

Fisheries Management: Status and Challenges

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With fish providing at least 20% of animal protein intake for approximately 1.5 billion people or at least 15% for about 3.0 billion people in our world, it is critical that fisheries management is both efficient and effective. Yet, capture fisheries have reached their maximum productive capacity, and as we shift from the old productivism paradigm to one of responsible fisheries management, it is imperative that we balance viable utilization and conservation. The idea of inexhaustible fisheries must be replaced by the recognition that access to fisheries must be restricted if they are to sustainably generate wealth and to alleviate poverty.

This paper focuses on seven core challenges to implementing responsible and genuinely effective capture fisheries management: understanding fisheries and their environment, reconciling utilization and conservation, considering social and equity issues, assessing incentive structures, linking fisheries management with trade and with marketing standards, enhancing institutions and governance for management whilst embracing the vital concept of stakeholder participation, and engaging with developing countries. For each of these topics, the way forward is outlined—a way that, although challenging, can result in capture fisheries that create wealth, contribute to food security, and are part of sustainable patterns of consumption and production.

KEYWORDS capture fisheries management; governance; conservation; utilization; trade; incentives; developing countries; regional cooperation

* The views contained in this paper do not necessarily reflect the views of the Food and Agriculture Organization (FAO) of the United Nations.

1. Introduction

The range of fisheries and aquaculture issues that face the world is vast, complex, and potentially bewildering, and there are many issues worthy of inspection.

This paper focuses on seven core challenges to achieving genuinely effective capture fisheries management: understanding fisheries and their environment, reconciling utilization and conservation, considering social and equity issues, assessing incentive structures, linking fisheries management with trade and with marketing standards, enhancing institutions and governance for management whilst embracing the vital concept of stakeholder participation, and engaging with developing countries.

2. Setting the Scene: the Status of World Fisheries and Aquaculture

Aquaculture and capture fisheries currently supply the world with approximately 110 million tonnes of fish, or 16.7 kg per capita per year, for human consumption. World production from capture fisheries and aquaculture continues to rise, driven mainly by aquaculture production in China. Total

production amounted to 144 million tonnes in 2006 (Fig. 1).

Overall, fish now provides at least 20% of the animal protein intake for approximately 1.5 billion people or at least 15% of the animal protein intake for approximately 3.0 billion people— including those in low-income food-deficit countries— and 47% of the global production of food fish is now provided by aquaculture. Indeed, aquaculture is the fastest growing food sector, with total production growing at almost 9% per year over the period 1986 to 2006. China overwhelmingly dominates global aquaculture production with a share of 67% of total production, but there is growth in all regions of the world and diversification to new species, particularly crustaceans and marine fish. The outstanding question which remains is whether growth rates have peaked, either regionally or globally.

During the last three decades, the number of fishers and fish farmers has grown faster than the world's population, with an estimated 44 million people working as fishers and fish farmers in 2006. The vast majority of fishers and fish farmers are in developing countries, and most are in Asia, with China alone accounting for some 13 million. At the same time, the number of vessels in

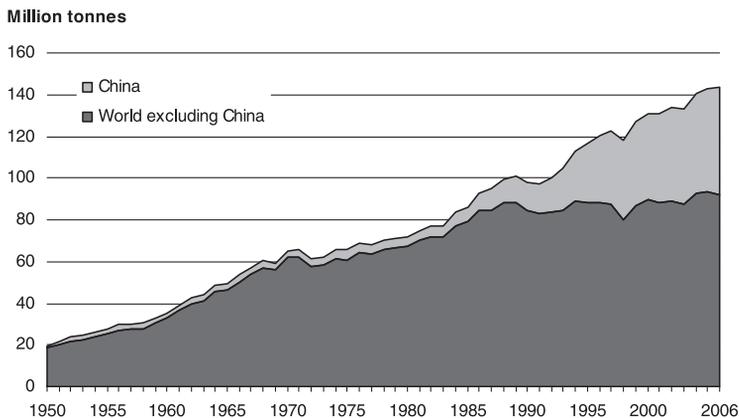


Fig. 1. World capture and aquaculture production (Source: FAO 2008¹).

the world fishing fleet has remained fairly constant for the last few years. In 2006, about 2.1 million were estimated as engine-powered fishing vessels, of which around 90% were small vessels less than 12 m in length. Almost 70% of them were flagged in Asia. There are many national fleet reduction policies in place, although reductions in effective fishing power are often less than those in number of vessels. Moreover, although the number of full time fishers has declined, the number of part-time fishers has grown rapidly—again, particularly in Asia.

International trade of fishery commodities reached approximately US\$ 86 billion in 2006, a dramatic increase of more than 55% since 2000.² The contribution of fish to GDP has doubled in the last 25 years, and currently fish is one of the most highly traded food commodities with 37% of all production now exported. This phenomenon is particularly evident in developing countries: total fishery net exports (i.e., the total value of fish exports less the total value of fish imports) have shown a four-fold increase in 20 years and been reaching US\$ 25 billion in 2006.

Since 2002, China has been the world's largest exporter of fish and fishery products, with exports valued at US\$ 9 billion in 2006. China's fishery exports have increased significantly since the 1990s, not only due to increased production, but also due to the expansion of China's fish processing industry. Befitting from competitive labour and production costs, Chinese exports also include re-exports of fish imported as raw material and processed to add value in the country.

International cooperation in the management of marine fisheries exploiting shared, straddling or discrete high seas fish stocks is being facilitated by regional fisheries management organizations (RFMOs). And, although some RFMOs are finding it difficult to achieve sustainable fisheries, many RFMOs are taking steps towards implementing the ecosystem approach to fisheries, adopting the precautionary approach, promoting transparency, and enhancing compliance. In contrast, and with respect to inland fisheries, only approximately 44% of international water basins are the subject of agreements, and many of these agreements do not include fisheries (FAO 2007, pp. 54–58).

The overall state of exploitation of the world's marine fishery resources has remained relatively unchanged over the past 10–15 years (Fig. 2). The proportion of fully exploited fish stocks has remained fairly stable at approximately 52% in 2006 (the most recent year for which there is data), and the proportion of underexploited and moderately exploited stocks has continued to decrease (20% in 2006). And, whilst the proportion of overexploited and depleted stocks increased steadily during the 1970s and 1980s, the figure has remained around 25–27% during the last ten years.

Such global figures, inevitably, mask some more specific concerns. A recent FAO report indicated that the proportions of overexploited and depleted fish stocks are much higher in some (again, aggregate) categories of fish: for highly migratory tuna and tuna-like species, some 30% are in this category—as are some 55% of highly migratory

¹ Source: FAO Fisheries and Aquaculture Information and Statistics Service. 2008. Total production 1950–2006. FISHSTAT Plus—Universal software for fishery statistical time series [online or CD-ROM]. Food and Agriculture Organization of the United Nations. See: <http://www.fao.org/fi/statist/FISOFT/FISHPLUS.asp>

² Source: FAO Fisheries and Aquaculture Information and Statistics Service. 2008. Fisheries Commodities Production and Trade 1976–2006. FISHSTAT Plus—Universal software for fishery statistical time series [online or CD-ROM]. Food and Agriculture Organization of the United Nations. See: <http://www.fao.org/fi/statist/FISOFT/FISHPLUS.asp>

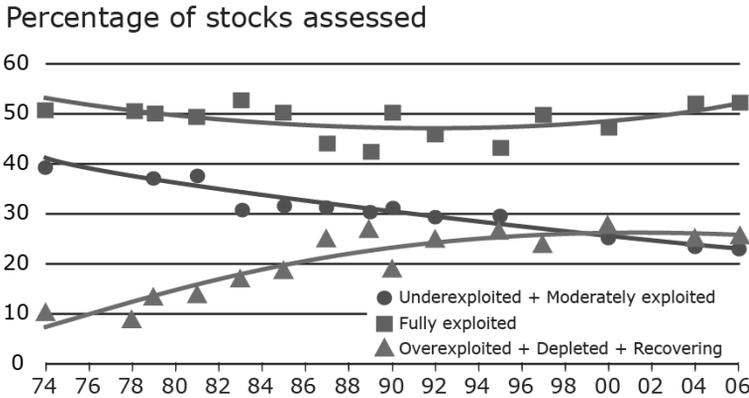


Fig. 2. Global trends in world marine fish stocks since 1974 (Source: FAO 2007, p. 32).

oceanic sharks and some 65% of straddling stocks and other high seas resources (FAO 2006: pp. 17, 30, 43). Moreover, there is no suitable stock assessment information for a large proportion of the world's fish stocks, highlighting the critical need for ongoing work such as the FAO Strategy for Improving Information on the Status and Trends of Capture Fisheries (FAO-STF Project).

With respect to inland fisheries, there is much evidence that many fisheries are overfished. Inland fishery resources are particularly vulnerable to habitat degradation resulting from pollution or use of water for irrigation and/or hydropower generation. Additionally, as with marine fisheries, there are particular challenges in protecting migratory species and those stocks shared among different jurisdictions.

In short, and as repeatedly stated by FAO, the overall maximum production potential from wild capture fisheries has been reached. The combination of further economic benefits and the sustainability of capture fisheries can only be achieved through fisheries management that is able to avoid overexploitation, to maintain (or rebuild) fishery resources, and to improve the commercial viability and generation of wealth

from capture fisheries.

3. Main Challenges and Ways Forward

The trends of the latter half of the 20th century—overfishing and the ineffectiveness of fisheries management—generated serious and widespread concerns amongst a range of agencies and governmental and non-governmental organizations, leading to the adoption of a range of legal instruments and calls for sustainable development, not the least of which was the United Nations Convention on the Law of the Sea of 10 December 1982 (UNCLOS).

Since then, the international community has spent much of the last decade extending UNCLOS and developing complementary international instruments for more effective fisheries management. At the 1992 United Nations Conference on Environment and Development, Chapter 17 of Agenda 21 called upon States to maintain or restore populations of marine species at productive levels, protect and restore endangered marine species, and preserve rare or fragile ecosystems and habitats. Three years later in 1995, the international community adopted the FAO Code of Conduct for Responsible Fisheries (CCRF) followed shortly thereafter

by the UN Fish Stocks Agreement³ for straddling and highly migratory fish stocks.

The international community has also worked with the FAO and within the framework of the CCRF⁴ to develop various International Plans of Action (IPOAs)—for seabirds, for sharks, for managing fishing capacity, and for illegal, unreported and unregulated (IUU) fishing—as well as to develop instruments regarding port State measures. New RFMOs have been established to fill the gaps in their coverage, and the mandate and the efficiency of RFMOs have been strengthened in response to technical and institutional audits.⁵ Concurrently, FAO has been contributing by developing complementary technical guidelines and guidance regarding specific aspects of the CCRF and these various related instruments and approaches.

The emphasis in addressing overfishing and the ineffectiveness of fisheries management has now shifted. Now, the priority is to implement the CCRF and related instruments. As expressed by the FAO Committee on Fisheries during its 26th Session in 2005, the period of 2005–2015 needs to be a “decade of implementation.” As part of doing so, countries will have to surmount seven core challenges.

3.1. Understanding fisheries and their environment

In addition to the many instruments and agreements mentioned above, the 2001 Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem and the 2002 Plan of Implementation of the World Summit on Sustainable Development established an ecosystem approach to fisheries (EAF). Consequently, whilst recognizing that the single-species approach to fisheries management frequently can be successful (Mace 2004; Hilborn 2007), these new developments reflect a desire to expand beyond the exclusive focus on the direct interactions between fishers and their target species and to consider the impacts of fishing in a significantly broader context.

3.1.1. Evolving knowledge and science

Fisheries interact with and within an ecosystem directly, affecting target species, bycatch species (whether retained or discarded), and critical or important habitats; however, fisheries also have indirect impacts which are typically transmitted through the food web. Heavy fishing of a prey species is likely to lead to a decline in the abundance and productivity of its predators which may be target species for other fisheries.

³ 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.

⁴ The FAO CCRF (FAO, 1995) provides a comprehensive overview of responsible fisheries management. Some of the key requirements are that: conservation and management measures should aim for long-term sustainability and optimum utilization of resources and be based on the best scientific evidence available (Article 7.1.1, also 7.2); management authorities should identify and collaborate with the relevant stakeholders in a fishery (Articles 7.1.2–7.1.6); States should establish effective mechanisms for MCS (Article 7.1.7); excessive fishing capacity (i.e., overcapacity) should be eliminated and fishing effort should be commensurate with sustainable use of the fishery resources (Article 7.1.8); fisheries management and decision-making should be transparent (Article 7.1.9); and, authorities must ensure that the relevant laws and regulations are known and understood by all stakeholders (Article 7.1.10).

⁵ See the Chatman House report on RFMOs at <http://www.chathamhouse.org.uk/news/view/-/id/396> and http://www.chathamhouse.org.uk/files/10301/10301_rfmo0807.pdf.

Conversely, changes in the ecosystem can affect fisheries. Natural variability in temperature commonly leads to variability in the productivity and sustainable yield of a fishery. Anthropogenic factors such as land-based pollution and eutrophication, coastal habitat destruction, offshore mining and oil extraction can all lead to long-term changes in the ecosystem that will then have impacts on fisheries resources and the humans dependent on them for their livelihoods.

This is the extended environment in which fisheries scientists (of both the natural and human sciences), managers and stakeholders need to plan and manage peoples' activities. As a result, the information and advice supporting fisheries management must cover the same disciplines and dimensions—not only incorporating species population dynamics and ecosystem dynamics, but also economics, sociology, anthropology, and more.

3.1.2. Looking forward

Overall, a pragmatic approach to the EAF needs to use the best available information coupled with a reasonable application of the precautionary approach and a very strong emphasis on full stakeholder participation (e.g. FAO 2003, 2005c).⁶

High levels of scientific uncertainty are a significant obstacle to implementation of EAF in many cases, and this problem is most severe where the fisheries sector is diverse and dominated by small-scale, low value fisheries, where the biological resources are equally diverse, management and enforcement capabilities are frequently weak, and reliable scientific information is also scarce. To further compound the challenge, reliable stakeholder participation (and the information that stakeholders can provide) can be difficult to obtain, especially when stakeholders are physically scattered and have different cultural and educational backgrounds.

Despite these hurdles, the EAF has global relevance; hence, the real challenge for the future will be to develop and use:

- reliable, robust and cost-effective means of assessing and monitoring the status of ecosystems and their resources, and
- rapid means of detecting any undesirable and excessive impacts, from whatever source, that threaten sustainable use.

Then this sort of information can be used in determining and implementing suitable and effective fisheries management.

Decision makers will have to balance the need to make management decisions that are conservative enough to accommodate major uncertainties whilst not being so conservative as to unnecessarily forsake some of the potential yields from their fisheries and aquaculture operations that would be obtainable if there was less uncertainty.

3.2. Reconciling utilization and conservation

Until the final decades of the 20th century, fisheries science was dominated by theories and models based on single-species population dynamics and the concept of “maximum sustainable yield” (MSY).⁷

Subsequently, it has been recognized that the risks of overfishing are too high when MSY is used as a target reference point due to scientific uncertainty and natural variability, and that MSY should be used as an upper limit to be avoided. At the same time, due to the soaring catches and fishing power that characterized the second half of the 20th century, fishing began to have major impacts on many other marine species (e.g., sea turtles, some shark species, sea birds, etc.) as well as on some important marine habitats.

The result has been to recognize one of the fundamental realities of fisheries: because humans and their behaviour are at the heart of fisheries management, there is a serious need to reconcile commercial utilization (i.e., people's livelihoods) with conservation concerns.

Indeed, this can be seen in the FAO CCRF which aims at promoting responsible fishing and aquaculture operations whilst ensuring sustainable use of aquatic biodiversity—integrating the requirements of UNCLOS, the UN Fish Stocks Agreement and the Convention on Biological Diversity (CBD).

3.2.1. Finding a balance

To reconcile these issues, FAO and its Members, using the CCRF as their guide, and several other inter-governmental and non-governmental organizations have been seeking partnerships with a view to finding a workable balance between utilization and conservation; to implement the respective IPOAs for reducing the incidental catch of seabirds by fishers, for better managing sharks, for managing fishing capacity, and for combating illegal, unreported and unregulated (IUU) fishing; and to collaborate actively with the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

For example, because the Parties to CITES take steps to regulate international trade of some species where such trade is considered to be a threat to the conservation status of the species, FAO and CITES have been working closely in recent years in relation to commercially-exploited aquatic species for which there are conservation concerns due to their trade. This cooperation has included (amongst other things) the development of listing criteria for CITES,

ensuring adequate consultations in the evaluation of proposals for listing commercially-exploited aquatic species in the CITES Appendices, as well as working on technical and legal issues relating to the listing of such species.⁸

At the level of global policy and practice, FAO's work on deep sea high seas fisheries and on the use of marine protected areas in fisheries management emphasize the need to balance technical solutions with strong training and capacity building activities. Similarly, EAF attempts to go beyond conventional fisheries management and to explicitly address the need for both the conservation and use of fisheries resources within a holistic framework that reflects a full set of all stakeholders' goals and objectives and the needs of future generations.

3.2.2. Looking forward

The WSSD Plan of Implementation identified two fundamental pre-requisites for sustainable development—namely, (i) the eradication of poverty and (ii) changing unsustainable patterns of consumption and production. Indeed, the current global suite of legally binding and non-binding instruments provides the policy framework necessary to ensure sustainable utilization and the conservation of biodiversity and ecosystem integrity.

The problem is that this policy framework is still not being adequately applied across the globe. Thus, the challenge to be

⁶ Good progress is being made in this way in Australia (e.g. Fletcher *et al.* 2005), the Alaska region of the USA (Fluharty 2005) and by Angola, Namibia and South Africa, the countries of the Benguela Current large marine ecosystem (Cochrane *et al.* 2007).

⁷ Article 61 of the UNCLOS urges States to "... maintain or restore populations of harvested species at levels which can produce the maximum sustainable yield, as qualified by relevant environmental and economic factors," implying that MSY or, equivalently, the biomass that can produce MSY, should be a target.

⁸ For example, sea turtles and the sawfishes are presently listed in CITES Appendix I, under which commercial trade is banned, while seahorses, the Napoleon wrasse, shark species such as white and whale sharks, and other species are listed in Appendix II which requires strict regulation of trade in those species in order to avoid utilization incompatible with their survival.

overcome will be to effectively direct political will into reconciling utilization and conservation of aquatic resources and ecosystems. Then this duality should be achievable.

3.3. Considering social and equity issues

3.3.1. Social and equity considerations in fisheries management

Fisheries make important contributions to meeting the Millennium Development Goals on poverty and food security. They can also be a source of wealth creation, supporting national economic development. Indeed, in some communities fishers are not the most impoverished, but in other communities, fishers are amongst the poorest of the poor. In such situations, poverty, vulnerability and low levels of social development often seriously compromise the ability of small-scale fishers to adopt responsible fishing practices, to constructively participate in co-management and community-based fisheries management regimes, and to benefit from the wealth inherent in fisheries.

The diversity and differences amongst fishers (and, especially, amongst those in the small-scale sector) defies definition. Whilst the absence of clearer and more focused socio- and economic information about the on-the-ground realities of fishers and their fishing communities has frequently contributed to inaction, trying to define small-scale fishers and fisheries may lead to inaccurate and incorrect perceptions and—as a result—improper management decisions.

Hence, the human aspects of fishers, especially those participating in small-scale fisheries, have gained increasing attention, and there has been a shift away from the traditional narrow focus on fisheries biology, ecology and conservation towards a wider developmental perspective based on the principles of integrated resource management. As a result, social and equity considerations have become recurring topics when

discussing the challenges of fisheries management, particularly in light of:

- the inevitable complications and implications of having to limit access to fisheries if they are to be commercially and biologically sustainable, and
- the serious concerns that arise about the allocation implications of fisheries management decisions and how people will react to them.

3.3.2. The way forward

Socio-economic and demographic studies—which provide insights about the living conditions, relationships, governance, and institutions in a community—can provide information essential for the details of fisheries management programmes that are acceptable to the participants. Such information is also a critical part of monitoring the impacts of management measures on the socio-economic well-being of fishers, their families and fishing communities. Accurately assessing and addressing the vulnerability and social exclusion of small-scale fishers is also critical for designing and implementing the sorts of access and user rights systems that will improve the contribution of fisheries to poverty reduction and food security.

Hence, the way forward towards being able to manage fisheries so that they create wealth and contribute to food security will require greater, more systematic, widespread collection and use of socio-economic information about fishing communities.

3.4. Assessing incentive structures

Ironically, many of the incentives—the things that tend to motivate or even provoke fishermen to act—that fishers are faced with on a daily basis as they operate their businesses are inadequately considered in fisheries management. And, yet, assessing and understanding the incentives that are created by different fisheries management measures is absolutely fundamental for ensuring that

regulations, plans, and programmes actually achieve what they set out to achieve.

3.4.1. The incentives when fishing without clearly defined rights

Whether small or large, coastal or international, small-scale or industrial, the world's fishermen are all out there fishing in order to make a living, a profit, which enables them to put food on their tables and to take care of their families. They can do this in two ways: either they can fish to maximize their revenues by taking as many fish as possible, or they can fish to maximize their profits within sustainable limits.

In the former case, the scenario becomes one of "If I don't catch the fish first, someone else will and I won't be able to make my living." Thus, fishers work to catch as many fish as possible—either legally or, when desperate, illegally—and even if their costs of doing so are high. The typical scenario of overcapitalization, overfishing, illegal, unregulated, and unreported fishing, and overcapacity emerges as fishers compete against themselves and the system.

This is the situation of ill- or weakly defined user rights. Moreover, it means that fishers will want to provide as little information about their activities as possible because information sharing amounts to reducing one's competitive advantage relative to the others in the same fishery. This, in turn, makes it extremely difficult to get accurate, first-hand assessments of the status of the resource.

3.4.2. A range of rights-based management approaches

Maybe it is not property rights *per se* that people find so problematic, but the particular kind of property rights that are promulgated. —S. Jentoft (2007, p. 93).

It is frequently helpful to put the topic of rights-based systems into a bit of perspective. Contrary to much of the media coverage of the use of property rights in fisheries man-

agement, rights-based fisheries systems are not limited to individual transferable quota (ITQ) systems. Indeed, it is possible to say that all fisheries management systems are based on user rights. It is simply the degree to which the four characteristics (exclusivity, durability, security and transferability) are defined—i.e., the strength of the total bundle of rights—that distinguish fisheries management systems and the incentives they create for fishermen.

Systems based on licences (or some other definition of participants), whether they limit access or not, somehow determine who may participate in a fishery. However, when used alone, the generally competitive nature of individual fishermen (regardless of whether their boats are large or small) will cause them to invest in technologies (better paddles, sails, fishing gear, etc.) that help them increase their catches and revenues. As a result, these systems set up incentives to over-invest and overfish, resulting in conflicts and overcapacity. To avoid this, licensing and limited access systems in general need to be accompanied by regulations to allocate sustainable units of catch or effort amongst the different rights holders.

Customary access/tenure programs as well as various types of territorial and group user rights in fisheries define many of the questions of authority, rights, and rules and thereby set up positive incentive structures for participants. These systems encourage participants to take care of the resources, but only for the duration and the exclusivity of these rights. Moreover, if not supported by contemporary laws, customary programs are not always respected by people outside the customary system and are weakened when national, regional and global forces are brought to bear on the fishery, causing conflict and competition.

The category of most clearly defined rights-based systems is comprised of catch share systems for groups or communities (e.g., community fishing quotas) or individuals (e.g., individual share quota systems). In

fisheries where determining total allowable catches may be problematic, the shares can be in the form of individual transferable effort units—sometimes described in terms of a particular part of the fishing gear or other technological units—as a proxy for shares of a total allowable catch. The drawback of this effort-based share-system is that it will create incentives for the fishermen to invest in technology (“technology creep”) and require constant readjustment of the units to compensate for this. In fisheries where quantitative TACs are set, it is possible to develop individual transferable quota and share quota systems where the individual participants have clearly defined percentage-based shares. In this case, the system still needs to address the problem of discarding motivated by “high-grading” as well as possible concentration of shares to a small number of the rich at the exclusion of the poor.

Not surprisingly, there are common issues that are crucial and applicable for all of these different systems. One is the ability to monitor and to enforce catches effectively. Another is whether the system readily encourages fishers to address bycatch concerns in a cost effective manner. Finally, there is always the question of whether or not the system will encourage or discourage consolidation, particularly in fisheries where overcapacity is a problem.

3.4.3. The way forward

For fisheries to be both biologically and commercially viable, it is necessary to promote fisheries management systems that are not only implemented transparently and collaboratively with all relevant stakeholders, but also based on clearly-defined and legally defensible user rights. Such systems are the only ones that create the conditions and incentives for fishermen to work to maximize their profits on limited amounts of catch—and they do this by minimizing their costs, catching fewer fish, and becoming stewards of the resources they have the rights to use.

Indeed, with the new demands for the ecosystem approach to fisheries, clear and secure fishing rights are essential because they create the environment in which fishing behaviour, conservation objectives, and commercial forces reinforce each other.

Nonetheless, the challenge is that there is not one style of rights-based system to fit all fisheries. Rights-based management systems need to be designed to reflect and build upon the norms and governance structures that the participants and their communities consider legitimate and acceptable. Moreover, when rights-based systems are applied to fisheries where there is overcapacity and overfishing, it is critical to address the impacts of transitioning to rationalized fisheries, the impacts on livelihoods, and the consolidation that will occur. In doing so, fishers and their communities will be able to sustainably generate the wealth that fisheries have to offer.

3.5. Linking fisheries management with trade and with marketing standards

3.5.1. Government failures, market responses

Traditionally, managing fisheries has been totally in the hands of governments as fishery resources in most countries are defined for the “common good.” Yet, because fishers are not vested in these fish resources, overfishing and rent losses have become prevalent as fishers race for the fish.

In part to try to overcome fisheries governance failures and in part due to the corporate social responsibility movement and its social and environmental reporting requirements, the private sector has responded with the development of standards, ecolabels, and product traceability initiatives.⁹ Purchasing a commodity such as fish is no longer simply based on price. Instead, purchasing decisions for fish are now being based on a wider range of factors—including respecting the environment, the welfare

of their workforce, the humane treatment of animals, etc.—and corporate performance is being evaluated on this. Whilst these initiatives are not mandatory, compliance with these standards, the use of ecolabels to distinguish fish products from competitors' products, and product traceability are increasingly becoming industry norms.

In essence, ecolabels are based on market mechanisms. These programs allow retail buyers to source fish from sustainable sources that have positive environmental images. Buyers are assured of an ongoing (sustainable) supply of raw materials, and they are also assured that the market value of their fish products is not compromised by negative images of overfished fisheries and environmental degradation. At the same time, consumers are able to demonstrate their support for sustainable fisheries and/or fisheries that use environmentally friendly methods when producing fish (such as ensuring that tuna is not caught in a way that kills a number of dolphins or turtles) by purchasing fish products bearing ecolabels.¹⁰

There are several key elements for successful ecolabels. As described in the FAO Guidelines for the Ecolabelling of Fish and Fishery Products from Marine Capture Fisheries (FAO 2005b) there is the need for reliable, independent auditing, transparency of standard-setting and accountability, as well as the need for standards to be based on sound science. Moreover, the economic incentives (literally, the commercial paybacks) created by the label have to be strong enough for fishers to want to participate in the pro-

gram and for fishery managers to improve management so that a fishery can qualify for an ecolabel. These elements, in turn, can build necessary consumer confidence and trust.

3.5.2. The way forward

The linkages between fisheries trade, marketing standards, and fisheries that are managed so as to be sustainable are, without a doubt, gaining strength.

Ecolabels do mean that the producers—the fishermen in developing and developed countries alike—will need to be able to adapt to the resulting evolution in demand. And, whilst this new commercial economic environment is an additional challenge to accessing the global value chain, the developing world is now recognized by major ecolabels as a major participant in global markets. Hence, there is the will to harness the power of consumer demand for responsible, sustainable fisheries that demonstrate reduced risks to food security and livelihoods.

The development of ecolabels and private standards is helping to increase awareness about the failures of fisheries management and to lead the way towards better fisheries management practices. Although many ecolabels are being applied to fisheries that are already fairly well managed, even there the fishers and fisheries managers have had to make changes and improvements.

Public relations, awareness creation and educational activities that may accompany an ecolabelling programme can also influence the political arena and contribute to

⁹ Product traceability—stringent chain of custody documentation—complements ecolabel programs because it allows for products to be traced throughout the full production, distribution and marketing chain down to the retail level or, as more popularly described, from “deck to dish.”

¹⁰ Over a decade ago, the failures of governments to ensure the sustainability of fisheries, plus the increasing importance of sustainable fisheries, led corporate and conservation interests to create the Marine Stewardship Council and its ecolabel that signifies that fish have been sourced from certified well managed resources. Today, a plethora of ecolabels exists to meet perceived consumer demands for ethical business behaviour and to help consumers to make informed choices about what they are buying and to support responsible food production.

the political will required for society and politicians to bear the short-term costs of improving fisheries management for the longer-term good. However, it has been emphasized by retailers that ecolabels alone will not relieve governments of their duty to manage fishermen effectively and in accord with increasingly extensive environmental requirements.

3.6. Enhancing institutions and governance for management

Aside from adjusting laws and institutions to new international and national requirements of fisheries management, many countries also need to account for the changing nature of fisheries management by enhancing their institutions and governance of fisheries.

Typically, the extension of national jurisdiction in the 1970's was followed by two decades of rapid growth of the fishing industry. Public policy was characterized by a paradigm of "productivism" and the promotion of fleet expansion and increasing production. Frequently, this occurred quite independently of management measures that were aimed at conserving stocks.

The results of ineffective governance on a broad scale can be seen in the common failure of fisheries management to achieve its biological, ecological, economic and social objectives. Furthermore, in addition to the widespread absence of sufficient political will or political ability, the generally unsatisfactory state of fisheries governance is characterized by:

- i. the high levels of scientific uncertainty, often leading to poor or inappropriate management decisions;
- ii. an inherent conflict in fisheries between short-term economic and social objectives and the longer-term objectives of biological and economic sustainability, with the former usually being given priority;
- iii. poorly defined or inherently conflicting objectives in fisheries leading to reactive decisions and actions rather than proactive ones;
- iv. shortcomings in the institutional frameworks including the use of inappropriate systems of user rights and inadequate participation by stakeholders;
- v. inadequate human, physical, and/or financial resources in management agencies;
- vi. inadequate monitoring, control and surveillance (MCS) and penalties for fisheries infringements, and the existence of incentives to overharvest or otherwise ignore regulations (Cochrane and Douman 2005).

The requirements for addressing these problems and for achieving effective management systems are well known and understood. FAO identified the main factors of unsustainability and overexploitation in fisheries as the lack "good governance" and "inappropriate incentives" and noted "the need to achieve sustainability by granting secure rights to resource users (individually or collectively)" to overcome these problems (Swan and Gréboval 2003: p. 8).

3.6.1. Institutional changes

With global catch levels flat and an increasing number of stocks showing signs of overexploitation, the last decade has seen signs of a transition. Since the mid-1990's, most countries have participated in the extensive debates on fisheries issues that led to the proliferation of new international instruments, and many countries have also initiated institutional adjustments on this basis. Quite simply, most countries have recognized the limited nature of fisheries resources in their policy framework and are giving more emphasis to fisheries management in lieu of sheer productivism.

However, few countries have undertaken reforms to completely break away from the old productivism paradigm to adopt a new

Table 1. Examples of “classical” and “emerging” topics in fisheries management and conservation.

Classical Topics	Emerging Topics
Natural oscillations	<i>Climate change</i>
Overfishing	<i>Precautionary Approach, extinction, CITES and FAO</i>
Bycatch and discards	<i>Biodiversity</i>
RFMOs and multi-level management	<i>Ocean policy development</i>
Overcapacity	<i>Ecosystem approach to fisheries</i>
Economic viability of fisheries	<i>Rights-based fisheries management systems</i>
Non-tariff barriers and trade	<i>Wealth generation from fisheries</i>
Labour standards	<i>Ecolabelling, traceability and catch certification</i>
Subsidies	<i>Ethics and fair trade</i>
Statistics and reporting	<i>Low cost and cost effective management</i>
Monitoring, control and surveillance (MCS)	<i>Stock recovery strategies</i>
Quality standards	<i>Decentralization and co-management</i>
Production maximization	<i>Port state measures and illegal, unreported, unregulated fishing</i>
–	<i>Deep sea fisheries in high seas</i>
–	<i>Spatial management, marine protected areas (MPAs)</i>
–	<i>Sustainable and ecosystem-based aquaculture</i>
–	<i>Use of fishmeal in aquaculture</i>
–	<i>Open ocean and capture-based aquaculture</i>
–	<i>Environmental impacts of aquaculture</i>

paradigm of responsible fisheries management. Major reforms are still needed in most countries to significantly change legislation, policies, and key institutions (research, administration, management, stakeholder organizations and their role, monitoring control and surveillance, extension services, etc.) so that their fisheries management can address emerging issues (Table 1).

3.6.2. Governance and participation

The key principles underpinning good governance are:

- i. **Openness.** Institutions should work in an open manner and actively communicate the decisions and actions taken, using accessible, understandable language.
- ii. **Participation.** The quality, relevance and effectiveness of policies depends on wide participation throughout the policy chain to increase confidence both in the end results and in the institutions which deliver policies;

- iii. **Accountability.** Institutions must provide greater clarity and take responsibility for their own activities as well as for their respective roles of institutions working in a multi-level governance framework;

- iv. **Effectiveness.** Policies must be effective and timely, delivering what is needed on the basis of clear objectives, evaluations of future impacts and, where available, of past experiences; and

- v. **Coherence.** Policies and action must be coherent and easily understood, and this is all the more important as the range of management issues expands (Table 1).

Poorly designed industry participation actually has led to less effective management with immediate concerns prevailing over requirements for long-term sustainability, and adequate inclusion of conservation stakeholders has also proved difficult. Hence, it is vital to build these principles into fisheries institutions, governance, laws and management approaches.

3.6.3. The way forward: institutions, governance, and participation

Enhancing institutions and governance is not necessarily a simple step, but the use of auditing to assess principles of governance, institutions and management policies, and— together with institutional analysis—is increasingly proving extremely useful in guiding reforms for improved governance and management frameworks.

Fisheries authorities are beginning to organize and promote governance based on the systematic building-up of consensus around the idea of responsible fisheries, with the aim of facilitating decision making on fisheries management issues—especially on the sensitive topics of access limitation, user rights, and the effective management of fishing capacity.

The effectiveness of participation is very much linked to properly addressing these issues. Ensuring appropriate representation and managing fisheries with interest groups while ensuring that societal goals are met are fundamental components of responsible fisheries management. Effective participation can still be considered very much a learning and adaptive process.

In short, moving forward requires that governments and stakeholders work to ensure that their institutional and legal frameworks are able to implement the solutions to ineffective fisheries management and that human and other resources required to effect good governance are available.

3.7. Engaging with developing countries

Following the extension of national jurisdiction in the 1970's, developing countries have made very important efforts to develop their fisheries and to build up the institutional base required for such development.

From the mid-1970's to the early 1990's the international community of donors, development banks and specialized or-

ganizations provided massive support for productivist development in terms of equipment, infrastructures, training and institutional building. As a result most developing countries were able to increase the production from their fisheries. However, the longer term result is that they are now facing the same fisheries problems as those faced by developed countries—overexploitation, overcapacity and deteriorating economic performance.

Unfortunately, donor support to the fisheries sector has been significantly reduced since the late 1980's. As the limits of capture fisheries production were progressively reached, development banks and most donors rapidly redirected their focus on other sectors, including aquaculture. Donor support to capture fisheries was subsequently pursued on a far more limited scale and with more focus, e.g. on small scale fisheries, quality control, export promotion, basic landing infrastructures, conservation and general institutional building. Today, donor support for changes in fisheries management remains quite limited and largely insufficient, despite some signs of renewed interest from the part of some institutions like the World Bank.

3.7.1. The way forward

The need for legal and institutional reforms is vital for successful fisheries management, and the need for improved fisheries management is very much recognized in developing countries. Yet, developing countries have struggled to keep up with the fisheries management requirements of the CCRF and related instruments whilst trying to redirect their policy focus away from “productivism” and in favour of increasing the value of catches within sustainable production limits. To achieve this, the main ways forward include:

- strong national political will to support successful fisheries management;
- international cooperation that creates and develops the skills and means for

developing countries to implement appropriate, collaborative fisheries management on an enduring and self-perpetuating basis; and

- international cooperation that engages developing countries and expands regional cooperation for fisheries management.

4. Conclusion

Capture fisheries have reached their maximum productive capacity in the face of ever increasing demands for fishery products, and with fish providing at least 20% of animal protein intake for approximately 1.5 billion people or at least 15% for about 3.0 billion people in our world, it is all the more critical that fisheries management is both efficient and effective.

Global understanding of fisheries resources and their environment continues to expand, and the way in which the world thinks about fisheries resources is becoming increasingly complex, and our society is increasingly demanding that fisheries management be more sophisticated in conserving ecosystem integrity.

As the world shifts from the old productivism paradigm to one of responsible fisheries management, it is imperative that we balance between viable utilization and conservation. The “inexhaustibility” of the oceans is still a pervasive idea that needs to be replaced by the recognition that there is a need to severely restrict access to these resources if they are to sustainably generate wealth and to alleviate poverty.

Management of fishery resources have been highly problematic largely due to inef-

fective institutions and governance, conflicting objectives, and weak user rights. Nonetheless, we are beginning to meet the challenge of establishing adequate institutions and creating governance and management systems that can complement increasingly global market forces and the incentives that fishermen around the world face on a daily basis. The importance of clear fishing rights has been emphasized strongly in recent years, and countries now need to set in action the political process of resource allocation.

The way forward will be challenging, but it can result in fisheries that create wealth and contribute to food security and are part of sustainable patterns of consumption and production, and FAO will continue working to implement solutions for creating sustainable fisheries that are at peace with humanity's claims on them.

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References

- Cochrane KL, Douman D. The rising tide of fisheries instruments and the struggle to keep afloat. *Phil. Trans. R. Soc. B* 2005; **360**: 77–94.
- Cochrane KL, Augustyn CJ, Bianchi G, de Barros P, Fairweather T, Iitembu J, Japp D, Kanandjembo A, Kilongo K, Moroff N, Nel D, Roux J-P, Shannon LJ, van Zyl B, Vaz Velho F. Results and conclusions of

- the project "Ecosystem approaches for fisheries management in the Benguela Current Large Marine Ecosystem". FAO Fisheries Circular 1026. FAO, Rome. 2007; 167 pp.
- FAO. Code of Conduct for Responsible Fisheries. FAO, Rome. 1995; 41 pp.
- FAO. The ecosystem approach to fisheries. FAO technical guidelines for responsible fisheries. 4, Supplement 2. FAO, Rome. 2003.
- FAO. The State of World Fisheries and Aquaculture 2004. FAO. 2005a; 153 pp.
- FAO. Guidelines for the Ecolabelling of Fish and Fishery Products from Marine Capture Fisheries. FAO, Rome. 2005b; 90 pp.
- FAO. Putting into practice the ecosystem approach to fisheries. FAO, Rome. 2005c; 76 pp.
- FAO. The state of world highly migratory, straddling and other high seas fishery resources and associated species. *In*: Maguire J-J, Sissenwine M, Csirke J, Grainger R, Garcia S. FAO Fisheries Technical Paper. No. 495. FAO, Rome. 2006; 17, 30, 43.
- FAO. The State of World Fisheries and Aquaculture 2006. FAO, Rome. 2007; 162 pp.
- Fletcher WJ, Chesson J, Sainsbury KJ, Hundloe TJ, Fisher M. A flexible and practical framework for reporting on ecologically sustainable development for wild capture fisheries. *Fish. Res.* 2005; **71**: 175-183.
- Fluharty D. Evolving ecosystem approaches to management of fisheries in the USA. *Mar. Ecol. Prog. Ser.* 2005; **300**: 241-296.
- Garcia SM, Grainger RJR. Doom and gloom? The future of marine capture fisheries. *Phil. Trans. R. Soc. B* 2005; **360**: 21-46.
- Gréboval D (comp). Report and Documentation of the International Workshop on Factors Contributing to Unsustainability and Overexploitation in Fisheries. Bangkok, Thailand, 4-8 February 2002. FAO Fisheries Report. No. 672. FAO, Rome. 2002; 173 pp.
- Hilborn R. Moving to sustainability by learning from successful fisheries. *Ambio* 2007; **4**: 296-303.
- Jentoft S. *Sizing Up: Property Rights and Fisheries Management: A collection of articles from SAMUDRA Report*. ICSF. 2007; 92-93.
- Jentoft S. Legitimacy and disappointment in Fisheries Management. *Marine Policy* 2000; **24**: 141-148.
- Jentoft S, Mikalsen K, Hernes H-K. Representation in Fisheries Co-management. *In*: Wilson D, Nielsen JR, Degnbol P (eds). *The Fisheries Co-management Experience: Accomplishments, Challenges and Prospects*. Kluwer, Dordrecht. 2002; 281-292.
- Mace P. In defence of fisheries scientists, single species models and other scapegoats: confronting the real problems. *Mar. Ecol. Prog. Ser.* 2004; **274**: 285-291.
- Swan J, Gréboval D (comps). Report and Documentation of the International Workshop on the Implementation of International Fisheries Instruments and Factors of Unsustainability and Overexploitation in Fisheries. Mauritius, 2-7 February 2003. FAO Fisheries Report. No. 700. FAO, Rome. 2003; 305 pp.
- Tietze U, Haughton M, Star, SV (eds). Socio-economic indicators in integrated coastal zone and community-based fisheries. FAO Fisheries Technical Papers-T491. FAO, Rome. 2006; 208 pp.
- Valdimarsson G, Metzner R. Aligning incentives for a successful ecosystem approach to fisheries management. *Mar. Ecol. Prog. Ser.* 2005; **300**: 286-291.
- Walters C, Maguire JJ. Lessons for stock assessment from the northern cod collapse. *Rev. Fish. Biol. Fish.* 1996; **6**: 125-137.