO), the World Ocean Council and GEF6, as well as commitments stemming from the Rio+20 Conference.

5. The challenge of combating illegal, unreported and unregulated (IUU) fishing

Frank Meere and Claire Delpuech

SUMMARY

- Illegal, unreported and unregulated fishing (IUU) fishing is a major impediment to the long-term sustainable development of fisheries. It damages the environment and threatens biodiversity by diluting the effect of policies aimed at preserving fish stocks and protecting ecosystems. It harms markets for legally caught fish, encourages corruption, reduces prospects for economic growth and food security, and undermines labour standards.
- Illegal, unreported and unregulated fishing (IUU) fishing is not an economically marginal phenomenon. It occurs both within EEZs and on the high seas. It results in forgone government revenues, depressed pricing of legally caught fish and suboptimal resource use. It is estimated that it creates losses in excess of USD20 billion annually to legal fishing operations. Developing countries are primarily affected by IUU fishing in their EEZs. This type of IUU fishing is estimated to account for the largest share of total IUU.
- Illegal, unreported and unregulated fishing (IUU) fishing practices derive from three key issues: a lack of management and enforcement capacity in many developing countries; a lack of control of activities of developed and emerging countries' fleets in third countries' waters and on the high seas by their flag States, and, more generally, overcapacity and redundant assets, which create incentives for IUU activities. Areas where governance of the fisheries sector is weak are particularly vulnerable to IUU.
- The OECD countries import about 60 percent of their fish from developing countries. Fish stocks are transboundary and migrate from one country's waters to another and onto the high seas, while fishing is a global activity, and resources (capital, vessels and crew) move freely among countries. Combating IUU fishing globally is thus necessary and requires cooperation to avoid migration of IUU practices from regulated and efficiently monitored areas to less regulated and less efficiently monitored areas.

QUESTIONS

- How can development cooperation be best targeted to help partner countries increase management and enforcement capacities, including through greater participation in regional agreements? What is the evidence as to the effectiveness of public development cooperation in doing so?
- How best can development cooperation be targeted to help partner countries provide adjustment assistance and develop alternative livelihoods for dependent fisher communities where there is a need to remove fishing effort in near-shore fisheries?
- How can the OECD and emerging countries better match their fleets' fishing capacity with sustainable levels of catches to reduce the incentive for IUU fishing?

- How can developed and emerging countries better control the activities of their fleets on the high seas and in the EEZs of third countries?
- How can developing countries and DWFNs work together to enforce management arrangements effectively?
- How can the market for illegally caught fish be reduced, through trade policy measures or consumer-driven initiatives such as sustainable fish labelling?
- How can greater communication between development and fisheries agencies be initiated to develop holistic long-term visions of the sustainable development of fisheries?

WHAT IS IUU FISHING?

Definition

The term illegal, unreported and unregulated fishing (IUU) is an expression in fisheries management that is now widely used. It is often referred to in the context of foreign vessels fishing illegally without appropriate authorization in waters under the jurisdiction of a State. However, IUU fishing is in reality far more complex.

The concept was developed in the late 1990s to depict a phenomenon being increasingly observed in a number of international fisheries. Essentially, it seeks to describe different types of fishing behaviour that take place outside, or that contravene, agreed management arrangements and international norms.

These arrangements and norms basically fall into two categories. A State exercises its jurisdiction over fishing activities of all vessels, both national and foreign, in its EEZ; that is, out to 200 nautical miles from its coast⁵. In their EEZs, countries apply management and conservation measures to different degrees. Some countries strongly regulate fishing activities by restricting the types of gear that may be used, by establishing fishing zones and seasons, and/or by setting the maximum amount of fish that may be harvested. In other countries, fishing activities are lightly regulated or even unregulated, and their EEZs effectively remain open-access fishing grounds. In a developing country context, the incapacity to develop and implement effective management arrangements combined with a lack of enforcement capacity results in poor regulation of fishing activity.

Beyond the 200-mile EEZ, vessels on the high seas are subject to the legislation of their flag State. Some countries apply management and conservation measures in full compliance with UN conventions, notably the United Nations Convention on the Law of the Sea (UNCLOS), concluded in 1982 and effective since 1994, and FAO voluntary codes. Member countries of RFMOs are also required to apply in full the agreed RFMO conservation and management measures. The RFMOs regulate fishing in certain areas of the high seas, sometimes focusing on particular species and or areas being fished. However, such international and regional legal regimes are binding only for member States.

Just as some countries have poor regulation of fishing in their EEZs, some flag States have poor or non-existent regulation of their fleets' fishing activities on the high seas. Poor management is often a consequence of broader governance weaknesses. Sometimes, however, it aims at offering the possibility to foreign companies and vessels to register under what is known as a "flag of convenience" or "flag of non-compliance" precisely to escape stronger regulations in their country of origin.

⁵ International law recognizes the following key zones, which were created with the United Nations Convention on the Law of the Sea (UNCLOS). The EEZ starts at the sea baseline (the shore) and extends to 200 nautical miles. When a boundary with another State lies before the 200-mile limit, the EEZ generally ceases at an agreed boundary between the two States. The EEZ includes the territorial sea (baseline to 12 nautical miles), for which no particular rules apply in terms in fishing. The high seas correspond to the area beyond the EEZ not subject to another State's EEZ.

Illegal, unreported and unregulated (IUU) fishing describes three separate yet overlapping elements. Illegal fishing refers to activities conducted in a State's EEZ in contravention of its laws and regulations as well as to fishing in international waters in violation of that country's flag state law and regulations related to its obligations under the international treaties and RFMO convention arrangements to which it is party.

Unreported fishing refers to fishing activities that have not been reported, or have been misreported, to the relevant national authority or RFMO, in contravention of the laws, regulations and reporting procedures of that country or organization. This can occur both within EEZs and on the high seas.

Unregulated fishing refers to fishing activities in areas or on fish stocks in relation to which there are no national, regional or international conservation or management measures applicable to a particular fishery or fishing vessel. Unregulated fishing can occur in an unmanaged fishery within an EEZ or on the high seas by vessels without nationality, or by those flying the flag of a State not party to international conventions or a relevant RFMO (FAO, 2001).

These definitions cover a large number of widely different practices, ranging from large-scale illegal fishing to small-scale subsistence unregulated fishing. To better illustrate the different realities of IUU fishing, the next section describes where and why IUU fishing takes place.

Why and where does IUU fishing occur?

Illegal, unreported and unregulated (IUU) fishing exists because it is profitable, and it will continue as long as the revenue it generates exceeds its costs. It exists because there is a market for IUU-caught fish. This market is often the same as the one for legal fish where primary buyers do not differentiate between the two. It also exists because operating costs are relatively low compared with expected profits. This is the case because IUU fishers have very short-term operating horizons, which means that long-term costs are disregarded; and the opportunity cost of being caught (which depends on the probability of being caught and on the price to pay if caught, including but not limited to fines) is low where on-water surveillance or enforcement capacity is weak. It also occurs because of information asymmetries between surveillance authorities and fishers. As individual catches are rarely observable to authorities, a moral hazard problem arises in the regulation of the fishery (see, for example, Vestergaard, 2010). Areas where governance of the fisheries sector is weak are particularly vulnerable to illegal and unreported fishing, and empirical estimates identify a correlation between governance and the level of illegal and unreported catches (Agnew *et al.*, 2009).

Illegal, unreported and unregulated (IUU) fishing activities can be characterized along different dimensions – where they take place, their scale and their drivers, to name only a few. The particular drivers of IUU fishing vary considerably according to local circumstances. Unscrupulous fishers operate outside management schemes on purpose, for example by flying flags of convenience. Other fishers simply happen to operate in loosely regulated areas with no alternative livelihood means. The following sections describe four archetypal IUU fishing practices for illustrative purposes.

The IUU fishing practices that are most directly detrimental to developing countries are those that take place in their EEZs, which is where many of the valuable fish are. They include relatively large-scale illegal fishing, typically by vessels from DWFNs from developed and emerging regions, although sometimes they are operated as local joint ventures. They operate illegally where the on-water enforcement capacity is weak, or as unregulated fishing where national regulation is lacking, which is the case in a number of developing countries. This type of IUU fishing accounts for the largest share of total IUU, although it is difficult to have precise estimates, notably in terms of unregulated fishing. This does not imply that developing countries with little governance and enforcement capacities are solely to blame for IUU fishing. There

is also a failure of control by the flag States or the States where the fishing capital originate from, which are almost exclusively developed or emerging countries.

The IUU fishing in developing countries' waters also includes smaller-scale artisanal or subsistence fishing, typically by local fishers operating traditional fishing practices and harvesting small amounts. They often operate in the absence of any regulation or enforcement capacity. Their operations are also sometimes tolerated by authorities because fisher communities have little alternative livelihood means, and no social safety net is offered to ease adjustment. While the individual catches of such small-scale fishers may seem marginal, combined, this smaller-scale IUU fishing can have significant ecological and ecosystem impacts.

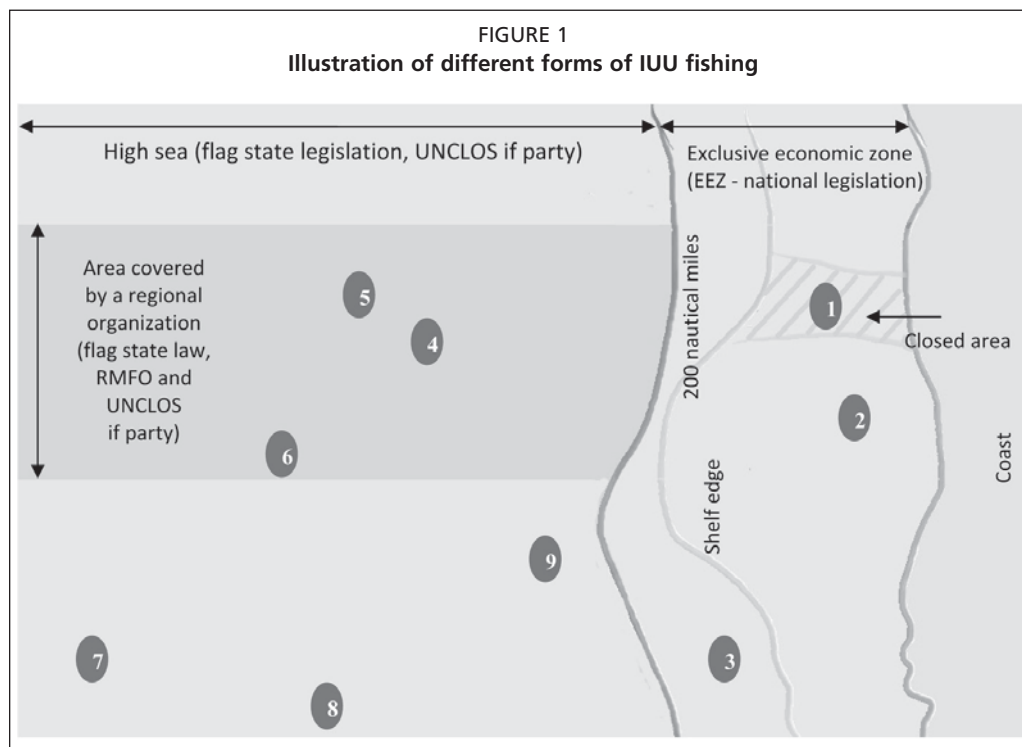
Illegal and unreported fishing on the high seas has received much attention in international discussions in the past decade, although it represents a smaller share of total illegal and unreported fishing globally (less than one-sixth in value terms according to Agnew *et al.* [2009]). Large-scale industrial IUU fishing is an economic activity with potentially high returns.

Illegal and unregulated fishing takes place in areas where the chance of paying the price of being caught is low. In the mid- to late 1990s, for example, operators of illegal vessels plundered the Patagonian toothfish (also known as Chilean seabass) resources in the sub-Antarctic, a region managed by a regional organization responsible for the Antarctic and fishing operations in the Southern Ocean. For these operators, the returns were huge, with a good fishing trip potentially yielding a worth catch many million dollars and the chances of being apprehended very low. They used old but specially refitted vessels and cheap labour from developing countries to maximize their returns. Many viewed the apprehending of a vessel as simply a cost of doing business. In most cases, these vessels were not of high value and the value of the catch often exceeded the value of the vessel. In two or three trips in a year, the total investment of such activity could be paid off many times over.

The IUU fishing on the high seas also includes unregulated fishing, where there are no management agreements or where loopholes in management regimes exist. There are large areas and many species not covered by RFMOs and where management arrangements are thus at best minimal or even non-existent. This leaves a significant area of the high seas subject to potential unregulated fishing. A further challenge is that the key legal regimes do not describe in great detail the rights and responsibilities of States. The regulation of the high seas is a difficult and costly issue, both technically and diplomatically, the discussion of which is beyond the scope of this chapter. Some of these issues are taken up in more detail in Chapter 6.

Illegal, unreported and unregulated (IUU) fishing also occurs in developed countries' EEZs. While not treated extensively in this chapter, it is worth mentioning because it is often forgotten. Even within the most sophisticated management regimes, there is always scope for unscrupulous profit-seeking operators to contravene the law, often on the margin of their legal activities. Such illegal fishing, for example, includes licensed fishers taking extra fish over what they are entitled to, partly fishing in areas where their type of activity is not permitted at a particular time of the year or using unauthorized gear. Such practices may arise with declining catches owing to excess fishing capacity and the inability to match stock sustainability and fishing effort. This is often due to ineffective management or lack of political will.

Figure 1 illustrates some of the different combinations of IUU activities.

**Notes:**

- 1 – Illegal, contravenes closed area under EEZ law (the vessel can be foreign or national).
- 2 – Illegal by an unlicensed vessel, contravenes EEZ licensing requirements (can be foreign or national).
- 3 – Unreported, licensed but fails to satisfy EEZ reporting requirements (can be foreign or national).
- 4 – Illegal by a vessel from a party flag State, fails to satisfy RFMO conservation and management measures set out in domestic law.
- 5 – Unreported by a vessel from a party flag State, fails to satisfy RFMO reporting requirements as set out in domestic law.
- 6 – Unregulated by a vessel from a flag State non-party to the regional organization.
- 7 – Illegal, fails to satisfy UNCLOS requirements implemented by flag State in accordance with treaty obligations.
- 8 – Unreported, fails to satisfy UNCLOS reporting requirements implemented by flag State in accordance with treaty obligations.
- 9 – Unregulated by a vessel from a flag State that has not ratified UNCLOS.

Source: Adapted from MRAG and DFID (2009).

WHY IS IUU AN IMPORTANT CHALLENGE?

Illegal, unreported and unregulated (IUU) fishing is a major impediment to the long-term sustainability of fisheries resources. In particular, many developing countries are concerned that IUU fishing constrains their attempts to sustainably manage their resources and provide food security and fisheries income.

Estimated scale of IUU fishing

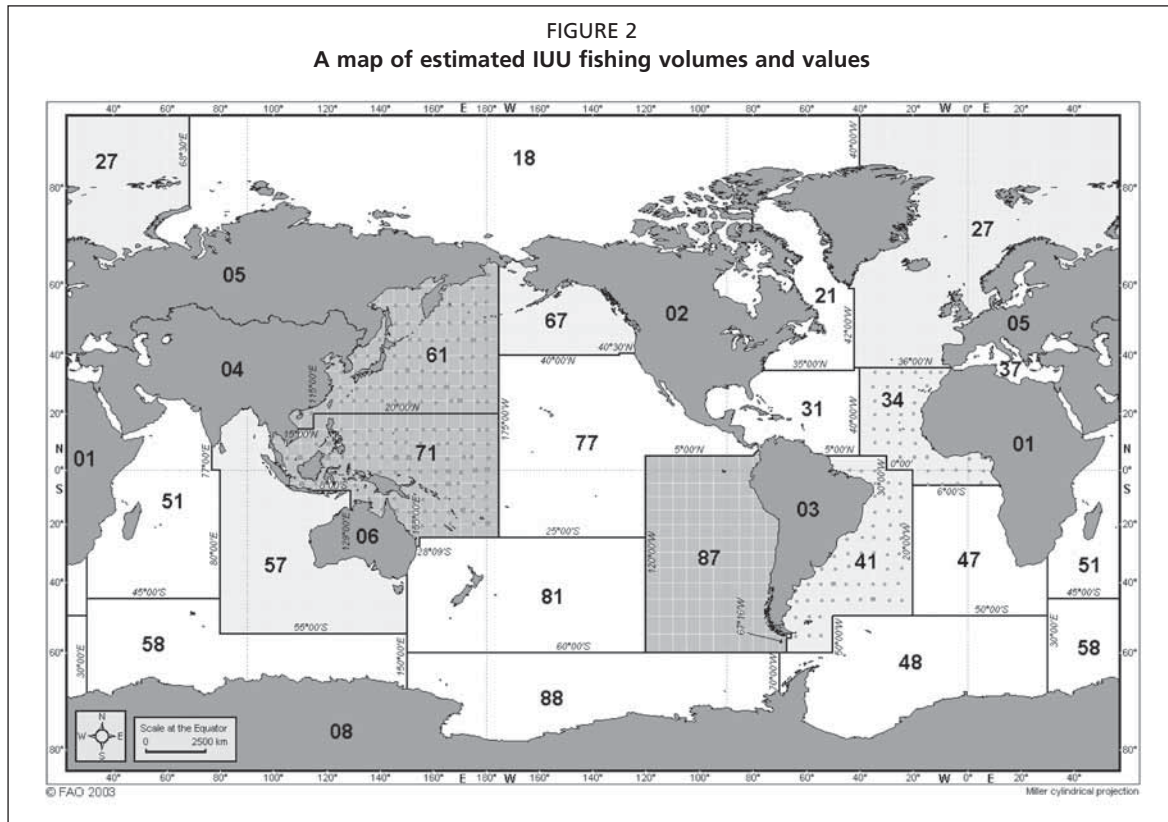
By its nature, it is difficult to give an accurate figure for the level of IUU catches. The first detailed study arriving at global estimates of current and historical IUU catches was conducted within the framework of a project financed by the United Kingdom of Great Britain and Northern Ireland aimed at establishing a network for information sharing on IUU fishing (Agnew *et al.*, 2009). It builds on almost 300 case studies in 54 EEZs and 15 high seas regions, which together account for about half of the reported total world marine fish catch, and combines them with top-down analysis applying estimated percentages of IUU catches to reported catch volumes in other areas. The study arrives at a global estimate of between 11 million and 26 million tonnes, excluding discards and artisanal unregulated catches. This represents between one-sixth and one-third of reported global catches.

The Pacific Ocean is the main fishing ground for IUU fishers. FAO zones 61, 71 and 87, depicted in dark blue in Figure 2, account for 65 percent of the global estimated

IUU catch. Adding areas 27, 34, 41 and 57, depicted in light blue, brings the total to 95 percent of global estimated IUU catches.

Estimated levels of IUU catches are particularly high in zones 34, 71, 61 and 41, depicted with red dots on Figure 2. IUU catch volumes account for more than 30 percent of reported catches in these areas.

According to estimates, some progress has been made in some areas since the mid-1990s, which Agnew *et al.* (2009) identify as the worst period for illegal and unreported fishing globally.



Notes:

Dark grey areas account for 65% of estimated global IUU catch.

Light grey areas account for an additional 30% of estimated global IUU catch (excluding Area 67).

Dotted areas have high regional IUU catches, with IUU catches accounting for more than 30% of total catches.

Source: Adapted from FAO (2003).

Economic impacts

There are multiple economic impacts of IUU fishing. The direct and short-term losses of revenue at the national level relate to: the value of the fish that is illegally removed from the country (usually by foreign fleets that export it or land it abroad), which otherwise would have been taken by legal fishing; forgone fish processing, packing, transporting, exports and domestic consumption as well as associated employment; and government receipts such as lost licensing fees or added-value and tax income. These losses in developing countries can be significant, particularly where the country is heavily dependent on the fisheries sector.

When IUU fishing is undertaken by artisanal local fishers, often only the lost taxes and fees are directly tangible. A large share of their catch is indeed landed in the country or in neighbouring countries and consumed locally (Agnew *et al.*, 2010).

Illegal, unreported and unregulated (IUU) fishing also indirectly affects legal operators operating in the same fisheries, or fishing the same stocks, as they eventually face increased effort and costs in harvesting the amount of fish they are legally licensed

to take as catches decrease as a result of the IUU take. Losses are largest when IUU fishing leads to stock depletion.

Agnew *et al.* (2009) estimate the overall economic loss from illegal and unreported fishing globally in 2003 to be between USD10 billion and USD24 billion. These figures are in line with other recent estimates. In value terms, the Northeast Pacific (area 67, in yellow on the map) is where IUU catches are greatest, accounting for an average estimate of USD2 billion dollars. Together with areas 61 and 87, they account for 65 percent of the estimated global value of IUU catches. More recent anecdotal information suggests there are other IUU hot spots, in particular East and West Africa (Copeland, 2014).

The lost revenue from IUU fishing is borne particularly by developing countries. Illegal, unreported and unregulated (IUU) fishing imposes significant economic costs on some of the poorest countries in the world where dependence on fisheries for food, livelihoods and export revenues is high. Significantly, another study (Agnew *et al.*, 2010) found losses from the waters of sub-Saharan Africa amounted to almost USD1 billion a year – an amount approaching one-quarter of Africa's total annual fisheries exports.

It is important to note that all the figures given above concern only illegal and unreported fishing i.e. the impact and losses from unregulated fishing are not estimated. Similarly, the studies do not estimate the cost of environmental degradation beyond the effects of IUU fishing on target fish stocks, such as the cost of losses in biodiversity, or on non-target species such as sea birds or marine mammals.

Food security and social impacts

Fish products are the main source of protein for about a billion people worldwide. They are particularly important for the poor as fish is often the cheapest source of protein available. Moreover, they usually remain available when other sources of food become scarce during seasonal lows. They are also an important source of essential micronutrients and essential fatty acids, which are often lacking in the predominantly carbohydrate-based diets of many poor people (MRAG and DFID, 2009).

To the extent that IUU fishing reduces the productivity of EEZs, it leads to reduced catches and, in the developing country context, to a reduction in the livelihood and food security of legal fishers and the communities that rely on fish. The available evidence suggests there is frequently conflict between local fishers and industrial fishing vessels, where these larger vessels often fish in areas reserved for local fishers (Environmental Justice Foundation, 2012). These larger industrial fishing vessels may be licensed to fish within the EEZ (but offshore) or may be foreign vessels fishing illegally.

A further related issue, which has received increasing publicity, is the extremely poor working conditions that the crews of many IUU fishing vessels endure. Many crew members come from developing countries, lured with the promise of ongoing work and good pay only to find they have been tricked and are subject to semi-indentured labour conditions. In some recent cases, information has emerged where the vessel's operator had confiscated the crews' passports and refused to allow them to leave the vessel (UNODC, 2011).

Environmental impacts

The environmental impact of IUU fishing is substantial because IUU fishing limits the ability to sustainably manage the fish resources. The IUU fishers are not constrained by management regulations such as catch limits, area closures or closed seasons and, as such, IUU fishing contributes to the overfishing of target stocks. Agnew *et al.* (2009) found a correspondence between their regional estimates of illegal and unreported fishing and the number of depleted stocks in those regions. However, correlation is not

synonymous with causation, as it may also be the case that IUU fishing takes place in less well-managed areas, where the state of stocks is not well documented.

In formal fisheries management arrangements, there are numerous requirements on licensed fishers to avoid non-target species and minimize impacts on the marine environment. An example is the use of bird mitigation devices in longline fisheries. These are important in reducing the impact of longline fishing on bird populations. This has been particularly the case in relation to the take of albatross during fishing operations in southern waters. However, IUU fishers do not use such devices (which also gives them an unfair advantage in relation to legal fishers as their fishing operations are simplified).

In addition, IUU fishing reduces the ability of researchers and fisheries managers to fully understand the state of the stocks they are seeking to manage. Licensed fishers are required to provide detailed information on their catch and effort, which provides vital input into stock assessments and knowledge of related and dependent species, and allows management arrangements to be fine-tuned. In the absence of this information (e.g. the catch by IUU fishers), modelling exercises are biased and less reliable. This is particularly true where more complex ecosystem-based management, which allows understanding of multispecies fisheries interactions, is used. Ensuring sustainability with increased uncertainty regarding the status of stocks requires more precautionary management arrangements. This heightens the penalty effect on legal fishers, their communities and, more generally, the fishing economy of the country.

WHAT ARE THE ISSUES IN POLICY COHERENCE FOR DEVELOPMENT AND WHAT CAN BE DONE?

This chapter makes the point that IUU fishing practices that are detrimental to developing countries derive from three key issues: a lack of management and enforcement capacity in a number of developing countries; a lack of control of activities of developed and emerging countries' fleets in third countries' waters and on the high seas by their flag States, and, more generally, subsidies, overcapacity and redundant assets, which create financial incentives for IUU activities. It shows that political will and international and regional coordination are necessary if these three issues are to be tackled. This section looks at these challenges within the framework of policy coherence for development (PCD) and investigates avenues for action by development cooperation agencies and governments of developed and emerging countries.

Developing effective fisheries management capacity is a prerequisite for sustainable fisheries development

A sustainable and well-managed resource and fishing sector will potentially provide the greatest ongoing benefit to the economy. The importance of effective fisheries management has two implications in the context of PCD. First, development cooperation agencies have an important role to play in supporting developing countries to scale up their management and enforcement capacity. As sound management requires sufficient knowledge of the stock and habitat status for harvested species, development cooperation agencies have an important role to play in supporting research in developing catch reporting systems.

There is scant evidence as to the effectiveness of development cooperation in achieving this. Cunningham and Neiland (2010) examine the significant amounts of development cooperation that were allocated to African fisheries between the mid-1970s and 2000 and find they have not had the expected developmental impact. They attribute this failure to the fact that most projects were not built on the theoretical underpinning provided by fisheries economics.

Another important point to make in this respect is that identifying and addressing political and institutional weaknesses cannot be done effectively without strong

domestic support and political will at the highest level. In order to progress in this area, governments need to be prepared to acknowledge current problems when seeking assistance. There is increasing evidence that countries in both eastern and western Africa, for example, are keen to move in this direction (see, for example, the FISH-i Africa project⁶).

The second implication for development agencies is that they should make sure that the programmes and projects they finance do not contribute to unsustainable fishing practices. While providing development cooperation to the fisheries sector should in principle benefit the recipients, there may indeed be important side-effects owing to the natural renewable resource nature of this sector. In the absence of strong governance and management regimes, support to fisheries can lead to unsustainable fishing practices.

Evidence over many years suggests that development cooperation has not always been targeted with enough precaution in this respect. Developing capital infrastructure, providing vessels, improving ports, or assisting in establishing canneries has in some ways put the cart before the horse. If sound management is not available, countries will struggle to protect the resource and to maximize the potential benefits of increased investment in the fishing sector.

Cooperation agencies thus need to ensure that development goals and strategies of supported programmes and projects align with fundamental domestic and international fisheries management arrangements.

Improving management of the activities abroad of developed countries' fleets

Where fisheries resources have been overfished in many developed countries, resources (vessels, capital, expertise and companies) have moved to where fisheries resources continue to be available. This has seen not only the development of significant high seas fishing capacity, but also the development of access agreements, joint venture arrangements and the establishment of subsidiary companies in developing countries. While in some cases this has been beneficial to both parties, there are examples where such arrangements have not benefited developing countries, either because the value of accessed resources has been undervalued or because they have given rise to IUU fishing practices (Mbithi Mwikya, 2006).

In addition, more recent information is coming to light about associated fisheries crimes, such as money laundering, corruption, document fraud, smuggling of illicit goods, and tariff and tax evasion. Evidence suggests that companies and vessels from developed countries are involved in such activity in developing countries (OECD, 2013b).

Much of the impetus for IUU fishing activities thus comes from operators in developed and emerging countries that see the opportunity to access resources, to avoid the regulations they face domestically and to maximize their returns using what they see as legitimate loopholes in current governance arrangements. Developed countries need to do more to address the actions of their nationals and associated corporations and subsidiaries. In some cases, even where evidence has been supplied to document these activities, countries have been slow to respond. An important question to investigate in this respect relates to how developing countries and DWFNs can work together to enforce management arrangements effectively. In particular, access agreements should become more transparent, and developed and emerging countries accessing a developing country's resources should demonstrate how their vessels will be controlled and monitored in its EEZ.

⁶ www.pewenvironment.org/uploadedFiles/PEG/Newsroom/Press_Release/Fish-i%20Statement.pdf

Offering alternative livelihoods is necessary to reduce overcapacity and incentives for IUU fishing

In many developed countries, an inability to reduce fishing fleets has led to the depletion of domestic resources and export of overcapacity to third countries' waters, including in the form of IUU fishing. In developing countries, demographic pressure on coastal areas is also creating incentives for IUU fishing.

For some years now, some developed countries have implemented significant effort reduction and stock rebuilding programmes to address overcapacity. These require major structural and policy adjustment within the industry and have flow-on effects for regional communities.

For developing countries where social safety nets are not available and food security is at stake, adjusting the fishing sector to available resources is a major challenge. The challenge is not only how to best accommodate the labour no longer needed to harvest fisheries resources in the context of a sustainable management system, but also how to provide food security for those who will not be operating in a more regulated fishery. In most cases, the current fishing pressure in these in-shore fisheries will be excessive, and adjustment will be needed to balance the volume of fish being taken with the sustainable resource. An important aspect of such adjustment will be the provision of alternative long-term employment and livelihood opportunities. Development cooperation agencies have a key role to play in assisting this process. Options include investment in infrastructure to develop alternative activities, and support in providing adjustment assistance.

Building effective bilateral, regional and multilateral arrangements to deal with specific issues

This chapter has highlighted the need for coordinated action in the fight against IUU. Unless comprehensive and coordinated actions and initiatives are taken by all countries involved or the region more generally, the IUU activities will move to other areas and continue unabated. The Port State Measures Agreement is a good example of such arrangements. However, if a port State implements rigorous port state measures, it is highly likely that unscrupulous operators who do not want this level of scrutiny will move to an adjacent port State where less rigorous arrangements apply. This has occurred, and is still occurring, for example, in relation to landing of Patagonian toothfish being caught in the Southern Ocean.

There are examples of effective bilateral and regional arrangements in place that work to facilitate management across borders and within regions. These take the form of both formal and informal arrangements. There are successful regional arrangements in place, including in Africa, both on the east and west coast, and in the Pacific where the Forum Fisheries Agency provides a vital link for the Pacific island countries.

At the regional level, there are also IUU-specific initiatives in place. Australia is working with Indonesia and other Southeast Asian partners in a regional plan of action to combat IUU fishing. Such initiatives are important but require commitment and resources from all involved in order to be successful. The lessons learned can be applied in other parts of the world, recognizing that each region may need specific and tailored arrangements. There may also be a role for development agencies in facilitating developing countries' participation in such initiatives.

Political will is necessary for a holistic long-term vision to guide sustainable fisheries management

While there are loopholes in domestic and global governance arrangements to address IUU fishing, the current governance arrangements would probably substantially reduce IUU fishing if the political will and necessary human and financial resources led all key States to implement them properly. The lack of political will is a major

impediment to progress in tackling IUU fishing (High Seas Task Force, 2006). The issue has lost political momentum even in the countries and organizations previously at the forefront of action against IUU fishing.

It is necessary for governments and administrators to tackle IUU fishing and associated fisheries crime via a “whole of government” approach. It cannot just be seen as the responsibility of the minister for fisheries. The right approach can be developed through greater communication between development and fisheries agencies. This needs to start in donor countries so that both agencies can work to ensure cooperation is well targeted and appropriate.

Finally, effective change in this area takes years. It is critical that in designing and implementing development projects, agencies use appropriate time horizons. The development and implementation of effective fisheries management is a long-term project. Significantly reducing IUU fishing requires sound fisheries management, the rule of law and effective enforcement, all significant challenges.

6. The role of regional fisheries management organizations

Frank Meere and Claire Delpeuch

SUMMARY

- Technological improvements, increasing demand for fish worldwide, lack of effective control of fishing in many countries, and inadequate fisheries management policies have led to overcapacity and overfishing. Combined with the exclusion of traditional DWFNs from the waters of third countries with the implementation of EEZs, this has contributed to increased catches from the high seas.
- Flag States have primary responsibility under international law to control the fishing activities of their vessels on the high seas. They are encouraged to cooperate in managing fish stocks in ways that ensure their conservation while maximizing benefits. This cooperative management approach is governed primarily through international or regional fisheries management organizations (RFMOs).
- The RFMOs are organizations that bring together countries with a common interest in managing a particular fish stock or the fish resources of a particular region and which agree to adopt binding management rules that apply to all RFMO members.
- Management of stocks on the high seas is challenging, with many stocks overfished and some being rebuilt. Reasons for overfishing persistence include:
 - Coverage of fish stocks by RFMOs is incomplete.
 - Many RFMO conventions do not implement either a precautionary approach to management or have ecosystem management tools.
 - Some countries that engage in fishing on the high seas are not party to the relevant RFMOs or do not apply the management measures of these RFMOs even where they are signatories.

QUESTIONS

- How can RFMO conventions be revised to reflect contemporary best management practices in accordance with international law and broader global expectations such as those expressed in the Rio+20 Declaration?
- How can RFMO membership opportunities and equitable access to resources be granted to developing countries?
 - What is the role for development cooperation in this process?
 - What is the role for the OECD and emerging countries' governments in their interactions with RFMOs?
- How can developed and emerging countries address problems of overcapacity in order to avoid exporting unsustainable fishing practices onto the high seas or developing countries' waters?

INTRODUCTION

As new entrants to high seas RFMOs, developing States are frequently in a position where fishing opportunities are limited or non-existent owing to the depleted nature of many key stocks. Given that high seas fish stocks belong to the global community,

what role should developed States play to ensure there is equitable sharing of these stocks?

The volume of fish harvested on the high seas has multiplied by ten since the 1950s. Although developing countries do not account for a significant global share of catches from the high seas, fishing methods have implications for the conservation of fish stocks, whether highly migratory fish or straddling stocks. This is thus of concern to developing countries whether it touches their EEZs or their stake or involvement in the high seas.

Flag States have primary responsibility under international law for controlling the fishing activities of their vessels on the high seas. However, some of the obligations attached to this responsibility are loosely defined and remain open to interpretation. Key United Nations agreements and recommendations encourage flag and coastal States to cooperate so as to manage fish stocks in ways that ensure their conservation and optimal utilization. The main mechanism for organizing this cooperative management is through international bodies such as RFMOs.

The RFMOs are organizations that bring together countries that have a common interest in managing a particular fish stock or fish resources of a particular region and which adopt common binding management rules that apply to all members. Such management rules may include, for example, setting maximum allowable catches of specific species and allocation of country-specific or region-specific quotas that limit each member country's catches of a particular species, be it in its EEZ or on the high seas.

This chapter explores the important role that RFMOs play in the management of high seas fish stocks and analyses how States that share fish stocks in several EEZs can best cooperate.

WHY DO FISHERS GO TO THE HIGH SEAS?

Fishing on the high seas – that is, beyond EEZs (generally, 200 nautical miles off a coast) – usually involves larger vessels that spend a longer time at sea, which is more expensive and difficult than fishing closer to shore. Vessels fishing on the high seas can range from as small as 15–20 m in length up to large vessels in excess of 140 m. Available evidence demonstrates the rapid increase in catches of fish from the high seas from slightly more than 1 million tonnes per annum in the early 1950s to well in excess of 10 million tonnes per annum in recent years. Two-thirds of this catch volume is made up of tuna and the remaining of deep-sea species, usually of high commercial value.

The rapid expansion in catches on the high seas is a direct result of a combination of factors. Technological improvements in vessels, gear and fish-finding equipment have played a major role by improving the catching efficiency of vessels both large and small. It has made high seas fishing easier by allowing, for example, vessels to stay at sea for longer periods, locate fish quickly (they now have real-time satellite information), process the fish on board (refrigerated vessels), and/or transship product to refrigerated cargo vessels.

Another major factor to explain the expansion of fishing on the high seas is the increasing pressure on domestic stocks as a result of overcapacity; that is, excess vessels with more power, gear or labour than is required to economically or sustainably harvest the available resources in domestic waters.

Because capital and labour are rarely perfectly mobile, at least in the short term, reducing capacity is a politically difficult process. This is particularly the case for unmalleable capital such as fishing vessels, which generally have a long life span. Faced with increased capacity but limited fish stocks, many States have sought ways to compensate for decreasing returns while avoiding having to reduce their fleets. They often choose to support the sector instead of developing and implementing more

stringent domestic fisheries management arrangements to balance fishing capacity with stock and ecosystem sustainability.

In most cases, support takes the form of subsidies to the fishing industry (for example, scrapping older less-efficient vessels while upgrading or building new vessels) and associated shore-based support services, such as providing upgraded port facilities or encouraging onshore processing. This has often led to inappropriate economic signals being provided to operators and creating even more capacity and pressure on stocks, which in turn has resulted in further eroding of economic returns (World Bank and FAO, 2008).

A solution to this domestic problem for many States has been to push excess fishing capacity on to the high seas or find fishing opportunities in the EEZs of third countries following the requirement of the UNCLOS that coastal States allow others to harvest their resources if there is a surplus.⁷

The establishment of EEZs, effective de facto as of 1977, also increased fishing pressure on the high seas as traditional DWFNs found they could no longer fish within these zones and had to move farther offshore.

WHO FISHES ON THE HIGH SEAS?

UNCLOS states that all States have the freedom to sail fishing vessels flying their flag on the high seas (Article 87) subject to a number of provisions (outlined below). An essential prerequisite to operating a ship on the high seas is for the ship to acquire the flag of a State, usually through the act of registration of that ship with the State.

Because the high seas are not subject to the jurisdiction of any State, in order to preserve public order, the right to navigate on the high seas must be restricted to those vessels that through their link to a State are subject to its jurisdiction and can be held to account for compliance with international rules to which the State subscribes.

UNCLOS allows each State to set the conditions for granting its nationality to ships, for the registration of those ships, and for the right to fly its flag, with the requirement that there must be a “genuine link” between the State and the ship (Article 91). However, it does not specify what the “genuine link” should be, leaving room for vessel owners to register their vessels with those States that implement the weakest conservation and management measures (see Box 3).

The key DWFNs, that is those States that have major fleets fishing on the high seas and in coastal States’ EEZs, are mainly from European and East Asian developed countries. Key European countries include Spain, France, the Netherlands and Ireland. In Asia, China, Japan, the Republic of Korea and Taiwan Province of China all have significant distant-water fleets. Poland and the Russian Federation, as well as other former communist and former Soviet countries, stopped being major players with the withdrawal of government assistance following the collapse of the Soviet Union.

HOW IS FISHING ON THE HIGH SEAS REGULATED?

International agreements

Flag States have primary responsibility under international law for controlling the fishing activities of their vessels both within their EEZs and on the high seas (Article 94).⁸ However, UNCLOS provides limited guidance in this respect. In particular, its prescriptions remain open to interpretation and are formulated as recommendations rather than obligations. The right to fish on the high seas is subject to general provisions and to the rights and duties as well as the interests of coastal States.

⁷ See note 5.

⁸ Where a foreign-flagged vessel is fishing within a coastal State’s EEZ, the coastal State may take such measures as are necessary to ensure compliance with its laws and regulations.

In terms of the former, UNCLOS specifies that flag States have the duty to “adopt, with respect to their nationals, measures for the conservation of the living resources of the high seas” (Article 117). They shall also cooperate with other States whose vessels fish in the same area or for the same stocks in taking measures necessary for the conservation of those stocks (Article 118). Regarding the interests of coastal States, UNCLOS requires that coastal States and DWFNs “seek to agree upon the measures necessary to coordinate and ensure the conservation and development” of “stocks occurring within the EEZ of two or more coastal States or both within the EEZ and in an area beyond and adjacent to it” (i.e. on the high seas) (Article 63). It also stipulates that coastal States and the DWFN should “cooperate directly or through appropriate international organizations with a view to ensuring conservation and promoting the objective of optimum utilization of such [highly migratory] species throughout the region, both within and beyond the exclusive economic zone” (Article 64).

Although coastal States and DWFNs are called upon to cooperate, they are not bound to reach agreement on management. UNCLOS suggests that cooperation can take place directly or through appropriate international, regional or subregional fisheries organizations, all commonly referred to as RFMOs whatever the geographical scale. UNCLOS invites States to create such organizations where they do not exist, although no obligation exists in this respect either.

The United Nations Fish Stocks Agreement (UNFSA) was adopted in 1995 and entered into force in 2001.⁹ It complements UNCLOS by specifying how some of its provisions concerning the conservation and management of straddling fish stocks and highly migratory fish stocks should be implemented. The RFMOs are identified as key institutions for this process, and the responsibility of States engaging with RFMOs is made more binding.

An essential concept developed in UNFSA is that only those States that are members of RFMOs should have access to the resources managed by those RFMOs. States that wish to fish should thus join the RFMO or, at the very least, ensure their vessels conduct themselves in accordance with the RFMO conservation and management measures (Article 8[4]). Consequently, a significant concept developed in UNFSA is the requirement that States that have a “real interest” in the fishery are entitled to become members of the relevant RFMO. This is an important provision as it is designed to ensure that RFMOs are not “closed shops”. However, UNFSA does not provide explicit guidance as to what a “real interest” is. It also reiterates the UNCLOS provision that States have a duty to cooperate where no RFMO exists (Article 8[1]).

The FAO Compliance Agreement, which is binding for signatory States, has a direct bearing on high seas fishing operations.¹⁰ It is intended to improve the regulation of fishing vessels on the high seas by strengthening flag state responsibility. Parties to this agreement must ensure that they maintain an authorization and recording system for high seas fishing vessels and that these vessels do not undermine international conservation and management measures. The agreement aims to deter the practice of re-flagging vessels with the flags of States that are unable or unwilling to enforce such measures (see Box 3). Provisions are also made for international cooperation and exchange of information in implementing the agreement, particularly through FAO. Thirty-nine of the 197 FAO Members have signed the agreement.

⁹ The full name of this agreement is: Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks.

¹⁰ The full name of the agreement is: Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas. For a full description, see www.fao.org/fishery/topic/14766/en

BOX 3

Flags of convenience or non-compliance

- In principle, the implementation of flag state duties and the responsibility that States collectively conserve and manage high seas resources are commendable. However, in reality, there have been and continue to be significant occurrences of lack of flag state control as well as failure to discharge conservation and management obligations. This is a major problem in ensuring cooperative regional fisheries management.
- The term “flag of convenience” was initially coined in relation to the use of merchant vessels, and it involved “flagging” or registering a merchant vessel under a foreign flag in order to profit from less-restrictive regulations. The practice is widespread and accepted in the merchant marine.
- The principle in relation to fisheries is not dissimilar. However, unlike the merchant marine, where binding arrangements in relation to key responsibilities operate across almost all States, with regard to fisheries, many flag States are not party to key binding international agreements such as UNCLOS and UNFSA, and the FAO Compliance Agreement. Even when they have ratified international agreements, some countries do not implement their obligations diligently. This leaves a significant loophole that unscrupulous fishers exploit and that some flag countries seem content to provide.
- “Flag of non-compliance” is a more recent term that has the same meaning as “flags of convenience”. It is particularly useful when talking to those who do not have a fisheries background. The term “flags of convenience” outside of the fisheries arena does not have the negative association it has in the fisheries context.

What are RFMOs, and what is their role?

The FAO defines RFMOs as “intergovernmental fisheries organization or arrangements ... that have the competence to establish fisheries conservation and management measures.” They are distinguished from RFBs, which are generally consultative or advisory bodies and which do not have the power to establish binding conservation and management measures. Thus, RFMOs are organizations bringing together countries that have a common interest in managing a particular fish stock or the fish resources of a particular region, and which adopt common management rules that apply to all parties.

The RFMOs have an important role to play in global fisheries governance. As international fora, they are the primary mechanism that allows for cooperation between and among fishing countries and coastal States in line with the requirements and responsibilities under UNCLOS and UNFSA. Their role is particularly important for the conservation of straddling and highly migratory fish stocks, which often move from one country’s EEZ to that of another or to the high seas. Stocks of such fish species can be sustainably fished only if coordination across all different zones inhabited by the stock allows for coherent management.

RFMO membership

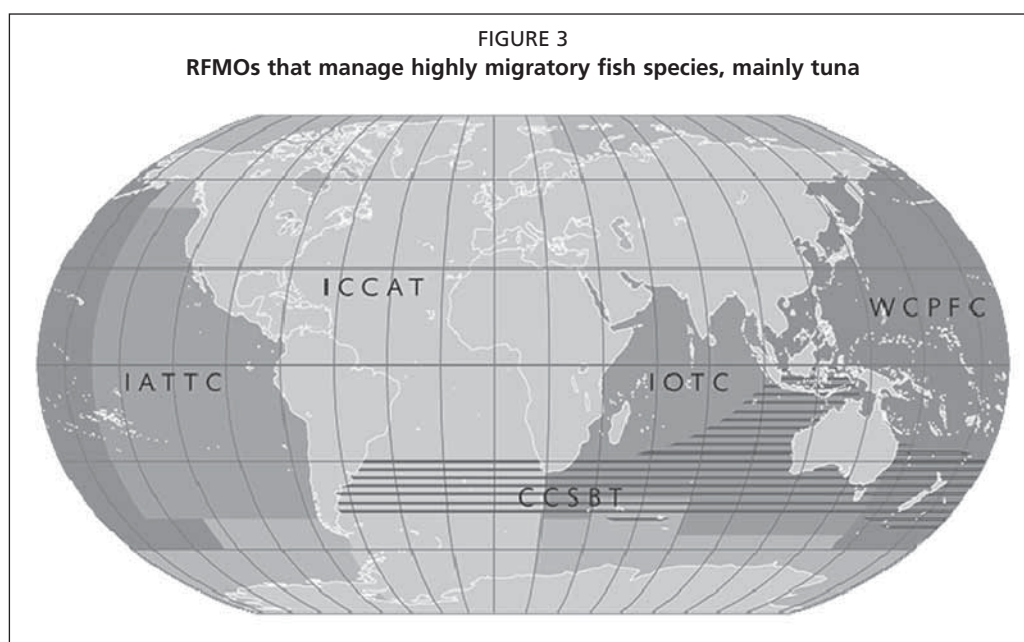
In accordance with UNFSA provisions, all States engaging in fishing on the high seas or fishing stocks that are managed by an RFMO, including within zones of national jurisdiction (notably highly migratory species), should be part of the relevant RFMOs and implementing their binding conservation and management measures. The reality is different.

At present, RFMO membership is mainly composed of a small number of largely developed countries. This reflects the situation of the distribution of coastal States and DWFNs. Many of these States are significant DWFNs; they include the European

Union (Member Organization) (which is a member of 11 RFMOs), Japan and the Republic of Korea (9), China and Australia (6), France, the United States of America and Vanuatu (5), Belize, Canada, New Zealand and Taiwan Province of China (4).¹¹ Some RFMOs have a significant number of developing countries as members.

Key management bodies for stocks or regions: incomplete coverage

The RFMOs have been established over time, with some dating back 50 years. The result is a patchwork of bodies with differing roles and responsibilities, and different species and regions under management. Figures 3 and 4 provide an illustration of overlap in terms of both geographical reach and species covered. These figures cover the main high seas RFMOs only.¹² FAO lists 51 RFBs, although many of these bodies do not have formal management mandates. While this might appear to be a very crowded playing field, there are regions and species that are not covered by any management arrangements.

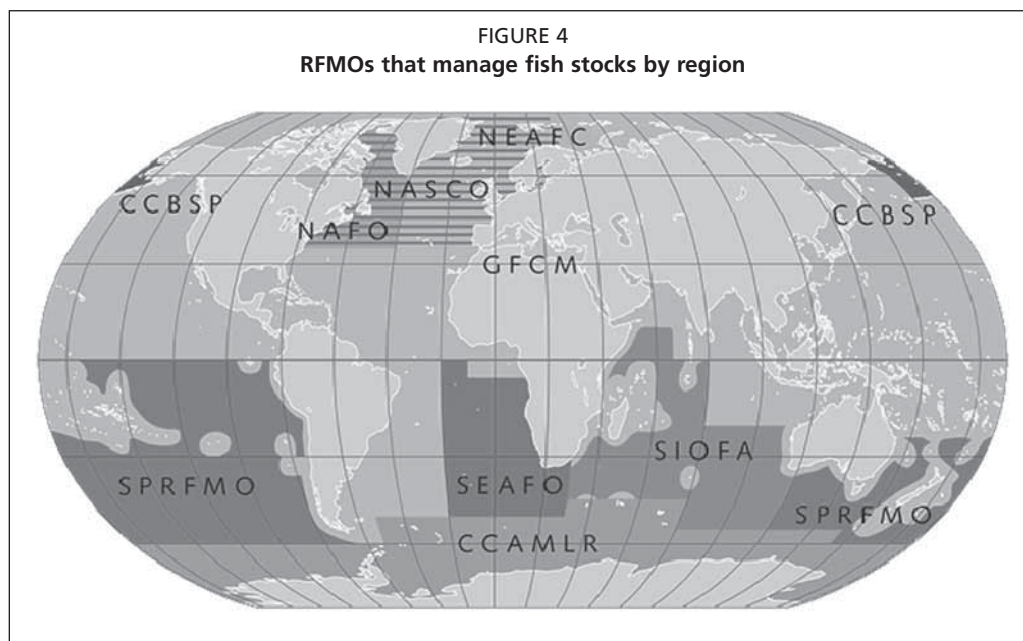


Source: Future Ocean, International Ocean Institute and Mare (2013).

¹¹ The European Union (Member Organization) has 28 member States that are all members of these RFMOs by virtue of their membership of that organization. Some member States are also members in their own right, often owing to the fact they were already members prior to the European Union (Member Organization) becoming a member, or, representing territories not members of that organization.

¹² Commission for the Conservation of Southern Bluefin Tuna (CCSBT); Inter-American Tropical Tuna Commission (IATTC); International Commission for the Conservation of Atlantic Tunas (ICCAT); Western and Central Pacific Fisheries Commission (WCPFC); Indian Ocean Tuna Commission (IOTC); Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR); Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea (CCBSP); General Fisheries Commission for the Mediterranean (GFCM); North East Atlantic Fisheries Commission (NEAFC); North Atlantic Salmon Conservation Organization (NASCO); Northwest Atlantic Fisheries Organization (NAFO); South East Atlantic Fisheries Organisation (SEAFO); South Pacific Regional Fisheries Management Organisation (SPRFMO); Southern Indian Ocean Fisheries Agreement (SIOFA).

While the world seems reasonably covered in terms of tuna fisheries management, there are overlaps for some species (Inter-American Tropical Tuna Commission [IATTC] and Western and Central Pacific Fisheries Commission [WCPFC]) and for some regions; e.g. southern bluefin tuna is managed throughout its sea range, which covers parts of the convention areas of the International Commission for the Conservation of Atlantic Tunas (ICCAT), Indian Ocean Tuna Commission (IOTC) and WCPFC. The coverage of non-tuna fisheries is generally patchier, with significant gaps in area and species coverage.



Source: Future Ocean, International Ocean Institute and Mare (2013).

How do RFMOs operate?

An important objective of UNFSA is to seek effective and compatible conservation and management measures both inside and outside areas of national jurisdiction. UNFSA identifies a key role for RFMOs as the appropriate bodies through which States are to cooperate. It identifies the significant issues States are expected to agree on in order to bring about the sustainable management of fisheries, including measures to ensure long-term sustainability, agreement on participatory rights (either allowable catch or fishing effort), decision-making procedures, measures for obtaining necessary scientific advice and ensuring the enforcement of conservation and management measures (Article 10). Typically, the management measures that RFMO members may adopt include setting maximum allowable catches and allocating these on a country-basis through national quotas. Member countries of RFMOs would then be bound by these quotas for their catches of the particular species, both in their EEZs and on the high seas.

UNFSA highlights the need for a precautionary approach to management and that it should be undertaken on an ecosystem basis. These key concepts that underpin contemporary fisheries management are explained in more detail in Chapter 3 on rebuilding fisheries. However, many RFMOs were established prior to the development and entry into force of UNFSA, and while some RFMOs' conventions have been updated, others have not. One obstacle to such an update is that the mandate of some RFMOs precludes such action. In other instances, the status quo has led to less rigorous management arrangements. This is despite the fact that many of the countries involved have ratified UNFSA.

Achieving best practice management requires particularly well-developed science-based decision-making processes. With many high seas stocks currently overfished, and others fully fished, the importance of high-quality science-based stock assessments cannot be overemphasized. It requires not only a commitment to this work, but also good-quality catch and effort data that provide vital input to the process. Importantly, the output of the assessments needs to be translated into binding management arrangements in the form of target and limit reference points to underpin the ongoing sustainability of the resource. However, such research and data gathering are expensive.

Despite the high value of many high seas fisheries (particularly the tuna fisheries), it is not uncommon for there to be inadequate resources to undertake this work and to manage the affairs of the organization. Similarly, there is reluctance by some members to see a greater role for RFMO secretariats, particularly on compliance issues, although many RFMOs have undertaken to review compliance. Some have also adopted mechanisms allowing for the identification of IUU vessels, with associated actions by the members to promote compliance, and mechanisms for the adoption of trade measures to promote compliance. However, some RFMOs still have no specific compliance and enforcement functions, leaving this role solely with the flag State; and even where RFMOs are given a role, the ultimate enforcement of conservation and management arrangements rests with member States.

A further critical point in relation to the operation of RFMOs is that they are largely governed by rules that require consensus decision-making. In practice, this means that if only one member decides it does not like a particular proposal, that proposal will not be implemented. While in theory consensus decision-making is a worthy ideal, as it ensures buy-in by member States, it may in practice be used by States to block or defer timely management arrangements.

Importantly, RFMOs are only accountable to their members and, as such, if an RFMO is underperforming there are no formal higher-level accountability arrangements to ensure that performance improves. In about the last five years, in response to calls for improved performance, most RFMOs have embarked on performance reviews, and some are in the process of implementing key findings. Examining the world's 18 RFMOs, Cullis-Suzuki and Pauly (2010) found low performance of RFMOs both "on paper", in terms of adopting best practice management, and in practice, in terms of stock conservation. The latter result is emphasized by the broader findings that two-thirds of stocks fished on the high seas and under RFMO management are either depleted or overfished.

WHAT ARE THE ISSUES IN POLICY COHERENCE FOR DEVELOPMENT AND WHAT CAN BE DONE?

How can performance improve to end stock overfishing?

The FAO report *The State of World Fisheries and Aquaculture 2012* (FAO, 2012) indicates a worsening situation for many high seas fish stocks. The most important high seas fisheries by both volume and value are the tuna fisheries, which are largely under formal management by RFMOs. Despite their apparent resilience, tuna stocks are now under considerable pressure. In some cases, overfishing is continuing. In general, the longer-lived species (bluefin and bigeye) are under significant pressure, with southern bluefin tuna currently overfished and being rebuilt, and Atlantic and northern bluefin tuna also overfished.¹³ Bigeye stocks are under increasing pressure

¹³ Stock rebuilding refers to a management process developed by the management authority (domestic or RFMO) to rebuild a stock to the target biomass reference point (an agreed level). Such a process is engaged when the estimation of a stock's status is at or below an agreed limit reference or, if no limit reference point exists, at a level that requires rebuilding to avoid resource depletion.

with overfishing occurring on Pacific Ocean stocks. Skipjack tuna stocks (short-lived and highly productive) are generally being fished at sustainable levels.

The newest of the tuna RFMOs, the WCPFC, was established after UNFSA entered into force and it was modelled on the contemporary management arrangements required by UNFSA. However, it is struggling to deal with the overfishing of northern bluefin tuna and bigeye tuna. Other RFMOs are also struggling to meet best practice management expectations.

To the extent that high seas stocks remain fully fished or overfished, there will be limited opportunity for access to, or potential benefit from, these resources for non-member countries. Tackling this problem implies improving the effectiveness of RFMO activities, through both better management and implementation of the measures by member countries. Some of the RFMO conventions have been reviewed and updated to better reflect current international law, but others need to be reviewed and updated.

In addition, problems of overcapacity should be addressed. A failure to do so, and thereby ignore the regional implications of maintaining non-sustainable catch levels, means imposing the “adjustment cost” on the resource itself and on other users of the resource, including developing countries and their populations who depend on fisheries.

How can RFMO membership opportunities and equitable access to resources be granted to developing countries?

Limited participation by developing countries

A review of membership of RFMOs by developing countries and their ratification of key treaties suggests that many have not ratified contemporary fisheries treaties such as UNFSA or the FAO Compliance Agreement dealing with high seas fisheries management. At present, while many developing countries are members of RFMOs, very few are significant players in terms of harvesting resources within convention areas. It is estimated that developed countries account for about 85 percent of high seas catches (IntraFish, 2014). The reasons for limited engagement of many developing countries with international agreements and their ability to participate actively in RFMO fisheries on the high seas vary, although physical resourcing and limited participatory rights are important factors.

While RFMO membership is supposed to be open to all those with a “real interest” in the fishery, this may not always be the case in practice. Indeed, where fish stock conservation measures imply a limit on total catches, accepting a new entrant and offering access to the resource would mean lower catch possibilities for existing member countries. In practice, where access to the resources managed by the RFMO has not been formally allocated, a new entrant may be at a significant disadvantage. This is due to the fact that many allocation processes rely on “catch history” as the fundamental determinant of an allocation formula. Where a State has little or no catch history, the chances of receiving a viable allocation would appear to be slim. In most cases, RFMOs have not undertaken formal allocation processes, and this may create perverse incentive where States encourage their vessels to fish harder to secure a catch history. Sometimes, a new entrant to an RFMO will not be guaranteed access to resources but will have to contribute to the budget of the organization.

All these factors work against resource-poor developing countries from gaining access to high seas resources. Yet, as members of an RFMO, they will be expected to implement fully all conservation and management measures and to partake in RFMO meetings at potentially significant cost.

So how is it possible to ensure that developing countries have the opportunity and human and financial resources to: (i) engage with RFMOs managing stocks that partly

occur in their EEZs to ensure that they regulate fishing in their EEZs in a sustainable way and that the RFMO ensures sustainable fishing of these stocks outside their EEZs; and (ii) participate in high seas fisheries if they wish to do so?

A role for development cooperation

Development cooperation has a potentially important role to play in helping developing countries engage with relevant RFMOs and participate in high seas fisheries. It would be useful to explore the modalities of such cooperation as there is very little information and evidence. To assist in this process, development cooperation should also be directed to building ongoing fisheries management and enforcement capacity in developing countries more generally. Indeed, assisting developing countries in developing and implementing robust domestic management arrangements will not only assist them in managing the resources within their EEZs, but will also enable them to play a more active role in RFMOs where they are members.

In this process, development cooperation could also prove very useful to support structural adjustments where such adjustments, within domestic fisheries, become necessary as new domestic fisheries management arrangements are implemented. Supporting the development and implementation of ongoing alternative employment opportunities for potentially displaced fishers will be an essential element of new fisheries management arrangements.

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APPENDIX

Fishing for development programme

A Joint Session of the COFI, DAC, FAO and WB on Policy Coherence for
Development in
Fisheries and Aquaculture
OECD Conference Centre, Room CC9, Paris
10–11 April 2014

Draft Agenda Day 1

Session 1. Introductory session (9:30–10:30)

- Welcome and introductory remarks by Mr. Erik Solheim, Chair, OECD DAC.
- Introductory remarks by Mr. Philippe Ferlin, Chair, OECD COFI.
- Introductory remarks by Mr. Lahsen Ababouch, Director of the FAO Fisheries and Aquaculture Policy and Economics Division and Chair of the meeting.
- Introductory remarks by Mr. Papa Gora Ndiaye, Director, Réseau sur les Politiques de Pêches en Afrique de l'Ouest (REPAO).
- *Presentation 1* by Mr. Christophe Béné, Research Fellow, Institute for Development Studies, University of Sussex, on the role of fisheries and aquaculture for development. (available at www.oecd.org/tad/events/Session_1_Point_5_Chris_Bene_Sussex_University.pdf).

Session 2. Rebuilding (10:30–13:00)

- *Presentation 2* by Claire Delpeuch, OECD. (available at www.oecd.org/tad/events/Session_2_Point_1_Claire_Delpeuch_OECD.pdf).
- *Presentation 3* by Mr. John Tanzer, Director of the Global Marine Program, World Wildlife Fund (WWF), on how marine conservation benefits food and jobs. (available at www.oecd.org/tad/events/Session_2_Point_2_John_Tanzer_WWF.pdf).
- *Presentation 4* by Mr. Tumi Tómasson, Director of the United Nations University Fisheries Training Programme, on the lessons learnt from Icelandic development assistance in fisheries. (available at www.oecd.org/tad/events/Session_2_Point_3_Tumi_Tomasson_Iceland.pdf).
- *Presentation 5* by Mr. Jean-Yves Weigel, Directeur de Recherches à l'Institut de Recherche pour le Développement (IRD), on protected marine areas in least developed countries. (available at www.oecd.org/tad/events/Session_2_Point_4_J-Y_Weigel_IRD_France.pdf).
- Discussion (Lead discussant: Roger Martini, OECD).

Session 3. Green growth in aquaculture (14:30–18:00)

Coffee available but no formal coffee break – help yourselves.

- *Presentation 6* by Mr. Rohana Subasinghe, Chief of the Aquaculture Branch, FAO. (available at www.oecd.org/tad/events/Session_3_Point_1_Rohana_Subasinghe_FAO.pdf).
- *Presentation 7* by the Swedish delegation on alternative feed sources for aquaculture. (available at www.oecd.org/tad/events/Session_3_Point_2_Anders_Kiessling_Sweden.pdf).
- *Presentation 8* by Mr. Eric Bernard, Shrimp Aquaculture Dialogue, and Director OSO, on certification in Madagascar shrimp production. (available at www.oecd.org/tad/events/Session_3_Point_3_Eric_Bernard_OSO.pdf).
- *Presentation 9* by the Namibian delegation on aquaculture in Namibia (additional). (available at www.oecd.org/tad/events/Session_3_Point_4_Namibian_Delegation.pdf).
- *Presentation 10* by the Norwegian delegation on how regulations can contribute to stable and sustainable growth in aquaculture. (available at www.oecd.org/tad/events/Session_3_Point_5_Martin_Bryde_Norway.pdf).
- Discussion (Lead discussant: Jane Feehan, Natural Resources Specialist at European Investment Bank).

Day 2

Session 4. The challenge of combatting IUU fishing (9:30–12:30)

- *Presentation 11* by Mr. Frank Meere, consultant for the OECD Secretariat. (available at www.oecd.org/tad/events/Session_4_Point_1_Frank_Meere_re_IUU.pdf).
- *Presentation 12* by Mr. Sidiya Diouf, Adjoint au Directeur des pêches maritimes, Direction des Pêches Maritimes du Sénégal, on local initiatives co-monitoring of artisanal fisheries in Senegal – contributing to the fight against IUU fishing. (available at www.oecd.org/tad/events/Session_4_Point_2_Sidiya_Diouf_Senegal.pdf).
- *Presentation 13* by Ms. Ida Kusuma, Secretary of Director General for Marine and Fisheries Surveillance, Ministry of Marine Affairs and Fisheries, Indonesia, on Indonesian Efforts to Combat IUU Fishing. (available at www.oecd.org/tad/events/Session_4_Point_3_Ida_Kusuma_Indonesia.pdf).
- *Presentation 14* by the delegation of the European Union on the European Union's action towards the international fight against IUU fishing. (available at http://www.oecd.org/tad/events/Session_4_Point_4_Desiree_Kjolsen_EU.pdf).
- *Presentation 15* by Ms. Isabella Lövin, member of the European Parliament, on the role of the EU in combatting IUU fishing and on how building development-enhancing access agreements may contribute to this fight. (available at www.oecd.org/tad/events/Session_4_Point_5_Isabella_lovin_EP.pdf).
- *Presentation 16* by the Norwegian delegation on IUU and fisheries crime – from a national problem to an international solution. (available at www.oecd.org/tad/events/Session_4_Point_6_Gunnar_Stolsvik_Norway_IUU_OECD.pdf).
- *Presentation 17* by the delegation of the United States on Building Partnerships to Combat IUU Fishing in West Africa. (available at www.oecd.org/tad/events/Session_4_Point_7_Greg_Schneider_US.pdf).
- Discussion (Lead discussant: Mr. Philippe Vallette, Director, Nausicaa).

Session 5. RFMOs (13:30–15:30)

- *Presentation 18* by Mr. Frank Meere, consultant for the OECD. (available at www.oecd.org/tad/events/Session_5_Point_1_Frank_Meere.pdf).
- *Presentation 19* by Ms. Gail Lugten, Fisheries Liaison Officer, FAO, on Regional Fisheries Bodies and their approaches to dealing with IUU fishing. (available at www.oecd.org/tad/events/Session_5_Point_2_Gail_Lugten.pdf).
- *Presentation 20* by Mr. Hamady Diop, Head of Department of Research and information Systems, West African Union Sub Regional Fisheries Commission (SRFC) on a common policy for fisheries reforms in the SRFC's space: the case of small pelagics of North West Africa. (available at www.oecd.org/tad/events/Session_5_Point_3_Hamady_Diop_Senegal.pdf).
- *Presentation 21* by Mr. Fabio Hazin, Professor, Universidade Federal Rural de Pernambuco, and former Chairman of the International Commission for the Conservation of Atlantic Tunas on special requirements of developing States, as flag States, coastal States and port States and their participation in RFMOs: developing capacity-building strategies. (available at www.oecd.org/tad/events/Session_5_Point_4_Fabio_Hazin_Brazil.pdf).
- *Presentation 22* by the delegation of New Zealand on policy coherence in the development of Pacific tuna resources: A case study on the work of WCPFC. (available at www.oecd.org/tad/events/Session_5_Point_5_%20Matthew_Hooper_New_Zealand.pdf).
- Discussion (Lead discussant: David Hogan, delegation of the United States of America).

Closing session: Roundtable on implications for governance (16:00–17:30)

- *Presentation 23* by Mr. Papa Gora Ndiaye, Director, Réseau sur les Politiques de Pêches en Afrique de l'Ouest (REPAO), on policy coherence for development in fisheries and aquaculture in West Africa. (available at www.oecd.org/tad/events/Session_6_Papa_Gora_Ndiaye_Senegal.pdf).
- Concluding remarks by the FAO, OECD and WB.

Fishing for development

FAO/OECD
April 2014
Paris, France

This publication highlights the main conclusions of the Fishing for Development joint meeting, held in Paris in April 2014. The meeting was organized by the Food and Agriculture Organization of the United Nations (FAO), the Organisation for Economic Co-operation and Development (OECD) and the World Bank (WB) to initiate a dialogue between the fisheries and development policy communities from member and partner countries and organizations of the OECD. It brought together delegates to the OECD Fisheries Committee and OECD Development Assistance Committee, representatives of partner developing countries invited by FAO, as well as experts and representatives from FAO, WB, non-governmental organizations and regional organizations. The meeting focused on issues central to promoting sustainable fisheries and aquaculture in developing, emerging and developed countries alike.

This publication also includes the background papers originally prepared to provide context for the issues addressed. It identifies questions for a future work agenda on policy coherence in fisheries and aquaculture, and makes evident the strong need for further dialogue between the fisheries and development communities at global and regional scales.

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