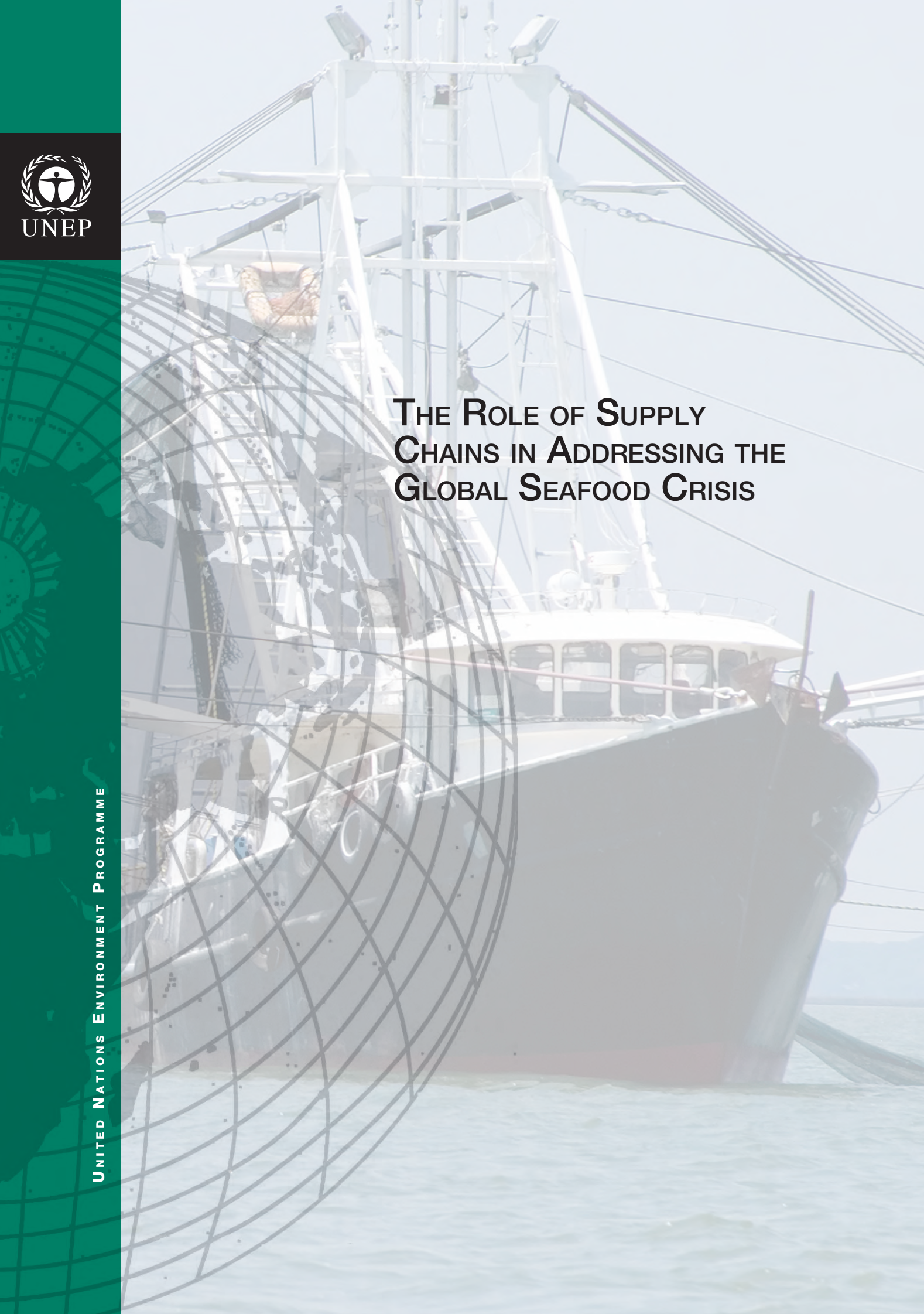

UNEP

The Role of Supply Chains in Addressing the Global Seafood Crisis

United Nations Environment Programme

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The Role of Supply Chains in Addressing the Global Seafood Crisis

Acknowledgements

This report was authored by Nancy Vallejo, Pierre Hauselmann and Rachel Asante of PIE Consulting. Preparation and publication was made possible by financial support from the Norwegian Government, which UNEP gratefully acknowledges.

The authors would like to acknowledge and thank all those who have helped with this work through comments, personal meetings or phone conversations, in particular:

Charles Arden Clarke, Cat Dorey, Erica Allis, Sophie Kuppler, Anja von Moltke, Marie-Christine Monfort, Margaret Nakato Lubyayi, Nina Thuellen and Katherine Short.

We also thank Phillip Lyndon who has edited and proof read this document.

Design and production: Steve Paveley Design

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Acronyms

4C	Common Code for the Coffee Community Association
ACP	African Caribbean and Pacific
AIPCE	Association des Industries du Poisson de l'UE
ASEP	Association Santé et Environnement Provence
B2B	Business to Business
CBI	Centre for the Promotion of Imports from Developing Countries
CBD	Convention on Biodiversity
CoC	Chain of Custody
CMI	Carrefour Merchandise International
CSR	Corporate social responsibility
DWFNs	Distant Water Fishing Nations
DTIE	United Nations Environmental Programme Division of Technology, Industry and Economics
EEZ	Exclusive Economic Zone
EU	European Union
FAO	Food and Agriculture Organization
FoS	Friend of the Sea
FSC	Forest Stewardship Council
GAA	Global Aquaculture Alliance
HACCP	Hazard Analysis and Critical Control Points
ICES	International Council for the Exploration of the Sea
IUCN	International Union for the Conservation of Nature
IUU	Illegal Unregulated and Unreported (fishing)
MCS	Marine Conservation Society
MSC	Marine Stewardship Council
NGO	Non-governmental organisation
PIC	Pacific Island Countries
PPP	Public Private Partnerships
RFA	Responsible Fishing Alliance
SCA	Seafood Choices Alliance
SME	Small and Medium Enterprises
TAC	Total Allowable Catches
UK	United Kingdom
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environmental Programme
US	United States of America
WWF	WWF World Wildlife Fund

Executive summary

Global fisheries crisis, international trade and consumption trends

The fish and fish products sector is facing a crisis of global dimensions: its primary resource – fish stocks – is collapsing. Action undertaken by governmental and intergovernmental institutions has fallen short on redressing the crisis. A number of factors associated with unsustainable consumption and production patterns have led to this situation. These include increasing consumption levels, over-fishing and unsustainable aquaculture, as well as the contribution of pollution and climate change.

The general depletion of wild stocks across most species and the growing worldwide demand has resulted in a significant increase of aquaculture in the global supply of fish and fish products. Aquaculture is expected to provide about half of all production within a relatively short time but has become part of the problem rather than the solution.

All organisations concur in their diagnosis that most of the internationally traded major fish species now range from fully exploited to depleted. Of a total production of 27.7 million tonnes of the top ten traded species, 20.5 million tonnes (or 74%) are categorised as fully to over-exploited, while the remaining 7.2 million tonnes are classified as fully exploited. Seven percent of all fish stocks are classified as depleted. Europe, Japan and the United States represent the three most important markets for fish and fish products with about 80% of total imports. In the face of growing consumer demand and stagnant local production, these three countries are dependent on imports.

However, besides fish availability, developed countries have more stringent market access requirements relating to consumer health and safety, environmental and social issues and quality. These requirements are derived from regulations or voluntary mechanisms which are likely to become more and more demanding. This poses special challenges for artisanal and small producers needing to access international markets. Large producers and processors will continue to take a growing part of international markets at the expense of smaller ones.

In terms of consumption, there is a difference between that of developed and developing countries. Consumers in developed countries tend to prefer fish that is high in the food chain, which is having a negative impact on aquaculture with, in many circumstances, more fishmeal being consumed than fish farmed. This increases the pressure on wild fish stocks.

In terms of consumers' sustainability awareness, media reports on threatened fish species (such as bluefin tuna, and North Sea cod) in European waters, have led to a growing awareness by European consumers concerning the sustainability of fish products. This issue has mainly been driven by environmental NGOs using a variety of tools including eco labelling, lobbying of consumers outside supermarkets, press releases and publications and the promotion of sustainable fish guides aimed at consumers.

However it is not so much consumers' environmental concerns that make the difference, but instead the fact that this is translated into the purchasing decisions of most major brands. As experience shows across sectors, whether a brand buys and sells products labelled under a certification scheme has always been one of the main drivers behind the success of that label.

Sustainability issues in fish supply chains

One of the effects of globalisation is the rapid transformation of the corporate world to attaching major importance to supply chain management as a key tool in improving operational efficiency

worldwide. Companies are setting and controlling strict quality standards, to now include environmental and social aspects as part of their purchasing requirements, up and down-stream. As these aspects are not measurable on the product itself, their control, be it by the company itself or through a second or third party scheme, requires that the information moves with the product, across the production, processing and distribution phases.

Traceability, i.e. the capacity to follow a product from its origin to the shelves, incorporates the two elements mentioned above (i.e. increased supply chain management and consumers' ethical awareness translated into the purchasing decisions of companies). By creating a recorded chain of events and places a product has gone through, traceability is the fundamental engine that allows:

- a response to legal requirements in terms of food safety;
- the transmission of information regarding social and environmental aspects of the production; and
- proof that related requirements are fulfilled.

Analysis of diverse supply chains shows that they follow a general pattern, regardless of product and regional location. Using this information, specific and generic maps of supply chains in the fisheries sector have been drawn. Using these maps, chains can be compared. Comparisons have been drawn for the examples shown below:

- Icelandic cod;
- Lake Victoria Nile perch;
- Thai tuna; and
- Anchovies from Morocco.

Included with each supply chain map are the relevant value chain information and sustainability issues specific to the fish species. This information has then been used to develop an analytical tool to identify where action can be taken to alleviate barriers to sustainability within the supply chain.

Most sustainability issues such as ill-adapted governance and institutions, open access, unfair fishing, Illegal Unregulated and Unreported fishing (IUU), bad working conditions, lack of price transparency and information sharing etc, are concentrated at the level of production and first intermediaries/processors. The consuming side of the chain (i.e. companies selling to consumers and consumers themselves) has a strong responsibility for the un-sustainability of the production and has reacted late. Now that it is starting to react, it cannot do so properly because the information simply does not flow due to the lack of traceability.

Thus, **traceability is a crucial and fundamental component for sustainable supply chains** – although traceability in itself is not sustainability. Organisations willing to implement social corporate responsibility programmes and promote them are thus dependent on reliable traceability systems.

Retailers and the food service provider policies

Retailers and the food service sector are well aware of the sustainability issues in their trade, alongside the growing expectations of consumers. Some have developed policies towards sustainable sourcing, but are faced with huge difficulties in implementing them. Possibly as a result of this situation, they are not very open about sharing concrete information regarding either the details of the policies or where they stand in the implementation.

Retailers, being at the end of the chain prior to final consumers, are also faced with the need for, but absence of, full traceability. Without being able to reliably identify the sustainability of the fish and fish products they sell, they are now starting to rely on certification as a tool. They have also started to develop specific projects trying to partially address this issue, for example, Carrefour's Katosi Women's project on Lake Victoria in Uganda which is attempting to provide alternative revenue for local fishers.

Leveraging change

As traceability requires significant resources, it may not be achievable for some small fish producers. The fish market may become divided into those who already offer traceability, those who could achieve it with some incentive/help and those who will never be able to achieve it.

Market and finance tools that address sustainability issues through the supply chain fall in to four types:

- certification;
- business-to-business claims;
- public and private partnerships (PPPs); and
- responsible investment.

Each has different benefits for different segments of the fishing industry.

Certification may be well adapted for large organisations, which can already provide traceability, at least from the landing point onwards. However, it may not have the flexibility to promote improvement for small and medium sized enterprises (SMEs). Business-to-business (B2B) claims have this flexibility and could be usefully combined with certification to promote a progressive implementation of sustainability requirements. Public Private Partnerships (PPPs) could have a broader impact by increasing the scale of specific initiatives. Responsible finance would need to be provided for the fishery sector which could provide the opportunity to adapt existing guidelines to suit smaller operations.

Small artisanal fishers who cannot adapt to market requirements, notably the traceability requirements, may be doomed to vanish from lucrative markets. Should they disappear, then resources would be required to find new long-term livelihoods for these people, instead of perpetuating an un-sustainable situation.

In a relatively short time, the following instruments would be needed to help provide a sustainable supply chain:

- A method to determine whether organisations would best benefit from capacity building in relation to fishing or to changing revenue patterns.
- Traceability methods that allow tracing fish from the fishing point to the shelves and are SME friendly at the same time.
- A progressive approach to certification linked to some market benefits that can be based on a B2B approach.
- Guidelines for responsible investment practices.

Additionally, consistent with sound natural resource management practice, the promotion of an ecosystem approach in managing fisheries would greatly support any tool that improves sustainability.

A global partnership that could be convened by UNEP is the first step to achieving a movement towards sustainability. Such a collaboration would need to be accepted by all to ensure significant progress. There are numerous examples of such partnerships with some more successful than others. The Common Code for the Coffee Community and the Union for Ethical BioTrade provide good examples. They are both organisations that stemmed from governmental or intergovernmental institutions, bringing together different parties and aiming to resolve specific issues related to the sustainability in their sector. Both offer B2B progressive approaches and work in collaboration with certification institutions.

Discussion on certification standards must include traceability from the start, equitable benefit sharing and access rights that are crucial in protecting SMEs and local livelihoods. A further recommendation is that any discussions about fisheries should encompass the topic of aquaculture as capture fisheries depend directly on the capacity of aquaculture to provide sustainable fish products without adding to the burden on the oceans.

1

Introduction

1 Introduction

The last two decades have seen a deepening of the fish crisis. Action taken by governments at the national, regional and multilateral levels for the management and control of the marine and inland water ecosystem and restoration of fish stocks, as well as for the implementation of instruments such as the UN Fish Stock Agreement, the FAO Code of Conduct for Responsible Fisheries, the Johannesburg Plan of Implementation of the World Summit on Sustainable Development and the Millennium Development Goals, has fallen short in arresting the decline in fish stocks.

FAO (2006a) data confirms that approximately 75% of fish species with commercial value have been overexploited and some are close to extinction. 52% of commercial stocks are fully exploited, i.e. they are at or near their maximum sustainability production levels. 25% more are in very bad condition: 17% are overexploited and 7% are depleted. Only 1% is recovering from depletion.

The sheer complexity of the issues make it impossible to tackle them with a single approach. As the depth of the crisis demonstrates, regulatory frameworks, while absolutely essential, have failed to resolve the issue. If producers all along the supply chain do not also take complementary action, this crisis may lead to a collapse of all major commercial fish stocks.

In this context, UNEP's Division of Technology, Economics and Industry (DTIE) is implementing a project to assist and strengthen the ability of governments and stakeholders to promote the sustainable management of fisheries, as well as contribute to poverty reduction. In order to enhance the understanding of global fisheries supply chains, Pi has been tasked with identifying the barriers to establishing sustainable fisheries supply chains, as well as highlighting the action required to overcome them.

This document is based on the research and revision of secondary information and case studies about fisheries supply chains. The identification of key issues in the supply chain was initially envisaged through communicating with, and involvement of, some of the main retailers, to gain a working knowledge of their supply chains. Due to their reluctance to provide information on their supply chain beyond the general background policy information readily available on the internet, (a situation that is reviewed further in this document) the focus was switched to analysing existing studies on supply chains originating at the producers or harvesters' level rather than that of the retailers.

Chapter two sets out the main issues on the sustainability of fish and fish products, summarising current information on the collapse of commercial fish stocks and identifying – through a problem tree – the links and interrelations among underlying causes, main constraints and potential impacts. As well as describing the current situation with respect to the growth of international markets, chapter two correlates production and consumption of key traded species with their stock status. It also presents the trends in production and consumption, as well as the trends in sustainability awareness.

Chapter three discusses the fisheries supply chains situation in the context of globalisation. Based on the comparison of different chains, a generic pattern for analytical purposes is suggested. It also identifies what and where the common sustainability issues at the supply chain level are and highlights traceability as a crucial and fundamental component of sustainable supply chains.

Chapter four focuses on the role of buyers and consumers within the supply chain in addressing sustainability issues. It identifies key buyers' risks

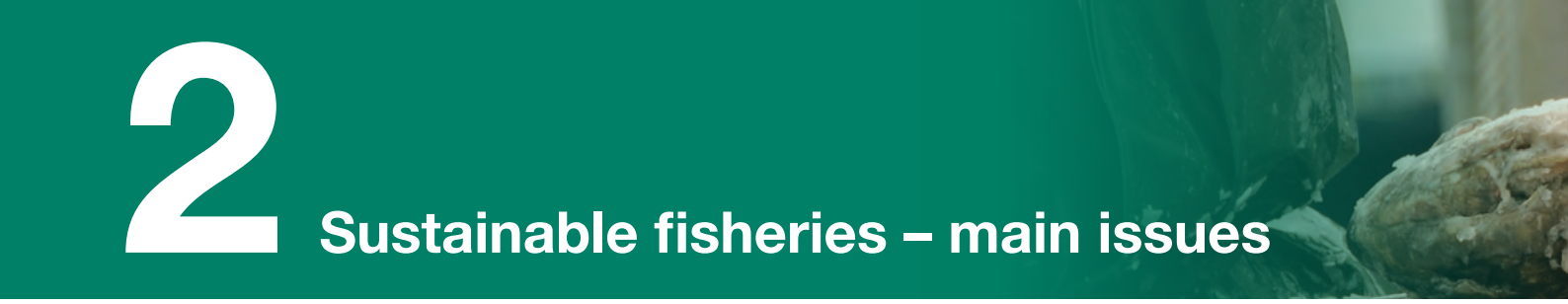
and concerns on the global fish crisis and how important it is for them to respond to consumers' sustainability awareness. It also emphasises the role of NGOs as opinion-formers in encouraging buyers to develop and/or improve sustainable seafood policies. Major retailers' initiatives such us those of Wal-Mart and Carrefour are discussed.

Chapter five is the concluding chapter that pulls together key aspects from the previous chapters to offer recommendations and discuss the role that instruments such as certification, B2B relations, responsible investments, private/public partnerships can play in leveraging change for addressing the global ocean crisis.

2

Sustainable fisheries – main issues

2 Sustainable fisheries – main issues



2.1 Collapsing stocks

The fish and fish products sector is facing a crisis of global dimensions: its primary resource, fish stocks, is collapsing. A number of factors related to unsustainable consumption and production patterns have led to this situation. These include increasing consumption levels, overfishing and unsustainable aquaculture. This situation is exacerbated by non-sector specific elements leading to important habitat destruction such as climate change and urbanisation of coasts. Diagram 1 – *Fish stocks collapse problem tree*, on p16, shows that the main constraints are interconnected and that consumption plays a central role, both as a factor in itself and by amplifying the other constraints.

One issue of particular concern internationally is the condition of stocks of fish species in high seas areas, outside national jurisdictions. In the case of straddling stocks[1] and highly migratory species (e.g. sharks), more than half of the stocks, and 66% of high-seas stocks are either overexploited or depleted. This includes species such as hake, Atlantic cod, Atlantic halibut, orange roughy, basking shark and bluefin tuna (FAO, 2007a). Recent research (Worm, B. *et al*, 2006) on the role of biodiversity in marine ecosystems has even projected, based on historical analysis of existing data, the collapse of all marine fish stocks by the year 2048. Collapse, defined by the report as a decline to less than 10% of their maximum observed numbers) seems to accelerate because different regions become low in biodiversity due to the cascading effect that the weakening of one species has on the others.

The underlying causes of the crisis are complex, but they have been clearly identified:

1. **Poor fisheries management and lack of ecosystem-based approach leading to over fishing**, largely due to excessive fishing efforts and overcapacity, technological improvements and quotas that are either unsustainable or uncontrolled, among others. This situation is fuelled by an excessive processing capacity in some regions and a high and increasing consumption demand.

2. **Subsidy policies**, particularly those that result in overcapacity of industrial fishing fleets (typically in the developed world) and processors (typically in the developing world and often the result of development aid programmes).

3. **Unsustainable fishing practices**, (e.g. bottom trawling) that are non selective, destroy natural ecosystems and waste species, unprecedented levels of by-catch, and discard of non-target species, including many juveniles.

4. **Illegal, unauthorised and/or undeclared fishing (IUU)** in key fishing areas, including those where control is difficult because they are located beyond national jurisdictions.

5. **Unfair fishing**: Many industrial fishing fleets from developed countries fish under the much criticised Fisheries Partnerships Agreements or even illegally – in territorial waters of developing countries.

Despite increased fishing efforts, annual catches are stable or even diminishing. However, global consumption increases. From a worldwide average of 9kg per person in 1961, fish and fish product consumption has climbed to 16.5kg in 2003. This increase is absorbed by aquaculture, which today produces 45% of human consumption (FAO, 2007b). This represents the largest food

[1] Straddling stocks are stocks of fish such as pollock, which migrate between, or occur in both, the economic exclusive zone (EEZ) of one or more States and the high seas. UN Atlas of the Oceans (http://www.oceansatlas.org)

consumption increase at a global level, across sectors (FAO, 2006b).

Although aquaculture is often presented as the panacea for satisfying the growing fish demand, many organisations, including NGOs such as the WWF (undated) and Greenpeace (2008a) have reservations about whether aquaculture is indeed a solution if urgent action is not taken to resolve the negative environmental and social impacts that have resulted.

Unsustainable aquaculture practices are having important implications for marine and coastal biodiversity at the genetic, species and ecosystem, as well as human, levels. This includes:

- **Habitat degradation and destruction** such as mangroves and coastal wetlands
- **Disruption of trophic systems** by the introduction of alien species
- **Depletion of natural seed** stock by the collection of wild juveniles of target and non-target species
- **Transmission of diseases and parasites, pollution** with the chemicals used for control, as well as **nutrient pollution** by organic wastes
- **Reduction of genetic variability** of wild populations by inbreeding with escaped farmed individuals and transgenic escaped fish
- **Increased pressure on wild stocks** to produce fishmeal and fish oil, with net protein lost (it requires more fish to produce fishmeal for each fish farmed)
- **Depletion and salinisation of potable water**
- **Human rights abuses**

FAO (2006c) is particularly concerned that the speed of growth in aquaculture could taper off if governments and development agencies don't adjust their policies to respond to the challenges that threaten to dampen the sector's future growth.

Because the development of aquaculture is largely due to the incapacity of capture fisheries to satisfy consumption and because it has itself an important impact on wild stocks, it is difficult to analyse the situation of capture fisheries without considering the issues surrounding aquaculture. Figure 1 – *Evolution of world production and the growing part of aquaculture over the last 55 years*, on p18, shows the increasing part of aquaculture in overall fish production. Areas with high consumption but low fish stocks such as Europe are increasingly looking towards regions like Africa to source fish. This trade is another major challenge to sustainable production.

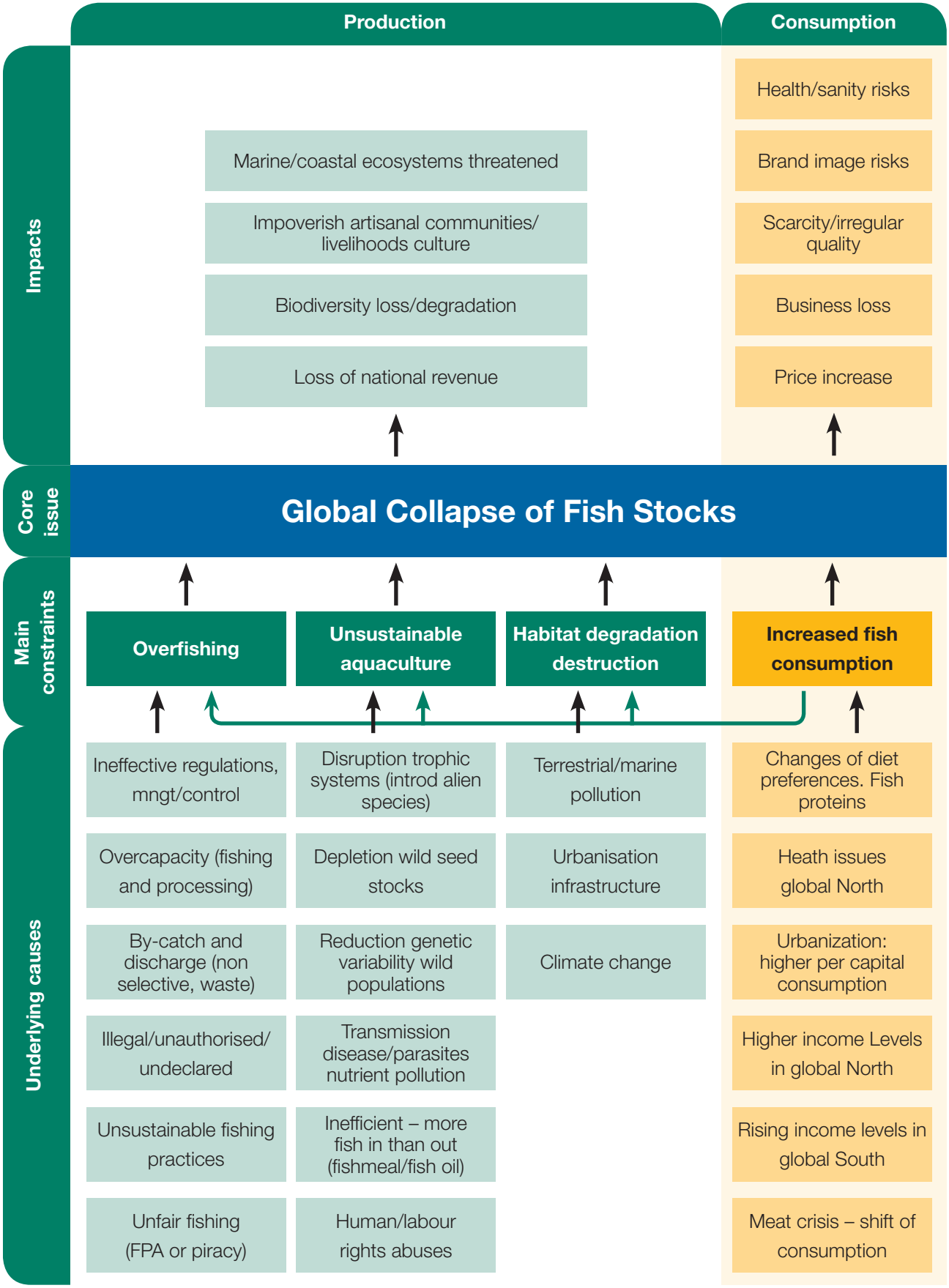
2.2 Increasing international markets

Despite the critical state of global commercial fish stocks, the international fish trade continues to increase, reflecting the increasing popularity in fish consumption world-wide. According to estimates, 38% of fish production (capture and aquaculture combined) enters international markets. Fish captures in the wild have reached a record high of 95 million tonnes a year, with 85.8 million tonnes coming from marine fisheries and 9.2 million tonnes from inland fisheries (FAO, 2007a).

The last decades have seen a steady growth in global per capita fish consumption, which increased from 11.5kg in the 1970s to 14.8kg in the 1990s. In 2007, these figures had risen to 17.4kg (FAO, 2007b). One of the factors in the growth of global fish consumption has been the influence of China, with a per capita fish consumption of less than 5kg in the 1970s to a 2007 per capita consumption of 26kg and a population of around 1.3 billion people. Fish contributes to up to 54 per cent of people's protein intake in Asian countries. Areas with high consumption but decreasing fish stocks such as Europe are increasingly looking towards regions

2 Sustainable fisheries – main issues

Diagram 1: Fish stocks collapse problem tree



like Africa, where consumption and production are currently low, to source their fish. This adds dangerously to the increased pressure caused by local population growth.

According to FAO (2007a), global fisheries production (marine and inland capture fisheries plus fish farming) totals 141.6 million tonnes annually (see Table 1). Around 105.6 million tonnes of this (75%) are used for direct human consumption; the rest is used for non-food products, in particular the manufacture of fishmeal and oil.

Developing countries share 48% by value and 57% by quantity of exports. With net export revenues of around the US $ 20 billion in 2004, this makes fish and fishery products the largest source of food commodities revenues for them, before rice, coffee or tea (FAO, 2006d).

As mentioned above, the increasing fish consumption in a context of over exploitation and dwindling fish stocks has encouraged the rise in aquaculture. According to FAO (2007b), while in 1980 just 9% of the fish consumed by humans came from aquaculture, in 2007, it accounted for over 36% of total fish production and 45% of food fish supply. By 2015, it is predicted that the supply of food fish from aquaculture will be equal to that of capture fisheries (Huang et al, 2007).

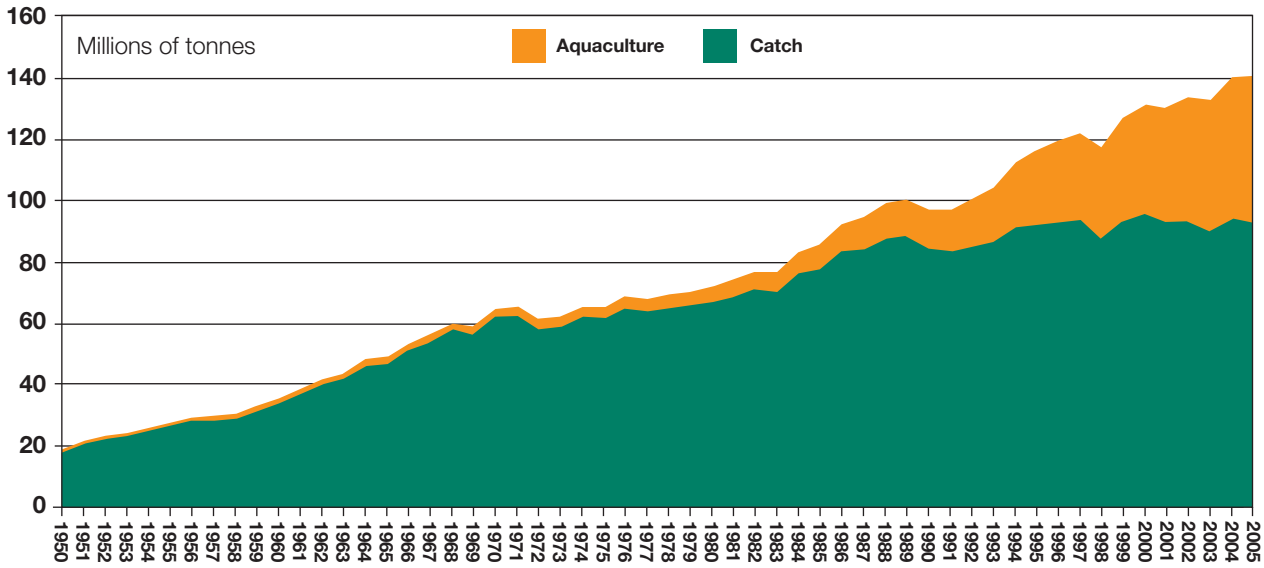
Over the last three decades, both in terms of quantity and relative contribution to world fish supply, aquaculture is considered the world's fastest growing food production sector. Global aquaculture production reached 47 million tonnes in 2005 – 18.9 million tonnes of marine and 28.9 tonnes of freshwater aquaculture (FAO, 2006a).

Table 1: World fish market at a glance (FAO, 2007b)

WORLD BALANCE	**2005**	**2006** *estim.*	**2007** *f'cast*	**Change: 2007 over 2006**
	million tonnes			%
Production	**141**	**141**	**143**	**1.4**
Capture fisheries	93	91	91	0.0
Aquaculture	48	50	52	4.0
Trade **value** (exports billion US$)	78	86	93	8.1
Trade **volume** (live weight)	57	55	54	-1.6
Total utilisation				
Food	108	112	115	2.6
Feed	23	18	17	-5.6
Other uses	10	11	11	0.0
SUPPLY AND DEMAND INDICATORS **Per capita food consumption**				
Food fish *(kg/year)*	16.7	17.2	17.4	1.2
From capture fisheries *(kg/year)*	9.3	9.5	9.5	0.0
From aquaculture *(kg/year)*	7.4	7.7	7.9	2.6

2 Sustainable fisheries – main issues

Figure 1: Evolution of world production and the growing part of aquaculture over the last 55 years



Source: FAO FISHSTAT 2007

Traditionally, the most popular species for aquaculture tended to be those at the lower end of the food chain, such as shellfish, carp, and herbivorous fish, which is still generally true for developing countries. However, the more demanding developed countries' markets are now asking for species located higher up the food chain, such as shrimp, salmon and marine finfish, thus creating severe pressure on wild stocks that are now increasingly captured for processing into feed for aquaculture. Juveniles or larvae are also often captured in the wild for regeneration. There is, therefore, a kind of vicious circle by which farming, which should alleviate the pressure on wild stocks, actually increases this pressure. All these elements mean that two thirds of total fish production is still provided by capture fisheries.

Different organisations, including FAO (2006a), Greenpeace (2005), WWF (2007b), the Seafood Choice Alliance (2008) and Centre for the Promotion of Imports from Developing Countries (CBI) (2007) categorise most of the major species internationally traded ranging from fully exploited to depleted. Generally speaking, all concur in their diagnosis. As an example, the evaluation of FAO, as the official reference for stock status, and Greenpeace, as possibly the most visibly active NGO regarding capture fisheries, is summarised in Table 2 on p19. The ranking is based on the proportion of total export value. It shows the correlation between production, sustainability issues and consumption. This connection is further illustrated by comparing Table 2 with Figure 2 – *Top 10 marine species*. It is difficult to split the data between capture fisheries and aquaculture, to draw precise quantitative conclusions.

It is important to note that Table 2 aggregates farming and capture numbers when they indicate the share of species compared to overall export value of fish products. The proportion varies from one species to the next; for example, the quantity of farmed shrimp is high, while farmed Atlantic cod is nearly non-existent. In terms of the status of fishery stocks there is often disagreement between respected organisations such as FAO

Table 2: Main species (in terms of export value) and stock status (2004)

Major species exported		Part of total export value	Stock status estimated by FAO	Stock status estimated by Greenpeace
Shrimp		18%	Shrimp/prawn stocks in Eastern Indian Ocean fully to over-exploited. Northeast Atlantic prawns fully exploited.	Not given. However damage to seafloor habitats and excessive by-catch caused by trawling are highlighted.
Groundfish	**Atlantic cod**		Northwestern Atlantic stocks depleted. Northeastern Atlantic stocks over-exploited to depleted	Icelandic and Barents Sea stock in good condition. North eastern Atlantic in poor condition.
	Pollock	11%	Fully to over exploited. Northwest Pacific fully-exploited. Northeast Pacific fully-exploited.	Aleutian chain and Bogoslof area have not recovered from overfishing.
	Haddock		North eastern Atlantic stocks over-exploited to depleted.	Some stocks improving but many are over-exploited. IUCN listed as vulnerable
	Other		Stocks fully exploited and depleted	General information not given.
Salmon		9%	Northeast Atlantic fully-exploited to depleted. Northeast Pacific fully to over-exploited	Atlantic salmon severely depleted. Pacific Alaskan stocks healthy. Northwest Pacific stocks depleted.
Tuna		8%	Bluefin tuna in Mediterranean, Atlantic Indian and Pacific Oceans depleted. Atlantic Ocean stocks over-exploited to depleted. Only yellowfin stocks in West and Central Pacific not over-fished	In general fully-exploited with many overfished. Bigeye, southern and northern bluefin tuna are listed on IUCN's red list of threatened species. Only West and Central Pacific stocks not over fished.
Small pelagic		5%	In general fully-exploited to depleted. Peruvian anchovy: recovering to over-exploited.	Peruvian stock overfished. South Brittany, north and west. Spain overfished, critical. Portuguese stocks unknown.
Mollusks and crustaceans		5%	In general from fully exploited to over-exploited. E.g.: • Octopus stocks in the Eastern Atlantic Ocean overex-ploited • American lobster and Caribbean spiny lobster fully ex-ploited to over-exploited	Insufficient information to provide general picture.

Sources: FAO 2005 *Review of the state of world marine fisheries resources*. FAO Rome; Greenpeace, 2005. *A recipe for disaster*; and Greenpeace, 2008b. *Carting away the oceans: How grocery stores are emptying the seas*

2 Sustainable fisheries – main issues

and Greenpeace as highlighted in Table 2. Precise aggregated numbers are very difficult to provide, as Box 1 – *Wild catch versus farming in the shrimp sector*, below, shows. However the stock status refers to wild stocks.

The top 10 marine species caught at the global level are shown in Figure 2. With a production of about 10.2 million tonnes, Anchoveta from Peru and Chile are by far the most caught.

It is important to note that, of a total production of 27.7 million tonnes of the top ten species, 20.5 million tonnes (or 74%) are categorised as fully to over-exploited, while the remaining 7.2 million tonnes are classified as fully exploited.

There is a clear correlation between the main species and the main producing countries. It is not surprising, as shown by Table 3 on p22, that the top 10 species also rank high in the production of the main export countries. Thus, a grim picture is presented by Table 2 and Figure 2, depicting a very serious situation in sustainability terms. It proves, by comparing it with the production of the top 10 producing countries (Table 3 – *Top ten countries suppliers and total production*), a worrying economic issue as well as a threat to the resource availability in developing countries.

Table 3 shows also that the distribution of fish production is divided between China and the rest

Box 1: Wild catch versus farming in the shrimp sector

In **Ecuador**, around 90% of shrimp production is based on aquaculture. The remainder is caught in Pacific waters (Ecuador export, undated).

In 2004, total **Thai** marine capture value was 2,653 thousand tonnes of which 3% were shrimp, (i.e. 79.6 thousand metric tonnes).

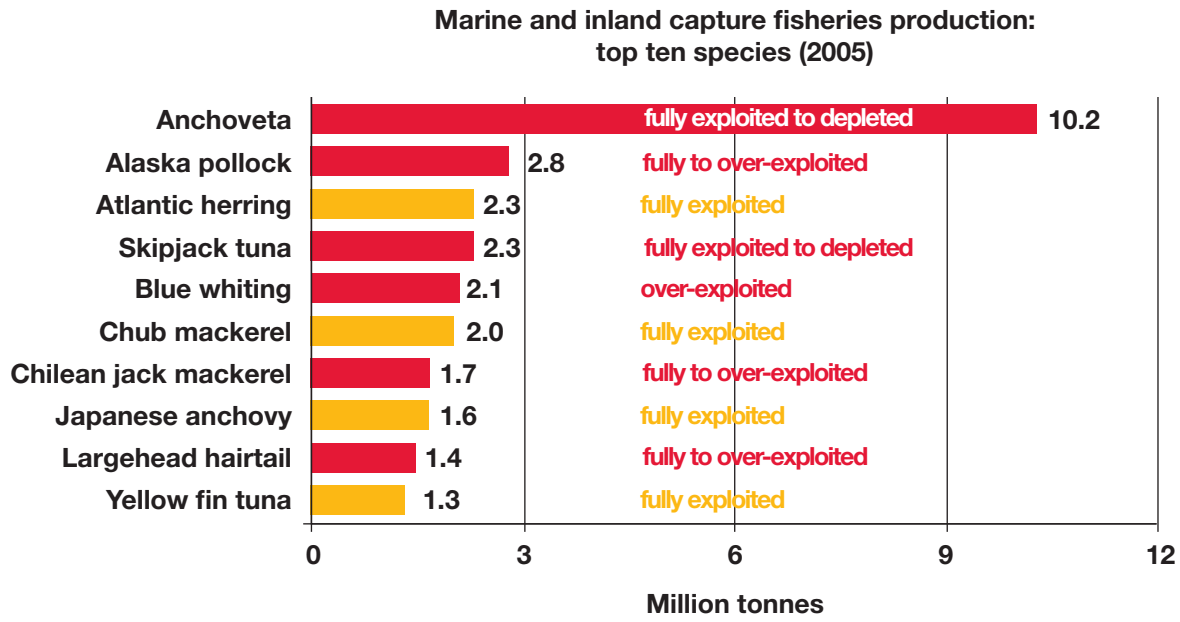
In the same year, brackish water culture production was 736 thousand tonnes, less than one-third of marine capture production. Almost half (49%) of this production was shrimp (i.e. 360 thousand tonnes) (Pupphavesa, et al, 2007). Two issues must be addressed when analysing shrimp production figures in relation to aquaculture and wild harvesting. Firstly, wild harvest figures do not include eggs and larvae harvested as input into the shrimp aquaculture process. Also, countries like Thailand are unable to produce the amount of shrimp needed for export and therefore may import shrimp for further processing. Whether these imported shrimps come from wild capture or aquaculture is unclear.

In 2005, wild catch shrimp accounted for 40% of the total **Indonesian** shrimp production (USDA, 2007b).

In 2004, 64% of **Chinese** aquatic production came from aquaculture (Glitnir, 2006a). In 2005, according to FAO data, China produced 624,000 tonnes of farmed shrimp (INFOFISH, 2007e). In the same year, wild catch shrimp totalled around 970,000 tonnes (FAO, undated).

In 2006, aquaculture was responsible for 77.2% of **Vietnam's** shrimp production at 354.6 thousand tonnes compared with 104.7 thousand tonnes of wild capture shrimp (USDA, 2007d).

Figure 2: Top 10 marine species



Based on: FAO, 2006a. State of the World Fisheries and Aquaculture, Rome and FAO FISHSTAT 2007

of the world. The division being fairly even among this last group and Peru standing in the middle.

Europe does not figure amongst the top ten producers, as it is not a single country. It represents only 4% of world production, or 5.9 million tonnes of capture fishery, down from 6.9 million tonnes in 2001. Capture fisheries have been falling for more than 10 years in the EU (CBI, 2007) continuing a decline that started more than 10 years ago. The EU as a whole is the third global producer after China and Peru. In 2005, marine and inland capture represented 82% of total EU fish production in 2005.

The most important species in capture fisheries are herring (15% of total capture in 2005), European sprat (12%), blue whiting (8%), Atlantic mackerel (5%) and European Pilchard (7% each) (CBI, 2007). Fish catches depend on Total Allowable Catches (TAC) established by the European Council. It is expected that TAC will continue to be reduced as European fish stocks are overexploited and will need a long time to recuperate, if they do it at all.

In 2005, EU exports reached 15.7 billion Euros for 5.2 million tonnes. Denmark, Spain and Netherlands are the top exporters (CBI, 2007).

Three markets dominate the global fish trade in terms of consumption: the European Union, Japan and the United States (see Table 5). Together they represent two-thirds of all imports. Growing consumption, except in Japan, alongside stagnant domestic supplies, have led to a reliance on imports to meet domestic demand. This demand, added to the emergence of new important consumers such as China, may create an incentive for overfishing in other countries.

2 Sustainable fisheries – main issues

Table 3: Top ten countries suppliers and total production

Country (2005)	million tonnes	Main Species
China	17.1	Hairtail, yellowfin tuna, herring and shrimp.
Peru	9.4	Pelagic species mainly anchovies, sardines and Jack mackerel, and demersal as hake
US	4.9	Pollock, menhaden, and salmon
Indonesia	4.4	Tuna and Shrimp
Chile	4.3	Anchovy, herring and Chilean jack mackerel.
Japan	4.1	Trout, sweet smelt carp and eel
India	3.5	Sardines, mackerel and shrimps
Russia	3.2	Alaskan pollock, Pacific herring, blue whiting and Atlantic cod
Thailand	2.6	Sardinella, anchovy and mackerel.
Norway	2.4	Cod, blue whiting and herring

Source: FAO FISHSTAT 2007

In this context, international trade has been found (Béné, et al, 2007) to have had negative impacts on fish resources in several developing countries such as Brazil, Chile, Fiji, Ghana, Kenya, Namibia, Nicaragua, Senegal, Sri Lanka, the Philippines and Thailand. The need for more effective management regimes is highlighted to prevent the potential negative impact on food security. In some of those countries, this crisis has led to the development of aquaculture in which some are now taking a leading role.

Europe

The EU represents the largest single market for imported fish and fish products. As with the rest of the world, seafood consumption is increasing. It is a net importer, with an estimated consumption of 11 million tonnes (live weight) in 2005, representing 10% of the global fish supply. Between 2004 and 2006, the import value increased by 23%, reaching 28.3 billion Euros in 2006, while volumes increased by only 7% in the same period, to 8.5 million tonnes (CBI, 2007).

The fact that the EU is an amalgamation of different countries is reflected in the fish imports of various countries which are not evenly distributed

Table 4: EU seafood production 2005
(1,000 tonnes)

Country	Total	Capture	Aquaculture
Spain	1,070	848	22
Denmark	950	911	39
United Kingdom	842	669	173
France	833	574	258
Netherlands	617	549	68
Italy	479	298	181
Germany	330	286	45
Ireland	323	263	60
Sweden	262	256	6
Portugal	218	212	6
Total	**5,924**	**4,866**	**858**

Source: CBI, 2007.

Table 5: Major importers of fish and fishery products

Country/Region	Import as a % of world imports	
	Volume (2006)	Value (2006)
European Union	10%	27%
Japan	8%	18%
United States	6%	18%
China	33%	6%
Others	37%	31%

Source: FAO, 2007b *Fish and fishery products. FAO food outlook global market analysis*.

between member countries. In 2006, five countries accounted for the two thirds of EU imports: Spain (18%) France (14%), Italy (13%), United Kingdom and Germany (each accounting for 10%). 45% of imports were intra-EU, while 33% came from developing countries.

Table 6 – *Major EU products imported, suppliers and stock status* on p24, parallels Table 2 – *Main species (in terms of export value) and stock status (2004)*, on p19. In Table 2, the distinction between aquaculture and wild capture is difficult to establish. The stock status columns describe more specifically the situation in the supplying countries.

Norway is the main supplier of fish and fishery products to the EU, particularly chilled and fresh salmon. Iceland export products to the EU are cod, salted, in brine and frozen fillets. The other major suppliers, ranked in descending order of importance, are China, United States, Morocco, Thailand, Chile, Ecuador, Argentina and India.

When considering regional exporters to the EU, countries from the African Caribbean and Pacific Group of States (ACP) supply nearly 35% of total EU fish imports (in value), of which 38% comes from West African countries (ICSD, 2007). This makes fisheries a crucial sector in economic relations between the EU and ACP countries.

Some seafood species are very popular throughout Europe, e.g. shrimp, tuna and salmon. However, the EU market can be broadly divided into three regions, each with particular seafood preferences:

- **Northern Europe** (including Scandinavia, UK and the Netherlands) where consumers prefer cold water species such as cod, herring, mackerel, pollock and trout. Ready made and processed meals have a strong market share.
- **Central Europe** (Germany, Austria and Poland) where consumers have less of a fish eating tradition and general preferences are less clear cut.
- **Mediterranean countries** where the most popular seafood includes hake, sardine, squid, octopus and various molluscs (CBI, 2007).

Portugal has the highest per capita consumption with 60kg per year. Demersal fish species are the most popular – cod accounted for 63% and hake for 31% in 2006 (Glitnir, 2007a). In Spain, the largest seafood consuming nation in Europe in absolute terms, tuna and hake are the most popular species, the Spanish preferring whole fish products. France may only rank fifth in European seafood consuming nations in terms of individual consumption, but its sheer size makes it the largest market for seafood in the EU. Salmon is the most popular species in France (Glitnir, 2007a).

Japan

In 2006, Japan was the largest single country market for fish (along with the US) (FAO, 2007b). However recent years have seen a decline in fish consumption which has been reflected in decreasing fish import volumes. In 2006, imports

2 Sustainable fisheries – main issues

Table 6: Major EU products imported, suppliers and stock status

Fish	Major suppliers (USDA, 2007a)	Stock status according to FAO	Stock status according to Greenpeace
Salmon	Norway Sweden Denmark (CBI, 2007)	Atlantic salmon in the Northeast Atlantic is fully exploited to depleted	Wild Atlantic salmon is seriously depleted across its entire range in Europe. In many rivers Atlantic salmon is extinct
Cod	Iceland China Denmark Norway	Atlantic cod in the North-western Atlantic depleted. North-eastern Atlantic, Atlantic cod over-exploited to depleted	Icelandic and Barents Sea stock in good condition. North eastern Atlantic in poor condition
Hake	Namibia, Argentina and Uruguay (INFOFISH, 2007a)	Argentine hake over-exploited to depleted. Senegalese hake over-exploited	South African hake sourced in southeast Atlantic have healthy stocks.
Pollock	China, US and Russian Federation (INFOFISH, 2007b)	Fully to over exploited. Northwest Pacific fully-exploited. Northeast Pacific fully exploited	US's Bering Sea healthy. Aleutian chain and Bogoslof area have not recovered from overfishing
Crustacean			
Shrimps/ prawns	Argentina Ecuador India	Giant tiger prawns stocks in Eastern Indian Ocean fully to over-exploited	Not given. However damage to seafloor habitats and excessive by-catch caused by trawling are highlighted.
Crabs	US Canada	Stocks in the North-east Pacific fully exploited	Stocks not assessed by ICES and Greenpeace. However, it is highlighted that many crab populations are over-fished and reduced to unsustainable levels
Lobster	US Canada	Stocks in the North-east Pacific fully exploited. Stocks in the Northwest Atlantic fully to over-exploited	Lobster stocks sourced from the Northwest Atlantic are classified as being low or unknown

Table 7: Major fisheries import items and volumes in Japan in 2006

Import item and major suppliers	Volume: 1,000 tonnes	Value: Million US $	Stock status FAO	Stock status Greenpeace
Shrimp from Vietnam, Indonesia and China	231	23.925	Stocks in Eastern Indian Ocean fully to over exploited	Not given. However damage to seafloor habitats and excessive by-catch caused by trawling are highlighted
Salmon/ trout from Chile, Russia, Norway and US	202	10.334	Atlantic cod in the North-western Atlantic depleted. North-eastern Atlantic, Atlantic cod over-exploited to depleted	Atlantic salmon wild stocks severely depleted. Pacific stocks Alaskan stocks healthy. North west Pacific stocks depleted
(Groundfish), cod from US, Russia and China (INFOFISH, 2007c)	117	4.770	Atlantic cod in the North-western Atlantic depleted. North-eastern Atlantic, Atlantic cod over-exploited to depleted	Atlantic cod overfished in US waters and seriously depleted in Canadian waters. Icelandic and Barents Sea stock in good condition
Tuna from Mediterranean, Australia, South Korea, Indonesia and China	211	22.272	Bluefin tuna stocks in Mediterranean, Atlantic Indian and Pacific Oceans depleted. Atlantic Ocean stocks of tuna over-exploited to depleted	In general, stocks are fully-exploited with many over-fished. Bigeye, southern and northern bluefin tuna are listed on the IUCN red list
Crab from Russia, China (INFOFISH, 2007d)	96	6.732	Not given in source material	Not given in source material

Source: IBPC Osaka Network Center site, 2008. *Japanese Market News: Fisheries Industry 2008*. USDA Foreign Agricultural Service, 2007c. GAIN report: *Japan Fishery products annual report*.

showed a 5.6% decrease in volume and a 3.5% decline in value from 2005 to below US$14 billion (FAO, 2007b). The average consumption of fish and fish products in Japan in 2005 was just over 12 kg per person per year (USDA, 2007c), the most popular being shrimp, salmon, trout and tuna. Figures for 2007 confirm the downward trend, with a further 5.5% drop in import value. Import volumes in 2007 reinforced the downward trend falling to below 3 million tonnes – a decline of 8.5% on the 2006 figure (FAO, 2008).

Following several tuna management programmes and fishing restrictions worldwide, global tuna landings have started to shrink but import values are moving up. Future supply shortage remains a major concern and large-scale tuna farming is being seriously considered.

2 Sustainable fisheries – main issues

Table 8: Leading US seafood imports in 2006

Import item and major suppliers	Volume: 1,000 tonnes	Value: Million US $	Stock status FAO	Stock status Greenpeace
Shrimp from Thailand (33.8% of total imports), Ecuador (11.9%) and Indonesia	590	4,115	Shrimp/prawn stocks in Eastern Indian Ocean are fully to over-exploited	Not given. However damage to seafloor habitats and excessive by-catch caused by trawling are highlighted.
Salmon from Chile (50%) and China (50%)	140	977	Atlantic salmon, North east Atlantic fully-exploited to depleted. Salmon in North-east Pacific fully to over exploited	Atlantic salmon wild stocks severely depleted. Pacific stocks, Alaskan stocks healthy. North west Pacific stocks depleted
Crabs from Canada	84	703	Stocks in the North-east Pacific fully exploited	Stocks not assessed, but it is highlighted that many crab populations are over-fished and reduced to unsustainable levels
Tuna	193	611	Bluefin tuna stocks in Mediterranean, Atlantic Indian and Pacific Oceans depleted. Atlantic Ocean stocks of tuna over-exploited to depleted	In general stocks are fully-exploited with many over-fished. Bigeye, southern and northern bluefin tuna are listed on the IUCN red list

For the past several years, the main exporters of fish to the Japanese market, in descending order, have been China, the United States, Chile, Russia and Thailand. The main suppliers of shrimp to the Japanese market are based in Vietnam, Indonesia and China, in descending order of importance.

United States

The United States is the second largest single country importer of fish and fish products after Japan. With both an increasing population and a long-term positive trend in seafood consumption, imports reached US $13.3 billion in 2006 – 1.5% more than in 2005. In 2006, Americans ate 7.5kg of fish and shellfish per person (Seafood Choices Alliance, 2007a).

The US has a large trade deficit in seafood – it produces only 20%. Almost 50% of the imported seafood originates from aquaculture, mainly shrimp from Thailand, Ecuador and Indonesia; Atlantic salmon and tilapia. Together, these species account for up to 45% of all edible seafood imports into the US. With demand for seafood growing in America, officials see the ability of the US to meet the growing demand through increased aquaculture

production rather than imports as of strategic economic importance. Table 8 shows main US imports (capture and aquaculture) in 2006.

The major US seafood import trade partners in 2005 were Canada with US $2,186 million, Thailand with US $1,522 million, China with US $1,471 million and Chile with US 778 million (Glitnir, 2006a).

2.3 Trends in production/ consumption and sustainability awareness

The general depletion of stocks across most species and the growing worldwide demand has resulted in a significant increase in aquaculture in the global supply of fish and fish products. Aquaculture is expected to provide about half of all production within a relatively short time. Developing countries are particularly active in developing aquaculture, although this does not come without economic, social, environmental, and health and safety challenges.

Faced with a growing consumption and a stagnant local production, Europe, Japan and the United States, the three most important markets, are dependent on their imports in the face of growing local demand. This explains why developing countries have been able to enter these markets, profiting by very low import tariffs for non-added value products (FAO, 2007b). However, developed countries have, in general, more stringent market access requirements in terms of consumer health and safety, environmental and social issues, and quality, when compared to developing countries.

These requirements are derived from regulations or voluntary mechanisms, and are likely to become more and more demanding, driven in part by consumer awareness relating to issues of food safety and sustainability.

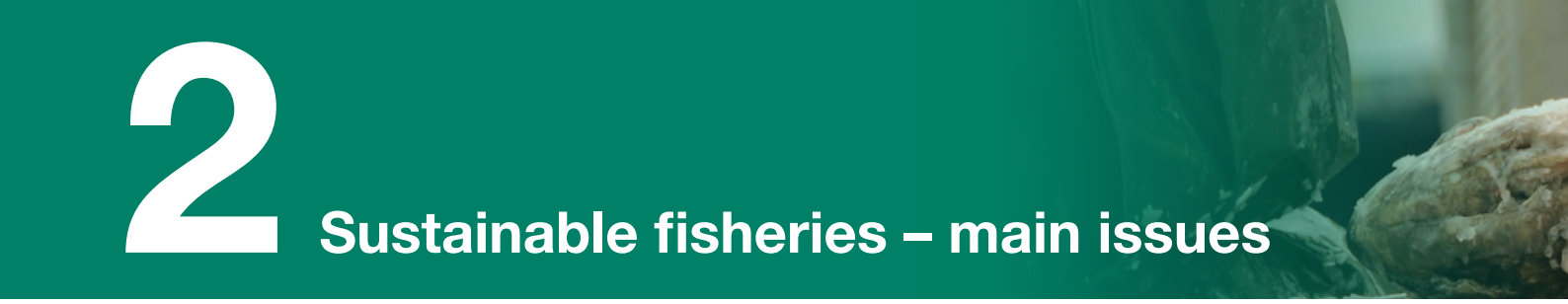
This provides special challenges for artisanal and small producers wishing to access international markets. Large producers and processors will continue to take a growing part of the international market at the expense of smaller ones.

International financial assistance to developing countries and the support from their own pro-export agencies is often directed to the development of the processing capacity and help in fulfilling the requirements of international markets. The recipients of this assistance are larger organisations with better social ties than smaller companies. This contributes to a further marginalisation of artisanal and small producers and makes them dependent on, and vulnerable to, industrial processors.

The situation is described by several authors, e.g. Thorpe and Bennett (2004) who discuss the situation around Lake Victoria, Kulkarni (2005) in India or Wilkinson, Rocha and Fuertes (2006) in Peru and Brazil.

With reference to consumption, patterns are different between developed and developing countries, the former preferring fish that are high in the food chain. This trend gradually reaches developing countries as their purchasing power increases. This taste for carnivorous species has a negative impact on the energy balance of aquaculture, which, in many circumstances, consumes more fish as fishmeal than it produces. Research into alternative feeding methods/species has not yet produced any convincing answers. Thus, current aquaculture practices that depend to a large extent on feed and sometimes regeneration

2 Sustainable fisheries – main issues



derived from wild catch, adds to, rather than lifts, pressure on wild stocks.

The import of fresh water species from developing countries, such as catfish, Nile perch or tilapia is expected to continue growing both in developed and developing countries, to compensate for the stagnation of fish produced locally. The demand for shrimps and prawns is expected to continue to be strong. Growing demand and high prices in the EU market is attracting developing country's crustaceans such as lobster and crabs, while the scarcity in the Mediterranean Sea is opening markets for cuttlefish, squid and octopus. Without responsible management practices, pressure will grow on these wild stocks.

In Asia, (for example Vietnam and China) the more widespread use of standards and requirements in the traditional (developed) markets, and increasing fish consumption are driving the Asian fishery industry to diversify its products and to put more emphasis on domestic and regional markets with Asian style goods. Partnerships and Free Trade Agreements particularly facilitate this (Ferdhouse, 2008).

At the same time, the improvement and increase of processing capacity in developing countries will mean that more and more value will be added locally, as production is priced more competitively.

Media reports on threatened fish species (such as bluefin tuna, and North Sea cod) in European waters have led to a growing awareness by European consumers about the sustainability of fish products. This issue has mainly been driven by environmental NGOs using a variety of tools including:

- Promotion of eco labelled fish products;
- Lobbying of consumers outside supermarkets;
- Press releases and publications; and
- Sustainable fish guides for consumers.

In **Europe**, sustainability awareness about the fisheries sector is more prominent among central (including, amongst others, Poland, Slovakia and Slovenia) and northern European countries including the UK, Scandinavian countries, Germany and Switzerland. The latter boasted in 2006 the highest number of MSC certified brands in the market place. According to a Seafood Choices Alliance public opinion poll (2007b), on average 85% of consumers in the UK, Germany and Spain express a great concern about the current state of the world's oceans. Top concerns amongst European consumers are freshness, 98%, health benefits, 91%, environmental impact, 79% and over-fishing, 73%. 95% of consumers want clearer and more reliable information on the sustainability of seafood – this will have an impact on their purchasing decisions. 86% say they would be more likely to buy seafood labelled as environmentally responsible (Seafood Choices Alliance, 2007a). In addition, 79% state that environmental considerations are more important than price when purchasing seafood (Seafood Choices Alliance, 2007b).

It is important however to have a good understanding of the outcomes of this kind of survey which have been done in many other sectors, e.g. agriculture or forestry and timber. The evidence is that there is not necessarily a direct link between what consumers express during a poll and their actual purchasing decisions. Other short term or immediate considerations and needs come into account when buying a product. The physical characteristics (e.g. taste, appearance) and costs are evidently very important factors. However, the expression in the poll vis-à-vis social and environmental issues is a clear message to retailers and brands that their customers are aware of the issues and that they expect retailers to deliver environmentally and socially responsible goods.

Throughout all sectors, some brands have started to ignore these signals and have paid dearly for

this. Well known examples include Nike, Chiquita and Shell. All have had to redress their image. Nowadays, the lesson is relatively well understood by large companies and they have incorporated the issue of corporate responsibility into their management strategy.

In other words, it is not so much the actual purchasing decision of final consumers that matters, but the fact that the expression of their social and environmental concerns translates into purchasing decisions of most major brands. This is one of the main engines over and above the success of social and environmental certification and labelling across all sectors.

However, the price elasticity for sustainable products is low and the implementation of a procurement policy may not lead to significantly increased purchase prices. A crucial issue limiting the uptake of sustainably sourced products is the importance given to sustainability issues by consumers, when compared to other factors that determine purchase. Price sensitivity is one factor that governs the willingness of consumers to purchase sustainable products, as demonstrated by the following example.

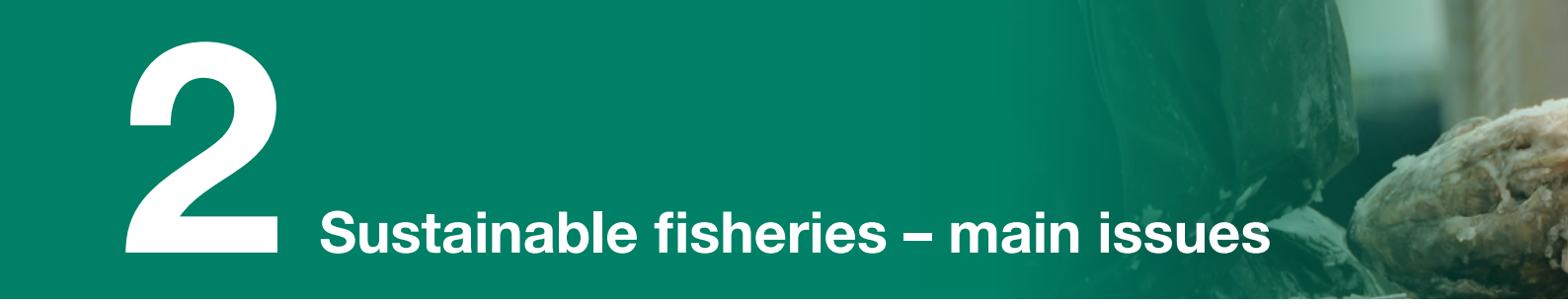
In 2003, the Germany based Frosta supermarket decided to substitute non-sustainable white fish products with MSC certified hoki based products. The use of hoki resulted in a 10% increase in the price of the end product, which the supermarket believed customers would be willing to pay for sustainable fish. Despite the high quality of the fish products on sale, Frosta's market share dropped 50%, due to the change in fish species, and the 10% price increase (Porrit, 2005).

In the US, over the past 10 years, the demand for seafood has been growing. Imports account for over 80% of US seafood consumption, and this figure grew in 2007 although it is likely to stall in the future (Johnson, 2008). This means that decisions made by US consumers regarding seafood purchase are critical for the health of fisheries worldwide. There is a growing awareness of the impact of commercial fishing and aquaculture. In the US, 84% of consumers are concerned about the depletion of fish stocks (Stromsta, 2008 and Greenpeace, 2008a). Nine out of 10 Americans describe themselves as "conscious consumers" and are more likely to buy from companies committed to environmentally friendly practices (87%) rather than purchasing equivalent products made using environmentally detrimental practices (BBMG Conscious Consumer Report in Greenpeace, 2008b). Chain restaurants, retailers and wholesalers are responding to customers' expectations by moving towards organic, local and sustainable foods. They are also removing some seafood items from their shelves due to environmental concerns (Seafood Choices Alliance, 2007b).

A consumer survey to distinguish eco-labelling awareness in **China**, carried out by the Secretariat of the China Certification Committee for Environmental Labelling in 2004, found that 80% of consumers were aware of eco-labelling (Poseidon, 2008). Furthermore there is evidence that Chinese consumers are willing to pay a premium for sustainability in the fisheries sector. Hong Kong consumers of live reef fish indicated that they would be willing to pay a 21% premium on the average current market price for sustainable fish identified via eco-labelling (Wai Wah, et al, 2006).

Today, whilst 40% of consumers in **Europe** say they are willing to pay between 5 -10% more for sustainable seafood, only 25% would pay a price premium greater than 10%. Unsurprisingly, wealthier consumers are willing to accept higher premiums for sustainable seafood. A quarter of affluent consumers are willing to pay an extra 20% for sustainable seafood (Seafood Choices Alliance, 2007b).

2 Sustainable fisheries – main issues



Another limiting factor to the selection of sustainable seafood by European consumers is their reluctance to forgo quality and taste. In the Seafood Alliance study, consumers ranked both freshness and health benefits above environmental impacts. Europeans regard seafood as a healthy food product due to its low fat, source of protein and high omega-3 fatty acids content. Recent media reports about people contaminated with PCBs by their fish consumption may change this perception (e.g. France Info, 2008a about contaminated fish in Lake Geneva and France Info, 2008b reporting on a ASEP-WWF study on the levels of toxins found in fish eaters around the Rhone river). In the US, there are contradictory messages about fish health and its safety, as shown by the media coverage of the case of contaminated Chinese catfish and shrimp, although its impact on the US demand could show in 2008 (Johnson, 2008).

An interesting fact related to consumer awareness of sustainable seafood options is that sustainability is couched in terms of species population and not the general health of the ecosystem. There seems to be large-scale consumer awareness on sustainability issues such as the over-fishing and the killing of non-targeted species (such as dolphins and turtles). However, there is significantly less awareness of the interrelation of species in an ecosystem and the cascading effect that one species can have on others, or the impact of aquaculture on the environment and the use of drugs and chemicals in aquaculture.

Overall, there are some doubts about whether sustainable seafood, particularly in the US market, can maintain its momentum given higher prices and tight supplies on the one hand and the current US economic crisis on the other. Everywhere, consumers look for ways to cut costs. In Europe the momentum is clearly stronger and may be longer lasting.

2.4 Chapter summary and conclusions

Official statistics show a worrying situation: fish stocks are dwindling and most commercial species are, at best, fully exploited, often over-exploited and several are depleted. However serious this account may be, it only covers the physical sustainability of the stock, not the overall sustainability of the ecosystems in which stocks live. Thus, it relates more to the amount of fishing taking place than to fishing methods. One conclusion from this situation may be that simply, aside from other considerations, humans fish too much. If that were the case, only a reduction in fishing levels may lead to a sustainable wild capture regime.

However, the consumption of fish products is increasing, while capture fisheries have difficulties in maintaining constant levels of production despite significantly increased fishing efforts. Increasing demand is met by the important development of farmed production.

It seems unlikely that wild capture could supply our demand over a much longer period and continued high consumption of fish and fish products will probably depend on the capacity of aquaculture to provide the necessary quantities. However, instead of relieving pressure on wild fisheries, current aquaculture practices add to the burden on wild stocks, besides imposing serious social and environmental problems of their own. This makes aquaculture too dependent on dwindling resources. Unless aquaculture adopts more sustainable working practices that do not depend to a large extent on wild catch as fishmeal and juvenile regeneration, it will probably not be able to offer a long-term solution. The sustainability of stocks and their eco-systems may thus depend on the capacity of aquaculture to become socially, environmentally and economically sustainable.

The high cost of processing and the disappearance of stocks in major consuming countries has led to an increase in fish products sourced from developing countries. However, social, environmental and health concerns in consumer markets force ever-increasing demands on producers, both for wild capture and aquaculture. Responding to these demands requires increasingly sophisticated processing methods which are more easily implemented by large organisations.

These are often better connected with institutions providing financial and technical support, which tends to increase the marginalisation of small producers from international fish markets. Artisanal and small producers may temporarily be able to sell in local and national markets. However, the growing wealth of developing markets, notably Asia, means that their own requirements are increasing. It can thus be expected that in the medium term, only the poorest and less sustainable markets will be reachable by small producers.

3

Fisheries supply chains

3 Fisheries supply chains

One of the effects of globalisation is the rapid transformation of the corporate world to lend greater importance to supply chain management. In the last decade, it has become a key tool in improving operational efficiency worldwide, as it rationalises product development cycles, increases product diversity, improves quality and customer satisfaction and responds to customer demands. A key element of this relatively new supply chain methodology is the identification of critical control points, i.e. times and places in the production and distribution process where something could go wrong in terms of ensuring the quality of the product. The focus on these critical points relieves pressure on the less critical ones, thus simplifying the monitoring process. Probably more importantly, it guarantees systems that deliver constant quality. In the food sector, this has been translated into the HACCP (Hazard and Critical Control Point) processes that ensure a satisfactory level of food safety and minimise waste due to poor quality products.

Globalisation means also that companies are now adding environmental and social aspects to the traditional quality requirements in their production process, as part of their purchasing requirements, up and down-stream. As these aspects are not measurable on the product itself, their control, be it be by the company itself or through a second or third party scheme, requires that all the information about the product flows with it, across the production, processing and distribution phases – a process called traceability. By creating a recorded chain of events and places a product has gone through, traceability is the fundamental engine that allows:

- a response to legal requirements in terms of food safety,
- the transmission of information regarding social and environmental aspects of the production, and
- proof that related requirements are fulfilled.

The seafood sector has taken longer than other sectors (e.g. textiles and clothing, forestry or agriculture) to react to social and environmental ethical concerns. Now that these concerns exist in the public environment, effective governance of supply chains is getting increasingly important in this sector as well.

A fish supply chain can be generally described as a set of interdependent fishers, agents, processors, distributors and wholesalers/retailers/food services, who work together to supply a fish derived product to the consumer (Thorpe and Bennett, 2004). No individual organisation within the fish supply chain is an island. Actions taken by one member of the supply chain can affect the whole supply chain, but more particularly the livelihoods of fishers who have fishing as their sole source of income in both developing and developed countries.

In practice, there are differences in supply chains among different countries and regions that correspond to socio-economic, environmental conditions and cultural differences. Differences also exist in relation to fish species and products as well as harvesting techniques (industrial production, artisanal production, aquaculture or capture).

The length of the supply chain can also vary depending on the product and country of origin and final destination of a product (whether for domestic consumption of export). Usually the shorter the physical distance from primary producer to consumer, the shorter and more transparent the supply chain. However smoking, pickling, salting or canning can extend the fish supply chain even when the destination of the product is local.

Fish supply chains can also vary in complexity from one company to another, depending on the level of integration of the different links and the ownership of the entire production process (i.e. horizontally or vertically).

3.1 Identifying a generic pattern

Despite the diversity of supply chains, their analysis shows that they follow a general pattern, regardless of product and regional location. This is probably due, in no small part, to the globalisation and consolidation of the fisheries sector. Their framework is presented in Diagram 2 on p36 and consists of the following stages:

- The **primary producer** of fish supply chains varies in relation to the nature of the fisheries. In capture fisheries, the supply chain begins with the fishers who harvest the fish. In shrimp aquaculture fisheries, the primary producer is the hatchery where shrimp larvae are produced, or fishers catch wild post larvae. In the case of fish farms, the fish farmer is the primary producer.
- **Intermediaries**, whose role is to connect the producers with the **processors**. Intermediaries can include **agent or sub-agents** (uniquely collecting fish at the landing points) and **suppliers' agents** who may be involved in some pre-processing including, sorting sizes and quality, cleaning and gutting fish and shelling prawns.
- Depending on the complexity of the final seafood product and the sophistication of the beginning of the supply chain (see Icelandic cod and Lake Victoria for opposing examples), there may be a **secondary processing** phase such as a breading or cooking process.
- If the product is destined for international markets **exporters and importers** will control the movement of the goods through international borders.
- **Distributors** purchase the product with the aim of selling on to **wholesalers, food service companies and retailers**. The distributor and wholesaler stage can be merged in some cases.
- **Retailers** purchase the final products from wholesalers before selling on to consumers. Large retailers may bypass wholesalers and buy directly from exporters. Some wholesalers also have a retail operation.

3.2 Key sustainability issues at the supply chain level

With the aim of identifying the main issues relating to sustainability within the fisheries sector, we analysed and compared below how various supply chains differ, based on the end product or regional location of the supply chain, highlighting issues related to sustainability. Below are examples of supply chains analyses in relation to the top seafood commodities from capture fisheries in value terms according to FAO (2006d), which are ground fish and tuna (with 10.2% and 8.7% of globally traded fish products respectively). The following popular product preparations are also highlighted.

- Fresh and frozen fillets, and
- Prepared and preserved fish.

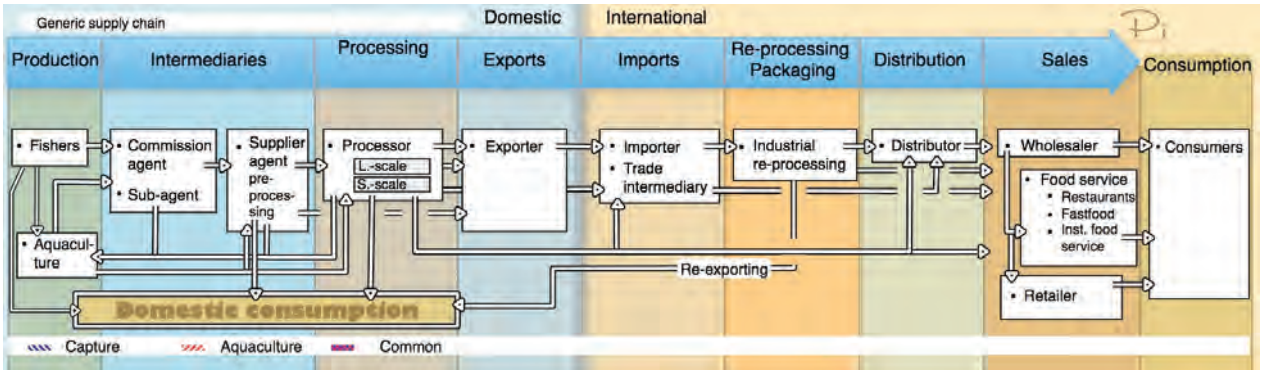
Diagrams used to illustrate the different examples follow the generic framework presented above. As the framework is applicable to capture fisheries and aquaculture, a colour code shows their separation. However, as this document and the examples below focus on capture fisheries, only this threat is represented.

Fresh, chilled and frozen ground fish fillets

Frozen and fresh fish fillets are the second largest category of seafood traded globally, behind shrimps. This category represents a diverse group

3 Fisheries supply chains

Diagram 2: Generic fish and fish product supply chain



of products including cod, salmon, and trout fillets. For the purpose of this analysis, we have selected Iceland cod and Nile perch filets.

Icelandic cod fisheries

Iceland is one of the largest single fishery countries in the world and fisheries play a prominent role in its economy. In 2007, 32% of the country's exported goods were marine products. As the domestic market in Iceland is small, the country exports most of its marine product. Iceland's fish products are noted for their high quality in foreign markets. In 2007, the largest 10 fishery companies owned 53% of the total fishing quotas in Icelandic waters (Glitnir, 2006b). Small-scale fishers complain that they are losing access to the resource. As a result, villages are abandoned in the north of the country, despite abundant fish stocks (Moody, 2007).

The Icelandic cod market is the single most important market in Iceland in terms of export value. Utilisation of cod is dependent on the size and texture of the catch. Large cod is preferred in the production of salted cod, with medium size cod used to process frozen cod fillets. Cod products are mainly sold to three markets, Europe, Asia and the US, with the bulk of exports going to the EU and the US. The US cod market is the single most important market for cod with more than 12% of the total export market. Icelandic companies offer a homogenous range of products in all states. These factors mean that the US market has a simple supply chain, focusing as it does on the restaurant and catering business, with a homogenous product. In the EU, cod is sold to both restaurants and the retail sector and many country specific sub-markets exist. This results in a much more fragmented supply chain.

Diagram 3: Icelandic cod fisheries

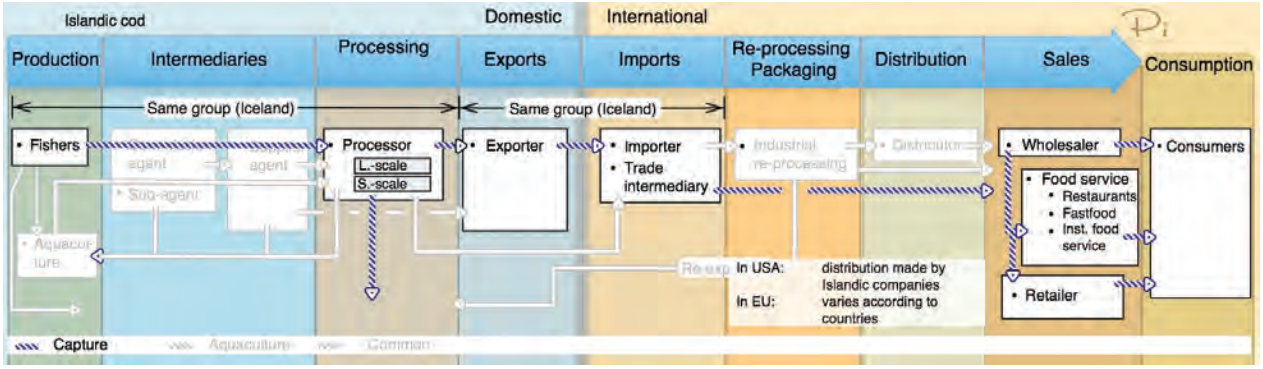
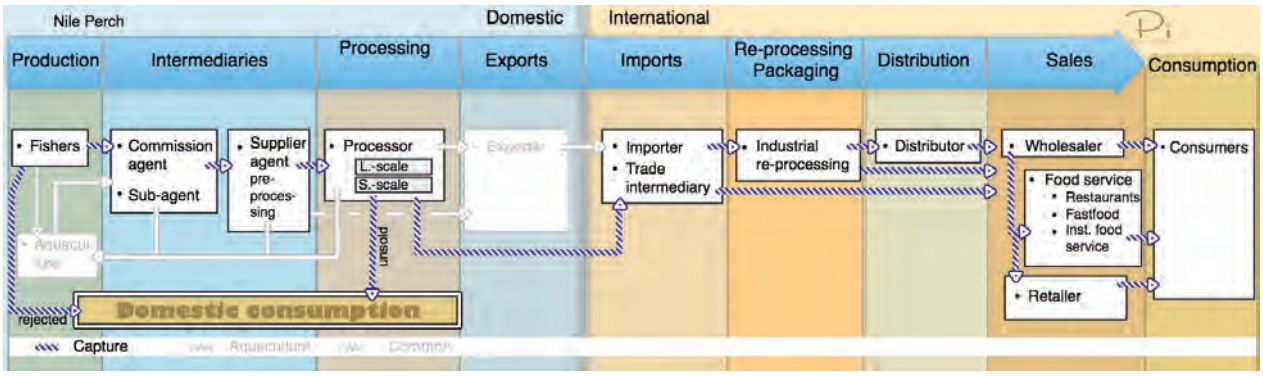


Diagram 4: Lake Victoria Nile perch exported to Europe



The supply chain for Icelandic export to the US has five segments: fishing (see Diagram 3), processing, exporting, marketing and distribution (FAO, 2006e). At the producer level, the majority of the cod exported to the US is harvested by trawler ships which are owned by the processing companies. The cod fillets are processed with the final product being individually quick frozen cod fillets. They are sold to export companies based in the US but owned by Icelanders. The biggest export company is Icelandic US Inc, which is a wholly owned subsidiary of Icelandic Group, based in Iceland. Today, this company is the dominant company in the US market selling Icelandic cod products. There are also several smaller companies exporting to the US. The Icelandic Group uses a network of brokers and US owned distribution/marketing companies to sell their products throughout the US. Hence, Icelanders control the entire value chain from fishing, through primary and secondary processing and exporting, as well as a part of the distribution network.

The supply chain for Lake Victoria Nile perch exported to Europe

Lake Victoria is the most productive inland fishery in the world and is shared by three African countries – Tanzania (51%) Uganda (43%) and Kenya (6%). The Nile perch is both the most abundant species and the most economically important. It was introduced to Lake Victoria in the 1950s and in the late 1970s Nile perch contributed only 2% of the lake's fisheries. However the population of Nile perch exploded and, by the mid 1980s, it was the dominant species (FAO, 2006e).

The supply chains for Nile perch in the three countries surrounding Lake Victoria are very similar as is illustrated by Thorpe and Bennett (2004). An analysis of the supply chain in Tanzania by the World Bank (2005) reveals two separate chains serving two distinct sectors of the industry: international and domestic. There is limited crossover in terms of the provision of raw materials and, when considering service providers and asset usage, such as warehouse sharing or a common information system, the two supply chains are very distinct. Good integration, low transaction costs, high levels of investment, and well-employed technologies characterise the international supply chain. Input is supplied by specialised agents to the export processors, both in terms of hard inputs (such as equipment and finance) and soft inputs (such as training). This chain enjoys good information flows up to the level of processors. For example, published guidelines direct prices that are set by industrial processor collectives. Poor organisation, and little information sharing characterise the domestic chain. This results in high risks for fishermen and boat operators and high transaction costs.

A typical supply chain for Nile perch exported to Europe is as follows (see Diagram 4).

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Artisanal fishers, in small boats, do the vast majority of the fishing for Nile perch; they then sell their catch to fish collectors. Fish collectors are based at various landing stations along the lake's shoreline or on boats in the fishing grounds, which ferry the catch directly to processing plants. The collectors who are directly linked with the processing plants determine the price for Nile perch at landing stations or on the beach. Transportation availability and cost also affects the price given to fishers. As most individual fishers have no preservation facilities, a delay in selling results in low quality fish and lower prices. This, along with the fact that the fishers are not organised into negotiating groups, makes them price takers rather than price setters.

The third segment of the supply chain involves the processors who receive fish collected from the fishing boats and collectors. These processors are the main source of raw materials used in preparing products for local and regional markets. This consists of fish rejected for export due to poor quality, by-products or illegally caught fish seized by authorities.

Similar issues have been reported in Kenya and Uganda by Schuurhuizen, vanTilbug and Kambewa (2006), and Thorpe and Bennett (2004).

Prior to the early 1980s small-scale and artisanal processors dominated the industry. However more recently, industrial-scale processors have become the driving force. Yet even within this international supply chain, industrial processing activities remain under national control.

One of the biggest processing plants in Tanzania is Vicfish Ltd based in Mwanza. Vicfish employs over 400 workers and is both HACCP and ISO 9000 compliant. As a general rule, processing plants try to use every part of the fish they purchase. For example, Vicfish is selling 7 tonnes of air bladders per month to China where they are dried and used in traditional medicine (IFCNR Fisheries Committee, 2001).

In this supply chain the export-import transaction is usually done by the same organisation, with importers having export offices and even cargo freight facilities around Lake Victoria. Most exporters/importers of Nile perch into the EU are based in the Netherlands and Belgium, however Spain is the main EU market for Nile perch consumption. It is not uncommon for importing companies to have offices around Lake Victoria to provide both logistical service management and assure quality control. Nile perch fillets received from the processing plants are chilled and flown to Europe where they reach the shelves within 48 hours of harvesting.

Comparing supply chains of white fish products

The Icelandic cod supply chain is in many ways very distinct from other supply chains. Icelandic companies control virtually all the supply chain from harvesting the cod up to its distribution. Also there are as few as two companies involved along the whole supply chain. This results in good traceability and transparency. In the case of Lake Victoria, the supply chain is much more fragmented, including artisanal fishers, fish collectors, national processors and international exporter/importers, as separate entities. Such a supply chain makes traceability and transparency more difficult.

The Nile perch example reflects a common situation for artisanal fishers in many developing countries: a lack of education and resources, and the dependence on fish collectors who perform size and quality selection and control the price fishers receive for their catch.

Another feature of the Icelandic cod supply chain is that all processing of the fish is carried out in Iceland, which is not typical for fish caught in the

Northern hemisphere. As mentioned above, third country re-processing has become a common feature of fisheries supply chains to overcome high labour costs. According to the EU fish processors association (A.I.P.C.E., 2006), virtually all the whitefish processed by China for the European market has its origins in other countries, such as Russia, Norway or the US. Decreasing processing facilities in developed countries is reflected in their decline in whole fish imports, because developing countries are doing more of the processing.

When considering the supply chain of fresh fish fillets, the ability to maximise added value by supplying markets on a daily basis is critical. Thanks to their highly integrated supply chains, Norway and Iceland dominate the European fresh fillet market. The frozen fillet market by contrast is dominated by China which has a very high rate of yield for fish fillets as well as low production costs.

Icelandic and Norwegian stockfish (unsalted dried fish) is an example of a ground fish product that is produced in developed countries and exported to developing ones. Cod is the most common fish used for this production, but haddock and pollock can also be used. Stockfish is the oldest export industry in Norway. High quality stockfish are mainly exported to Italy. Dried fish heads are also exported from Iceland and the Faroe Islands to Nigeria and are used as a cheap substitute for stockfish.

Sustainability issues in white fish supply chains

Lack of knowledge, information flow and communication. In developing counties, lack of knowledge and communication along the supply chain can result in artisanal fishers not optimising their catch. Fishers may be unaware that their catch for export must be packed in ice, but a lack of resources and cultural differences may also prevent adequate storage. Lack of communication can also lead to insufficient payment of fishers as any rise in the selling price of Nile perch for processing factories can be absorbed by fish collectors without fishers realising it.

Lack of traceability. Lack of traceability coupled with an increasing demand for white fish has led to an increase in illegal, unreported and unregulated fishing of whitefish. For example WWF (2006) quotes data from the International Council for the Exploration of the Sea (ICES) stating that 40% of North Atlantic cod caught is unaccounted for. Over-fishing has caused many whitefish stocks to become not only depleted, but collapsing. The situation is so critical that ICES called for a complete ban on cod fishing in the North Sea in 2007. This proposal was rejected in favour of a 15% reduction in North Atlantic cod quotas (Daily Telegraph, 2006).

The lack of traceability not only means that it is impossible to know precisely where the fish comes from, thus allowing abuses such as those described above to occur. It also means that no reliable information can be attached to the product that can be rebuilt afterwards. It may be possible to identify the fish species or its safety as a food product by analysing the product on the shelves, but all information on the conditions of its production is lost. As seen above, corporations include, more and more often, a corporate social responsibility policy in their management system that details social and environmental requirements regarding the production methods of goods. The lack of traceability defeats these policies as it makes them almost impossible to implement. Effective traceability is thus the primary tool for using market forces to direct processes towards sustainability.

Depletion of stocks. The depletion of stocks of traditional whitefish has led many of its traditional users, such as fast food restaurants and fish finger

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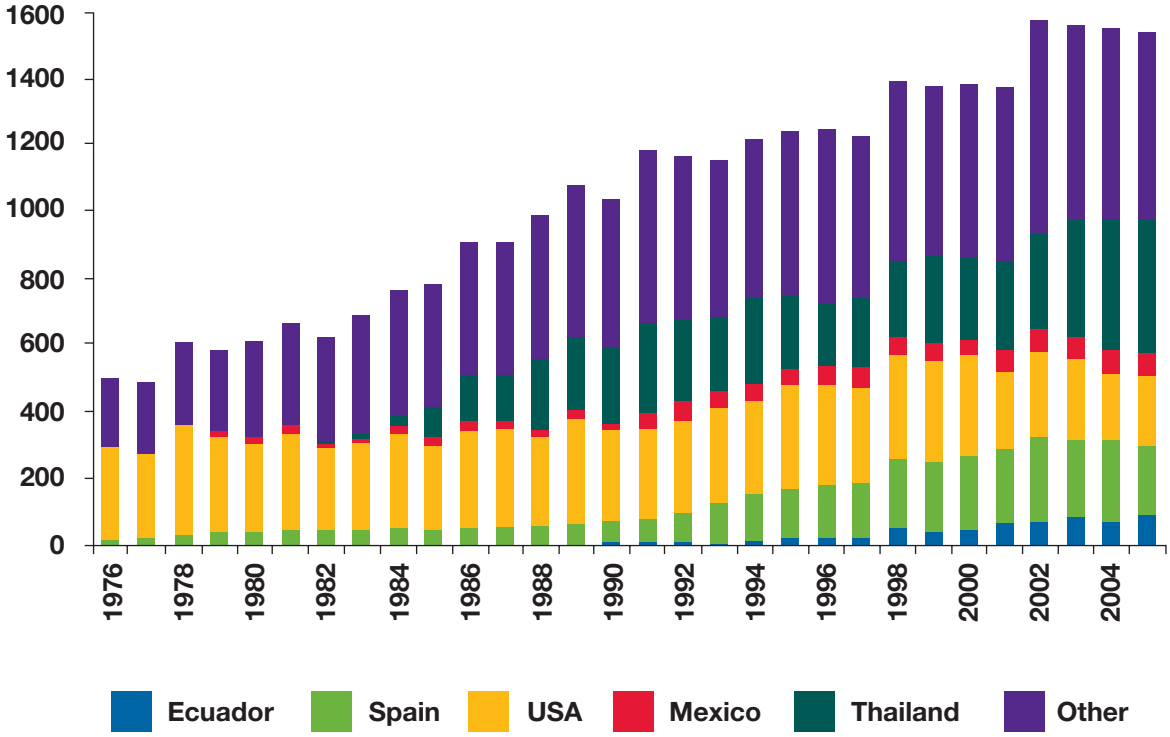
Figure 3: The world canned tuna production (David J., undated. Review of global tuna trade and major markets. Powerpoint presentation)



manufacturers, to seek substitutes. One of the most successful has been the Chinese twice-frozen Alaskan pollock, (categorised by FAO as fully to over-exploited), thus displacing the problem without resolving the issue.

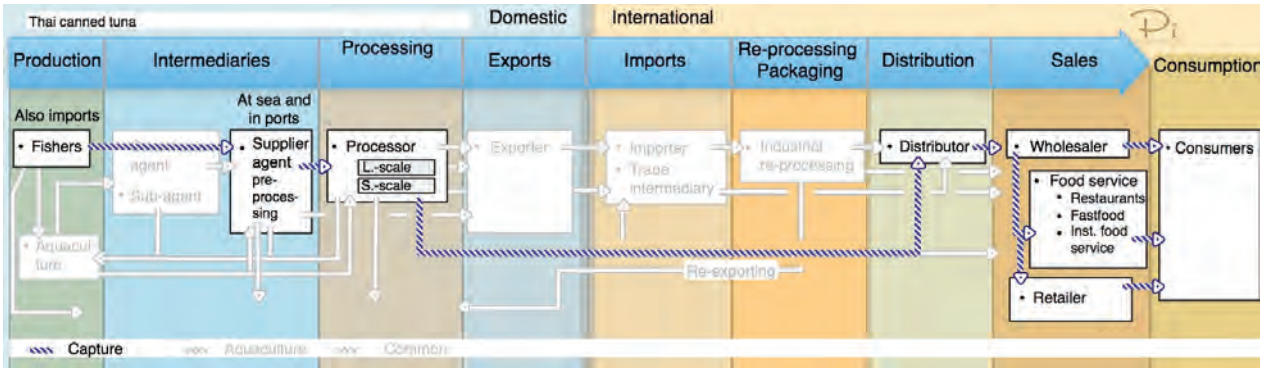
The depletion of fishing stocks in the northern hemisphere has led fishing fleets to move to alternative fishing grounds in the global South. This has had an impact on the availability and the quality of fish for domestic consumption in developing countries. This problem is more pronounced in coastal regions in Africa which do not have a significant aquaculture industry to help absorb any reduction in fish stocks.

An example of over-fishing in African national waters is that of Mauritania where the waters are attractive to foreign fishing vessels. In 2006, Mauritania agreed the EU's biggest fish payout to date of 516 € million over six years, with a clause allowing for a renegotiation after two years. The payment now accounts for around one-third of the government's annual budget (32%) (Europa, 2006). The agreement allows around 200 EU vessels to fish for crustaceans and groundfish. As well as European vessels, up to 99 Chinese vessels also fish in Mauritanian waters and, in 2005, China gave Mauritania two fighter jets as partial compensation for fishing rights. Unsurprisingly, local artisanal and subsistence fishers are unable to compete with international fleets and their catches of prized product such as groundfish and octopus are falling, with repercussions on domestic fish markets and people's livelihoods (Millar, 2007).

Prepared and preserved fish

The effect of the global stock crisis on supply chains is particularly visible in the tuna sector, especially canned tuna. Tuna is the third most

Diagram 5: Thai canned tuna



valuable traded seafood and the majority of internationally traded tuna is canned. Thailand is the world's largest exporter, whilst its home market is small at just 1.8% of export earnings. The most commercial tuna species for the Thai industry are skipjack, yellow-fin and albacore. The yellow-fin stocks are the only ones not to be over-exploited (see Table 2). Figure 3 shows the slight change in total production of canned tuna since 2002 and the growing part Thailand is playing in production over the last 20 years.

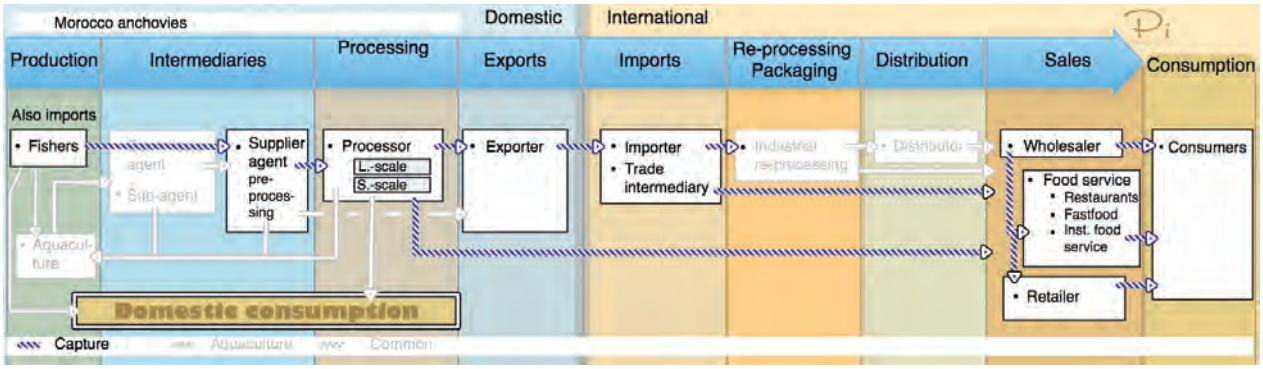
The supply chain for Thai canned tuna

Thai canned tuna processors source both imported frozen chilled fish (around 80% is imported, sourced mainly from the Indian and Pacific oceans) and chilled domestic fish as raw materials. Imports account for up to 70% of production costs. A major fishing ground for raw tuna is the area owned by Pacific Island Countries (PIC) where tuna is caught by Distant Water Fishing Nations (DWFNs) in and around their Exclusive Economic Zone (EEZs) and on the high seas.

Once caught, the fish is sold by tuna trading companies (usually based locally on PIC), who sell it to tuna processors worldwide. Trading companies co-ordinate trans-shipment onto reefer carriers from multiple vessels at sea (or in port) and offer volume and continuity of supply to processors as well as economies of scale for vessels owners (Campling, et al, 2007).

The raw fish is selected and, after precooking with white (light) meat, is sent for human consumption or red (dark) meat for pet food. After further processing, the tuna meat is canned. Although

Diagram 6: Anchovies in Morocco



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there are 19 canning processors in Thailand, the largest three manufacturers account for 70% of national production. The large manufacturers control the export and distribution of their product, which is exported to various countries including the US, Japan, Canada, and Europe. Low production costs and low tariffs under the US Thai free trade agreement have made Thailand a popular source for US canned tuna.

This simple chain is described in Diagram 5. The major issue that dominates the supply chain for canned tuna is the depletion of global stocks. This impacts on the supply and cost of raw materials for canned tuna production. Increased profitability in the tuna supply chain is therefore governed by controlling production costs (US Department of Labor, 2008). Large processors in Thailand responded to this by setting up their own fishing fleets. Similarly, major brands are constantly looking to enter markets with reduced production costs. US manufacturers of canned tuna now have processing and canning plants in various locations including Puerto Rico, American Samoa and Ecuador, not just in the United States.

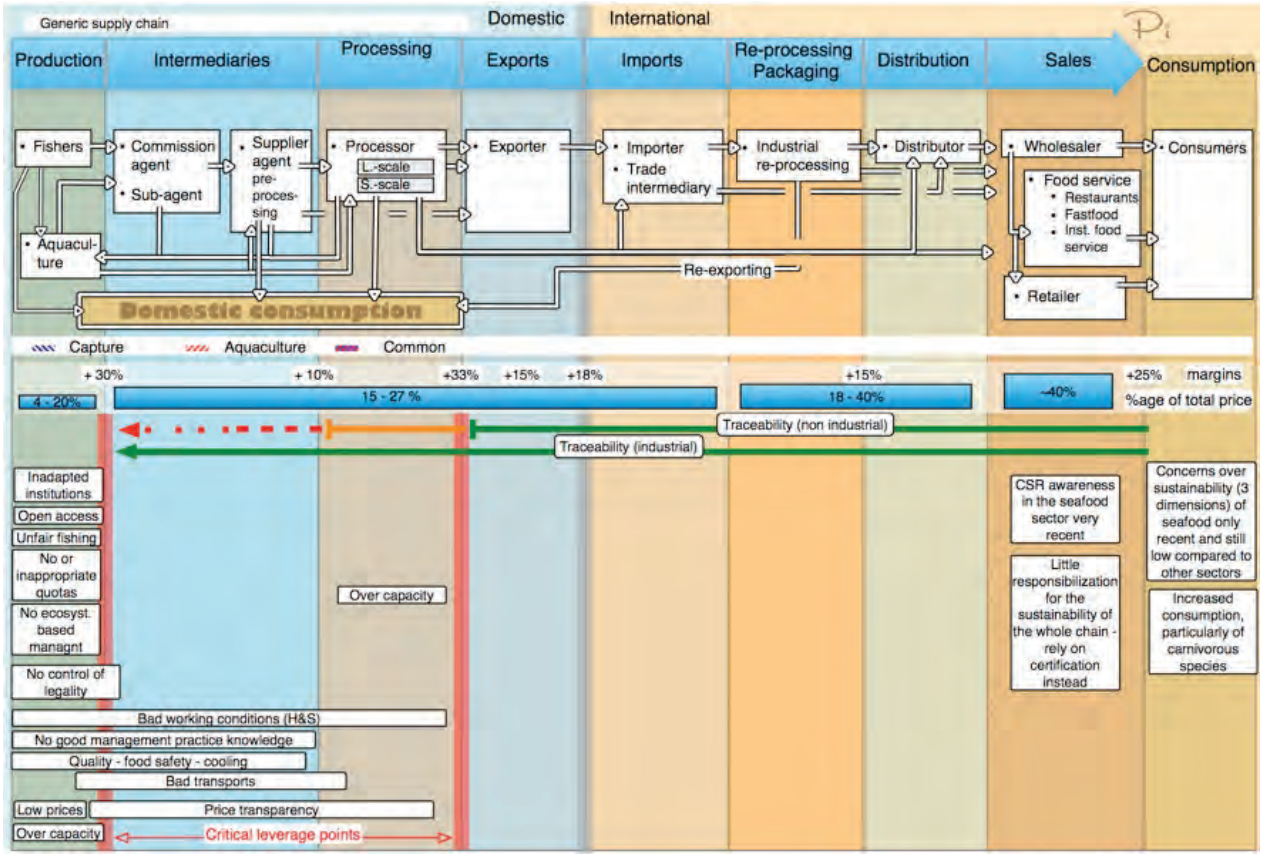
Moroccan anchovies

Depending on the price of the resource, Moroccan processors either buy locally or import their raw materials. While their location does provide low production costs, Moroccan anchovy processors have also perfected their processing techniques and established both a reputation and large market share for these products, in the US and EU.

Comparisons of supply of preserved and prepared fish

In PIC based production, the integrated chain described for Thailand is also operating. However,

Diagram 7: Issues related to supply chains



in some cases, processors are contracted and never actually own the fish itself. In this case, tuna trading companies play a central role in terms of supply, procurement and, sometimes onward sale of the canned tuna.

In contrast, processors of anchovies in Morocco (Diagram 6) are able to change their source of raw material from local fishers to international suppliers when price increases affect profitability. This makes loss of market share less likely. However, the Moroccan anchovy industry could soon face serious competition from Peru. Large fishmeal producers in Peru, such as Copeinca, are using surplus revenue gained from fishmeal and oils to diversify their production lines towards frozen and canned anchovies. At present, due to financial constraints, they are concentrating on domestic supply (Copeinca, 2006), despite this, it is categorised as fully to over-exploited.

Sustainability issues in the prepared and preserved fish supply chain

After bluefin tuna stocks in the Mediterranean Sea, the Atlantic, Indian and Pacific Oceans have been depleted, over-fishing of tuna species remains particularly acute in South Pacific fisheries where artisanal, subsistence and commercial fishers compete for tuna stocks as they migrate through various national jurisdictions. The process by which catches are transferred to reefer ships, at land or at sea, before being delivered to processing facilities, as described above, is prone to illegal catching if a strict traceability system is not in place. To be efficient, this system should start at the point of catching, not at the level of the vessels. Unfortunately, traceability systems with this level of detail do not exist. In an effort to reduce illegal fishing by international vessels, countries are applying the 12 nautical miles of the contiguous zone of territorial water, as defined by the 1982 United Nations Convention on the Law of the Sea, exclusively for subsistence and artisanal fishers. Others are enforcing exclusion zones in which foreign fishing vessels are prohibited (Campling, Havice and Ram-Bides, 2007).

The impact of sustainability issues on the canned tuna industry is exemplified by the closure of processing plants in Puerto Rico. Between 1990 and 2001 all but one of the tuna processing/canning plants in Puerto Rico closed. The reasons for this collapse include (US Department of Labor, 2007):

- **Growing public concern** for wildlife that was being killed as a **by-product** of tuna fishing, specifically dolphins which swam with yellow-fin tuna. This resulted in fishing grounds moving from the eastern to western Pacific Ocean where this generally does not happen.
- **Compliance with both US and Puerto Rican laws concerning waste disposal at canning and processing plants** became increasingly difficult and expensive, leading major producers to look elsewhere for production locations (thus displacing the problem).
- In 1997, canned tuna production workers had to be paid the **federal minimum wage** of US $5.15 an hour. This meant that production costs in other countries became much more attractive to big American producers.

High rates of **mercury contamination** reported in canned tuna led many consumers, especially in America, to switch to other products. As a result, many large tuna manufacturers are now looking to sell their product in local markets like Thailand. With the growing sophistication of emerging markets, this strategy may only be successful in the short to medium term.

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3.3 Common sustainability issues in the supply chains

Issues related to the sustainability of supply chains can be mapped using the generic supply chain map proposed in this chapter, as shown in Diagram 7 on p42. While the example provides an aggregated view of the situation at a global level, the exercise can be done at a more refined scale. By adding information related to the value chain, this map turns into an analytical tool where the financial, physical and information fluxes of supply chains are represented.

The diagram shows that most sustainability issues such as unadapted institutions, open access, unfair fishing, IUU, bad working conditions, lack of price transparency and information sharing etc, are concentrated at the level of production and first intermediaries/processors. It also shows that the consuming side of the chain (i.e. companies selling to consumers) has a strong responsibility for the unsustainability of the production and has reacted late. Now that it is starting to react, it cannot do so properly because of the lack of information flow due to the absence of traceability. At best, this flow of information starts at landings but this is far from sufficient as transfer of fish cargo at sea is a common practice, as demonstrated in the tuna example above. It is striking that tuna, depending on the species and the location of catch, is considered either as depleted or as the only main species not to be over-fished. Consumers do not know this and even if they did, they would not reliably know which species they are buying and where they originate. In other words they cannot exert their 'right to know' to make informed choices in their purchasing decisions.

By adding information on the value chain (Gudmunsson, Asche and Nielsen, 2006 and CBI, 2007), it is also possible to identify that the break in the information flows happens at points where there is the most increase in the value of the fish product: between production and first intermediaries and at the moment of export. A more detailed analysis at the country level also shows, as in Gudmunsson, et al (2006), that developed countries are better able to boost value than developing ones, even for similar products with similar markets such as cod and Nile perch fillets.

This analysis thus corroborates the description made in the problem tree discussed in chapter 2. The interrelations between all the levels of the supply chain cannot be overemphasised, nor the importance of the traceability of products that connects all the parts together. While in the case of industrial fishing, products can normally be traced up to the landing points, for non-industrial fishing, traceability starts to disintegrate from the exporters up, to become non-existent at the level of intermediaries and, of course, primary production.

3.4 Traceability

Traceability is defined by ISO (2000) as *"the ability to trace the history, application or location of that which is under consideration. When related to a product:*

- *The origin of materials and parts,*
- *The processing history and*
- *The distribution and location of the product after delivery".*

It refers thus to the ability to track a product through different stages of its production, and distribution, ideally from the very first level of production (i.e.when the fish is caught). Unfortunately this is rarely, if at all, realised.

Traceability can be a regulatory requirement or a voluntarily implemented commercial tool.

Laws are now in place in many developed countries including Europe and the US, which make the adoption of the HACCP systems (Hazard Analysis and Critical Control Points) in the fish and food industry compulsory (Dillon, 2004). HACCP methodology requires the identification of critical control points along the supply chain. Workers along the supply chain must be able to recognise the critical control point and know the critical control mechanisms that must be carried out to ensure HACCP compliance. This requires traceability along the supply chain in both directions. Failure to recognise critical control points and execute required checks can lead to withdrawal, recall and refusal of entry of fish products. See Box 2 – *Critical control point for capture fisheries (HACCP)* for a detailed description of the application of HACCP methods.

However, either because of lack of knowledge – for example fishers in Lake Victoria who cannot read or write, or because of a voluntarily unlawful attitude – as for example for the North Atlantic Cod (WWF reports that 40% are unaccounted catches [2006]), lack of financial and technical resources, or gaps in the legislation, upwards traceability often stops at the landing or at the processing facility. For example, EU regulations deem that a receipt is adequate documentation, information is required to flow only one step up and one step down, internal traceability is not required, batch size does not have to be defined nor that a traceability label is demanded (Frederiksen, 2006). All these elements weaken the system. For all practical purposes, traceability is only assured up to the exporter, unless part of a vertically integrated industrial operation. In any case, verified traceability stops at the point of landing as described in Diagram 7 – *Issues related to supply chains*.

The traceability required for health and safety reasons through HACCP, involves the collection and transfer of information that needs to follow the product along the chain. This information can and should include non-product related production and processing methods (PPM). In other words, it should include information about the product that cannot be measured on the product itself. This information flow only works if the traceability system is trustworthy.

A key condition for a sustainable supply chain is that information related to sustainability issues (socio-economic and environmental) can reach those involved in a useable fashion. One of the important effects of ethical labels, for example, is that they have allowed consumers to make informed purchasing decisions. As probably the only mechanism allowing the transfer of information from one element of the supply chain to the other in a systematic way, traceability is a crucial and fundamental condition for sustainable supply chains – although traceability in itself is not sustainability.

Box 2: Critical control point for capture fisheries (HACCP)

For seafood products deriving from capture fisheries critical control points include:

1. the identification of the boat,
2. date of capture,
3. location of capture (usually via identification of the FAO areas for fishery activities),
4. species identification and net weight,
5. Where an agent or fish collector (as with Nile perch in Tanzania) is involved fish should be labelled with date and time of landing.

Once at the processing plant or the wholesaler, the process should follow that described for aquaculture products points 7 & 8.

Source: Dillon M (2004) *A guide to traceability within the fish industry*, Sippo/Eurofish, Zurich and Copenhagen

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Organisations willing to implement corporate responsibility programmes and demonstrate this implementation are thus dependent on the implementation of reliable traceability systems. To date, this is almost exclusively provided by certification systems that include a Chain of Custody (CoC) element in their certification. This is probably one of the main reasons why certification has become so popular with retailers. This is also perhaps the single most important service provided by certification. It has to be noted however, that even in the case of the Marine Stewardship Council – the scheme that has the best reputation – traceability stops at the level of vessels, not where the fish was actually caught.

To be effective, notably in identifying and thus curbing IUU, CoC certification must start at the level of the catch, not the landing, and be non-forgeable. This can require technologies, e.g. vessel monitoring systems, radio frequency identification, bar code management, DNA analysis and electronic log books (Johnson, 2008), that necessitate capital investment.

In many developing countries, the artisanal fisheries sector is an occupational option of last resort, and many fishers have little education, few financial and technical resources and access to little information on market requirements, if at all. They may have difficulties in recording their catch and no means of preserving it. They may also not be aware of the necessity to do it (see next paragraph).

Tracing products sourced from many artisanal collectors is very problematic within any supply chain in any sector. For artisanal fishers there is often no information sharing concerning fish size, hygienic or traceability requirements, short of the fact that fish not reaching a required standard is not purchased. For example, processing plants in developing countries complain that fishers use unclean water for ice storage, and thereby contaminate fish, which is only rejected further down the supply chain. Traceability involves a cost outlay and technical requirements for adequate labelling (including date of capture, species and method of capture) as well as storage and transport. These requirements can prove difficult for small-scale fishers in developing countries. Traceability may thus be outside the scope of some small and artisanal operations (Dallimore, 2004).

Transparency and communication along the supply chain

Traceability involves transparency and communication along the supply chain. Because a sustainable supply chain requires coordinated action from all involved, information needs to be disseminated so that everyone can see what is happening in other sections of the supply chain, not just the segments that make a profit from them. In the case of seafood products being exported from developing to developed countries, often those companies and individuals closer to the export market are more aware of the actions needed to comply with regulations and requirements for successful trade.

Transparency in the price of raw materials can help to maintain sustainability of fish stocks. The knowledge of the value aspect of the chain can help to eliminate insufficient payment for raw materials, which in turn leads to both overfishing as fishers struggle to obtain sufficient income, and a lack of interest in the sustainability of their resource. In general terms, a highly valued resource is more protected by its users than a low valued one. A clear example from the cosmetics sector can be given to illustrate this fact: in Malawi, some very poor communities tended to give access to their baobab trees to collectors from outside the community. The latter used to fell whole trees to pick the fruit. Field visits could find hardly any

regeneration of baobab. A new commerce has been initiated in which communities are paid a fair price for the fruit they collect, under good management practices. The income of participating communities has doubled through this new activity. As a result, local people now care about their resource, do not allow access to it freely, have started planting young trees and protect them.

The work done on sustainable supply chains in the natural ingredients sector, in the framework of the UNCTAD BioTrade initiative, shows that the sustainability of the supply chain is dependent on a strong relation between the different partners in the chain. This concept, linked with the one of equitable benefit sharing, means that buyers along the supply chain take the responsibility of building the capacity of their direct and indirect suppliers, in market negotiation, for example. This tends to diminish the dependency of the suppliers on a single product or buyer (thus also diminishing the responsibility of the buyer vis-à-vis its suppliers), and creates more equal relations and an environment of trust.

Dependent suppliers, including producers, would not hesitate to shift to other buyers from one day to the other if they could find better deals. A business relationship based on trust, on the other hand is more likely to aid supplier loyalty, if only because a culture of information sharing is established. This resilience of the commercial relation is an important part in security of supply for buyers. It can however only happen in a context where the information is shared and flows with products. In other words it is dependent on a functioning traceability system.

Equitable benefit sharing is a legal concept generated by the Convention on Biological Diversity, by which monetary and non-monetary benefits, technology transfer, the recognition and compensation of traditional intellectual property rights (traditional knowledge), open and transparent negotiations are implemented in the case of access to genetic resources. The concept has been extended by many stakeholders to include access to natural resources and its application throughout supply chains. Equitable benefit sharing is not limited to natural ingredients. As pointed out by Nagato (2008), equitable benefit sharing is a key component of sustainability as it can provide an incentive for fishers to behave more responsibly, as exemplified by the Malawi example above. This concept corresponds to one of the three objectives of the Convention on Biological Diversity and requires full transparency in the chain, which is still rare in the fishery sector.

In the Moroccan anchovy supply chain (see Diagram 6, p41) transparency in the price of anchovies means that increased prices force processors to buy their anchovies from other countries, until domestic prices drop and then they revert to sourcing Moroccan anchovies. This helps to relieve pressure on fishing grounds when prices rise due to increased demand or decline in catches due to natural fluctuations (FAO, 2006e).

3.5 Chapter summary and conclusions

Supply chains in the fish products sector can vary enormously from one chain to another. However, despite their differences, they all fall within a general framework that can be used for analysing where issues related to sustainability exist and the connection between the different levels of the chains. This analysis shows that a major failure of the chain is the lack of traceability.

For supply chains to be sustainable, they need to function well, and the information has to flow from end to end. In other words, fully functional traceability (i.e. from the point of catch to the consumer) is a *critical* condition for sustainable

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supply chains. At an immediate level, this would allow the identification of IUU fish, and its eradication, using either regulatory or voluntary mechanisms, or both. At a more refined level, this would allow consumers to make informed purchasing decisions regarding the sustainability of fish, not only in terms of stocks, but also in social and broader environmental conditions. In this respect, a regulatory approach that would depend on the agreement of a number of governments is less likely to happen in the short to medium term. However, as seen in several instances in the forestry sector, the regulatory framework can be influenced by a voluntary approach, which acts as a catalyst.

The implementation of traceability systems and the fulfilment of ever-tighter requirements in terms of health and safety for food, mean that small producers may be gradually excluded from international markets, and with the growing sophistication of consumers in emerging economies, from regional ones as well. For the poorest, this may mean a degradation of their quality of living if they do not diversify into other sources of revenue. This is because they may only be able to sell their fish products to the poorest local markets, which do not require traceability or quality standards.

Thus, sustainable fisheries depend both on significantly reduced fishing efforts supported by sustainable aquaculture, as identified in chapter 2, and on the development and implementation of traceability mechanisms that can ensure the identification of the catch at its point of origin.

These mechanisms should be implementable by small organisations, bearing in mind that some will never have the sophistication to implement them and may disappear from all except the poorest markets.

This allows identifying two main – or critical leverage points in the chains: between the point of catch and the landing and just before exports usually after the domestic processing, if there is one (see Diagram 7).

The next section looks at different mechanisms connected to supply chains in the light of the findings of this study, including their graphical representation, and analyse their potential use at different stages. These mechanisms are:

- Certification schemes;
- Business to business partnerships;
- Responsible investments; and
- Public private partnerships.

4

The role of buyers and consumers

4 The role of buyers and consumers

At the end of the supply chain are buyers of fish and fish products, who provide consumers with different types of fish and seafood products. Consumers in the EU buy about half of their seafood in retail stores, mainly supermarkets (Greenpeace, 2008b). In the US, consumers split their seafood purchases between retailers and food services such as fast food outlets, carryouts, schools, hospitals, airlines, corporate and university cafeterias, among others. The latter category represents two-thirds of the total sales value in the US. However, in terms of buying value, each sector is about equal (Seafood Choices Alliance, 2007a).

As seen in chapter two, one of the key drivers of the depletion of fish stocks is consumption. This is a clear indication that influencing consumption patterns, either at the level of consumers or at the level of retailers, food services and wholesalers, could have a major impact on production practices. Buyers have a crucial role to play in influencing consumers' behaviour and/or responding to their expectations.

At the same time, they can directly influence the production and processing practices along their supply chains through their procurement policies. This has been demonstrated in other sectors like forestry, agriculture, textiles and clothing and now, natural ingredients. This approach has however a downside in that it often results in buyers imposing requirements on producers without taking the needs of the latter into consideration (they pass the burden to producers). As such, their ethical and responsible commitment to sustainability may remain somewhat superficial and does not always translate the real responsibility of the consuming side of a chain. Pro-active measures are needed to ensure that policy implementation truly contributes to sustainable development and to the United Nations Millennium Development Goals[2] to alleviate poverty.

4.1 Buyers concerns

The original intention of this chapter was to provide relatively detailed information on the supply chain of two major retailers (Wal-Mart and Carrefour) and discuss with them the issues they encounter in implementing their sustainability policies, as a basis to explore potential public and private partnerships. However, these retailers did not provide any detailed information beyond the generic description available on their web-site. This data is always classified as "sensitive" (Dorey, 2008).

As mentioned in the introduction to this report, this unwillingness or inability to provide details or evidence of the implementation of procurement and Corporate Social Responsibility (CSR) policies has been experienced by other researchers, including NGOs (Marine Conservation Society and Greenpeace [2005]) and as such it deserves some analysis.

Despite the diversity of sectors and cultural situations in modern trade, maybe thanks to globalisation, there are themes that are common to all buyers, across sectors.

- **They must meet the expectations of their clients.** These expectations have evolved in recent decades from simply providing good quality products at competitive prices to a responsible attitude towards the environment and people. This has led to the development of CSR programmes in most companies of a certain size. For SMEs, they often have to respond to the CSR policies of bigger companies who are their clients.

[2] The Millennium Development Goals (MDGs) are eight international development goals agreed by 192 States and 23 international organizations to be achieved by 2015 that respond to the world's main development challenges (www.un.org/millenniumgoals/).

- **They must make their supply chain safe**. Here again, the concept of safety in supply chains has evolved. Nowadays, it means safety in terms of accessing good quality supplies in sufficient quantities, in terms of legal liability (e.g. compliance with environmental and social legislation), in terms of safety for the users of the products (e.g. by avoiding certain chemicals in clothing), and in terms of the image of the company (particularly important if it is a recognised brand). This latter element is linked to the expectations of clients who may not always want to pay more for a "sustainable" product, but expect that the companies they buy from only provide responsible goods. This aspect is also strong in the fish sector, as shown by the different studies mentioned in chapter 2. In the interlinked modern world, no company can expect to stay in business for long if it does not manage these factors and act to minimise the risks associated with them.

However, the sustainability challenges faced in the fishery and aquaculture sectors are so complex that they are unlikely to be solved in the short or medium terms. These issues are mentioned in some detail above, but one simple number is telling and worth repeating. Approximately 75% of fish species with commercial value have been overexploited and some are close to extinction. This only speaks to the quantitative side of sustainability without addressing its environmental and social dimensions. Should these be taken into account, the report may be even worse. Aquaculture, that is supposed to palliate dwindling natural resources, is actually increasing the pressure on them.

Retailers, and all organisations in the fish and fish product supply chains, are thus faced with the fact that the resources they trade do not comply with their commitment towards sustainable resources, which is core to most CSR policies. This is a major risk to retailers' image and may explain why details of their seafood sourcing policies and the state of their implementation is very difficult to obtain, as will be further discussed.

This does not mean however that they are inactive. Although there are still important challenges in terms of transparency, information sharing and traceability, several large retailers are working on their policies and implementation. The two examples below illustrate the activities of the largest retailers, WalMart and Carrefour.

Responding to consumers' awareness

Despite the fact that growing consumer awareness about sustainability in the fisheries sector does not always translate into sales, retailers, wholesalers and food service providers have to respond to the expectations of their customers. Attitudes towards the importance of consumer demands vary between seafood retailers and restaurateurs. According to Seafood Choices Alliance (2007b), retailers in the US regard this factor as extremely important (80%), wholesalers slightly less (77%) and restaurateurs even less (64%), as they feel they have more flexibility. They still represent about two thirds of respondents. In Europe, more than half (52%) even think that environmental considerations may become more important than flavour for consumers (Seafood Choices Alliance, 2007b).

Despite the high level of concerns about sustainability issues expressed by consumers both in the EU and the US, as described in chapter 2, the majority of retailers, wholesalers and food service providers perceive themselves to be more concerned than their customers. In the US 49% and in the EU 88% are quite or very concerned about the environmental condition of the ocean and view it as a threat to their businesses.

Both in the EU and in the US, buyers consider over-fishing as the top fish sustainability issue.

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European buyers put however the issues of by-catch and destructive fishing practices at the same level. Quality, variety, and local/regional sourcing, are identified by all US supply chain organisations as key challenges, although restaurants (food services) are especially concerned with the verification of source and the chain of custody (49% of respondents).

Concerns with issues related to the impact of aquaculture are low, although relatively higher awareness exists in Germany in relation to the use of antibiotics, chemicals and drugs in fish farming. Quality, demand, availability and price are identified as the key factors in purchasing decisions, but for 79% of retailers and food services, the environmental impact of sourcing particular seafood is very important.

There is thus little doubt that retailers, wholesalers and food service providers are aware of the sustainability issue of their trade, and their customers share these concerns. They have translated this into specific policy decisions of retailers and food service providers. The policy decisions they have taken to reflect these concerns were initially developed as part of their general corporate social responsibility systems. Under pressure from consumers, and more importantly, NGOs, they have then slowly developed further tools to show progress towards responsible sourcing.

The importance, likely impact and differences in these policies, relate to the relative importance and place of each of the sectors. As mentioned before, European consumers make 50% of their seafood purchasing via the retail sector, while in the US the food service sector, receives two thirds of the revenue due to mark-ups. Thus, the purchasing policies decisions of supermarket and food service sector organisations become more relevant as global trend drivers.

The situation is particularly important for developing countries where, as result of globalisation, a select number of large internationals are able to dominate the market at a local level. (Wilkison *et al,* 2006).

The role of NGOs

Even though the market for sustainable seafood is reasonably well developed, both in Europe and the US, retailers and food services have taken time to meet consumers' demand for sustainably sourced seafood. Although behind other sectors, retailers and food services are now moving towards more responsible fish procurement policies and practices and are satisfying consumers' preferences for organic, fairtrade and sustainable products. For supermarkets it has become a matter of competitiveness and market share.

Undoubtedly pressure by NGOs has been key to driving this change. One of the earliest initiatives led by the sector in cooperation with NGOs was initiated by Unilever with its 1996 commitment to sustainable fish sourcing by 2005. This prompted the partnership with WWF to create the Marine Stewardship Council (MSC), which was established as an independent organisation in 2004. WWF has recently created its Seafood Buyers Groups to engage with seafood retailers on promoting sustainable sources. It is similar to Greenpeace's campaign (see below) and seeks to get buyers to stop unsustainable sourcing and ban the top endangered species from the shelves. WWF particularly seeks to promote the adoption of MSC standards. They have been also engaged in dialogues with aquaculture stakeholders to promote sustainability.

Greenpeace pushed UK retailers to move ahead with the publication of *"A Recipe for Disasters: Supermarket's insatiable appetite for Seafood"* (Greenpeace, 2005). This campaign, analysed UK supermarkets' fish policies and procurement

practices and ranked them using score-cards and a league table. It was later extended to other European countries and challenged major retailers to start the process of ensuring that all the seafood they sell comes from sustainable sources.

In their publication *"A Recipe for Change: Supermarkets respond to the challenge of sourcing sustainable seafood"*, Greenpeace (2007) reported the engagement of major retailers in its campaign by highlighting the removal of the most destructively fished species from the shelves of certain retailers, along with support for more sustainably sourced seafood. The report also testifies to the rapid strengthening and improvement in the implementation of policies by the seafood industry, while highlighting that it is just a beginning and that crucial challenges lie ahead.

More recently Greenpeace (2008b) has launched a similar campaign in US with *"Carting Away the Oceans: How Grocery Stores are Emptying the Seas"*. According to its research and the corresponding scorecard, the leading US supermarkets failed the test. According to Greenpeace, there is a lack of comprehensive policies for sustainable seafood procurement – an alarming situation. While many supermarkets sell organic or fair trade seafood products, they are behind on sustainably sourced fish products. According to the same study, most US supermarkets continue to buy seafood without much consideration for the health of the species they sell or where and how it was caught or farmed. Most of the species sold are from over-fished stock, are fished illegally or with destructive methods, or come from unsustainable farms. Only a few retailers had committed to sustainability and started to work on the implementation process.

In summary, whether or not the sector is receptive to NGOs, it is clear that they are influencing consumers' preferences and retailers' image and competitiveness' risks. Several large retailers are starting to improve their sourcing and it is expected that their example will encourage others to join. These actions are however made difficult due to the fact that the vast majority of current fish supply chains are fragmented and traceability is not ensured from the point of catch to the final consumer.

Further details on the specific buyers' policies and the use of labels in the US and Europe, particularly in the UK, can be viewed in Greenpeace (2005, 2007, 2008), FAO, (Macfadyen and Huntington, 2007), WWF (2007a), Seafood Choices Alliance (2007a, 2007b, 2008), Josupeit (2007) and the Poseidon's report (2008) produced in the context of the UNEP fisheries project, among others.

Perhaps some of the most recent and very high profile sustainable seafood sourcing announcements have come from Wal-Mart and Carrefour. The following section discusses these initiatives.

4.2 Some major retailers' initiatives

Wal-Mart

Wal-Mart is the world's largest retailer with 6,700 stores in the US, China, Japan, and several Latin American countries and annual sales of US $128,882,000,000. It has been in business since the late 1980s, and has been greening its business to improve its reputation as an ethical company. Today Wal-Mart is perceived as driving the ethical agenda for the whole retail industry in the fish sector, after Marks & Spencer (Fish Update, 2007).

Central to Wal-Mart's strategy is the pledge to ethical and environmentally responsible sourcing

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throughout its supply chains. By committing to buying larger volumes of environmentally sustainable products Wal-Mart wants to encourage suppliers to reduce the environmental impacts of their products and processes.

Wal-Mart's sustainable seafood sourcing policies are not publicly available. However, in 2006, Wal-Mart publicly announced its goal to carry 100 percent MSC-certified wild-caught fish in its stores by 2011.

This target certainly imposes a challenge not only to Wal-Mart's suppliers, which need to move forward if they want to retain their client, but also to other retailers working with seafood products, which may feel they need to react to keep pace.

Table 9 shows the extent of the challenge. The annual sales of seafood at Wal-Mart is significantly higher than the total global turnover of MSC (in 2007), and Wal-Mart is only one (albeit probably the largest) of 129 businesses in North America alone that sell MSC certified products. It represents only about 10% of the import value of the five main species entering the US. These products are also sold in many more countries. Even considering that aquaculture (thus not falling within the scope of MSC) will represent a growing part of the supply, it would be surprising if Wal-Mart's commitment was met, as it would suppose a huge and rapid increase of the number of certified fisheries in a context where most commercial stock is over-fished, thus not even meeting the criterion of a sustainable yield.

Figure 4: Wal-Mart's Sustainability Value Network Structure

Source: Wal-Mart

On the other hand, the commitment will create a huge demand for certified fish which may in turn create a "hunt" for certified products. Based on experience in other sectors, most notably with forestry certification, this situation where the demand for certified products largely exceeds supply, creates risks. At the end of the 20th century, WWF managed to create a high demand for timber products certified under the only scheme importance at the time, the Forest Stewardship Council. In addition to demand, it created an important visibility

Table 9: Wal-Mart, MSC and US import comparison (in US$)

	US$
Value of fish products sold by Wal-Mart in 2006	750,000,000
Value of the total MSC certified fish between April (MSC, 2007)	510,000,000
Number of companies selling MSC certified products in US (B2B) (MSC, 2007)	129
Number of countries in which MSC products are sold (MSC, 2007)	35
Import value of the of the five most important fish that enter the US (from Table 8)	7,033,000,000

for “certified timber” with the public. As global forestry management was not at a level that allowed certification for enough forests to meet the requirements, the supply did not follow. This opened a gap for other certification schemes that were able to piggy-back the situation and could produce “certified timber” with lower requirements, notably in terms of sustainability.

Macfadyen and Huntington (2007) provide an analysis of the different certification schemes and state that MSC is the most likely to bring about positive changes. The high demand created by retailers like Wal-Mart for MSC certified products may have the effect of creating a market for the others, but may be less likely to improve the situation.

Wal-Mart expect to encourage other fisheries to follow them into the assessment process and to raise awareness of sustainable seafood choices with the North American public.

Wal-Mart has taken two main steps towards its target:

- It ensured that all Wal-Mart seafood that comes from certified fisheries carries the MSC logo and details the source of all of its wild-caught fresh and frozen fish for the North American market.
- The retailer also engaged in a cooperative supply chain management with suppliers, staff and stakeholders, mainly with environmental NGOs such as WWF and Conservation International, and created the Seafood Network of suppliers. It developed the concept of a Sustainable Value Network Structure, a network of suppliers and other stakeholders exploring challenges and developing solutions that benefit Wal-Mart’s business and its local and global communities.

According to Wal-Mart (in Plambeck, 2007) this approach has already brought some results:

- Eliminating middlemen: MSC certification is shown by a Chain of Custody (CoC) certification that ensures a high level of traceability. This has helped identify middlemen whose intervention does not add value (only costs) to the chain.
- Consolidating relations with suppliers that act to improve their environmental performance, in what Wal-Mart calls a “race to the top”.

However, the recent Greenpeace (2008) study into US fish retailers, reports that although Wal-Mart is making major steps in the right direction, it still fails to pass the scorecards test. Amongst other things, the study mentions that Wal-Mart is still selling 14 of Greenpeace’s Red List Species such as Alaskan pollock, Atlantic cod, Atlantic halibut, Atlantic salmon, Atlantic sea scallops, Chilean bass grouper, hoki, red snapper, red fish, orange roughy, South-Atlantic albacore tuna, tropical shrimps and yellow tuna. Greenpeace noted also that Wal-Mart does not endorse any of the current certification systems favoured by the retailer including MSC or the Aquaculture Certification Council. This publication is likely to have an impact on retailers’ behaviour and may encourage Wal-Mart to implement the policy.

Carrefour

Carrefour is the number 1 retail group for global goods in Europe, number 2 retail group in terms of revenue after Wal-Mart and number 1 worldwide for food, with sales including taxes under the group banner for €90,7 billion (Gaebel, 2006). It has 12,547 stores, 456,295 employees in 29 countries worldwide, mainly in the European Union, South America, East Asia and Northern Africa.

Carrefour does not have publicly available sustainable seafood sourcing policies and its public communication leads us to believe that they have less of a structured policy and implementation regarding fish than Wal-Mart. The company’s actions fall more within its overall corporate

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responsibility programme. Some specifics can nevertheless be identified.

In 2005, the group decided to promote sustainable fishing and to contribute to sustainable management of resources, given the crucial problem of over-exploitation of ocean resources and decreasing fish stocks (Carrefour, 2005). Carrefour launched the "Responsible Fishing" line of products and label in France and Belgium, based on FAO's Code of Conduct for Responsible Fisheries and developed it according to the EU's directives (Correard, 2006). The line focuses on maximum traceability, good stock management and respect for the ecosystem.

According to Gaebel (2006) the main features of Carrefour's policy include:

- All producers, both at the fishing and first processing levels, are audited by Carrefour's quality control (QC) department or external dedicated third party bodies.
- Carrefour has developed direct import activities to improve transparency of the products (origin, traceability, checks and controls), as well as purchase price on high demand markets, so as to anticipate market trends.
- Fresh products are sourced and purchased by each national Carrefour chain.
- The main species for frozen products are sourced and purchased by a new central office, Carrefour Merchandise International (CMI). This includes Atlantic Cod, Alaskan pollock among other ground fish species. Other species are managed by each country.
- Canned products for the main species such as tuna and sardine are managed by CMI.
- At the global policy level, they have direct relationships with the producers, global negotiation for each species, and global purchasing.
- Sustainability is regarded as dealing with catching areas, resource management, catching methods and social aspects.
- Food safety is ensured by strengthening relations with suppliers, developing specification for its own brand products, such as GMO free, favouring natural flavours and colours and banning products from dangerous sources (e.g. cod from Baltic Sea).
- Quality management involves auditing all suppliers and validating technical specifications, tracking the products by regular checking, monitoring EU regulations and technical/ scientific developments, and anticipating crises (sanitary, media campaign etc.).
- Traceability is used to guarantee food safety (HACCP) to consumers.

Carrefour recognise both the need and the difficulty of achieving traceability throughout the chain. At present, the company is working to establish traceability two levels up the chain (i.e. to the suppliers of their suppliers).

As a whole the Carrefour group favours herbivore fish and avoids as much as possible deep-sea species (Carrefour, undated). The group also prefers shrimps sourced from the members of the Global Aquaculture Alliance (GAA), a trade association of "aqua-cultivators".

These policies have been in development for some time, but have not been made public yet (Correard, 2008). In 2006, Gaebel reported the following next steps:

- Sustainability target: long-term contracts with suppliers for main species.
- Extend the policy to processed products such as ready meals, surimi sticks.
- Promote eco-labelling products such as MSC Hoki from New-Zealand, Wild Pacific Salmon and pollock from the US.
- Improve purchasing from small-scale fishing.
- Improve Carrefour Quality Lines for fishing.
- Protect local economy (small boats with ice

water tanks, lining & jigging).
- Promote local know-how.
- Reinforce cooperation with specialised organisations such as the Groundfish Forum, the UN (FAO), governments, WWF, NGOs.

In France, Hypermarkets France launched a Carrefour Agir Éco Planète brand with Marine Stewardship Council (MSC) frozen and fresh products and 2008 should see this strategy being extended.

Carrefour is also a member of the Responsible Fishing Alliance (RFA), an informal group of organisations united through common projects to support the sustainable development of wild-fish fisheries and fisheries from alternative fish farming (RFA, 2007 and Sustainable Food Lab, undated). One such project is planed to build the capacity of fish communities around Lake Victoria (RFA, 2007), empowering them to:

- implement viable alternative economic activities to capture fishing: animal husbandry, agriculture and organic vegetable production, and/or fish farming (aquaculture); and
- become real negotiating partners in the supply chain, able to influence the decision-making process in matters that impact on their lives (e.g. price, fishing policy and method, access to social infrastructures, etc.).

One of the main focuses of this project is the Katosi women's community in Uganda. It is aimed at developing local alternative subsistence and revenue generation, i.e. not intended for international markets. The main needs that have been identified in the preparatory phase of the project are (Nagato, 2008):

- Information to the local population and beneficiaries of the project on the risks associated with the current situation around Lake Victoria (high dependence on one fish species that is over-fished and poor health and safety and socio economic conditions) and the existence of alternatives.
- Capacity building to take on new activities (e.g. farming or aquaculture).
- Sensitisation to the needs of wild stock fish management and capacity building – this needs to go beyond the direct beneficiaries of the project as it is crucial for the sustainability of the lake as a whole.
- Support to develop alternative income revenue.

When asked about the ideal supply chain, in her view Nagato does not necessarily call for new structures, but stresses the need for equitable benefit sharing along the whole chain, which implies transparency. This is one of the aims of the project. If they get fairer prices, fishers commit to reducing the catch of juveniles and environmental degradation.

Recognising the need to diminish dependency on exports, particularly in a context of dramatically reducing stocks, the project does not envisage using trade as a direct financing mechanism, but instead a levy (e.g. 1 Euro per kilo) is taken on the sale of fish at the retailer level. Carrefour Italy and Belgium have agreed in principle (RFA, 2007) and the first funds have been released (Nagato, 2008).

4.3 Conclusions on retailers' policies

Retailers and the food service sector are well aware of the sustainability issues in their trade, and the growing expectations of consumers. Some have developed policies towards sustainable sourcing but they are faced with huge difficulties in implementing them. Possibly as a result of this situation, they are not very open about sharing concrete information regarding either the details of the policies or where they stand in their implementation.

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Retailers, being at the end of the chain prior to final consumers, are faced with the need for and, the absence of, full traceability. As explained above, traceability is not only a tool that allows retailers to identify the source of a product but it also allows information, notably about the environmental and social conditions of the resource, to travel with the product. Without being able to identify in a reliable manner the sustainability or not of the fish and fish products they sell, they are now starting to rely on certification as an appropriate tool.

This trend is loudly promoted by Wal-Mart and more quietly by Carrefour, but Carrefour seems to be more and more reliant on third party evaluation. It has announced the achievement of three MSC certified products on their shelves in 2007, and the extension to other products in 2008.

Both retailers mainly refer to MSC certification. However, it is likely that others will benefit from this trend, such as Friends of the Sea, which is possibly a future important stakeholder. Macfadyen, G. & Huntington, T. (2007) rate Friends of the Sea lower than MSC as a potential catalyst for improvement.

Certification, if it includes chain of custody, can be a very valuable tool, if only because it ensures a much higher traceability than is the norm. It is nevertheless an “easy” solution for retailers as it, in a way, pushes back the responsibility of sustainability to certification schemes (to define it, verify it and assume the liability on the claims that are made) and on producers to shift away from unsustainable practices that are a consequence of excess demand on a limited resource, thus largely a responsibility for the end of the chain.

Approaches like the Katosi project are interesting but they may be limited in scope and difficult to upscale, which limits their application. Besides, the project was planned some two years ago but is only just starting, highlighting the difficulty in creating alternative revenue sources for fishers.

5

Leveraging change

5 Leveraging change

In the very short term, the sustainability of fish products depends on two major elements: a significant decrease in the pressure on stocks, and the actual implementation of traceability of fish from the point of catch to the shelves.

The former can be achieved through reduced fish consumption worldwide, which is not likely to happen, or through aquaculture, provided it becomes sustainable, i.e. it does not depend on wild catch for feed or regeneration and does not threaten ecosystems and respects equitable social conditions. Whereas achieving sustainable aquaculture on a large scale is a key element of sustainability for capture fisheries, aquaculture has not been the topic of this document.

Concerning capture fisheries, full traceability is the single most important element that needs to be achieved in the short term. Implementing it is a key element in accessing international markets. It will soon become a *critical* condition for access. This overarching trend is fuelled by an array of convergent sub-trends:

- The health and safety regulations in most developed countries, including the three which dominate, the EU, the US and Japan, have become more and more demanding.
- The strategy of some developing countries' processors to develop markets regionally, in Asia for example, because requirements are lighter, may be short lived. Traditionally, as emergent markets become wealthier, their health and safety requirements start matching those of developed countries. In some extreme cases, e.g. the use of medicinal plants in Colombia, the local legislation requires the approval by EU or US authorities to allow the commercialisation of the product (Urrea, 2008). Additionally, international retail groups are increasingly present in developing countries, to the point that they are becoming dominant in some markets. Their CSR policies, including purchasing policies, tend to be applied throughout all their subsidiaries.
- The security of their supply chains requires retailers, food service providers and all intermediaries up the chain to have as much information as possible in terms of legal and ethical considerations. Certification that includes chain of custody is a preferred tool for them to ensure that a sufficient level of traceability is in place.

It is important to reinforce here what was explained in chapter 3. Traceability is much more than the capacity to physically follow the product throughout the supply chain; it is also a mechanism that ensures the flow of socio-economic and environmental information about the different stages of production. This allows the identification of issues and facilitates responses from all stakeholders in the supply chain. It is a key element in providing transparency about commercial interactions. As such it is a fundamental part of equitable benefit sharing. Finally, it is the instrument that allows consumers to learn about the ethical conditions of production in the social and environmental sense. It is therefore the key that permits them to use their buying power to influence trade, being understood that they may do so, not necessarily by paying more for products, but by choosing producers and retailers they deem more responsible than others.

As traceability may require important resources for its implementation, it may not be accessible to some small fishers. Additionally, the strongest economic segments of the population are able to more easily access the funds channelled for the development of processing capacity in developing countries, thus increasing the gap with artisanal producers.

The fish market will probably become divided into those who offer traceability now, those who may achieve it with some incentive/help and those who

will never be able to achieve it. Because of this, the applicability of different market instruments is not shown below according to the place of organisations (any structure involved in fish supply chain) in the supply chain, but according to its capacity to implement traceability.

Organisations that can deliver traceability now, at least from the landing point, are large and relatively well-structured businesses, both in the developed and the developing world. The tendency is toward better vertical integration. As they are already well connected to international markets, they are subject to pressure by supply chains. However, the fact that they can deliver traceability does not mean that they necessarily do.

Despite the fact that they may have a traceability system in place, albeit not necessarily a fully fledged one, these organisations may not have incentives to play according to the rules and they may be involved in practices that could fall under IUU.

The assistance for developing processing capacity in developing countries, either by international development aid or by government, helps address issues of health and safety and traceability, but is often disconnected from environmental and/or social requirements or consideration of the availability of the primary resource – fish.

A certain number of **organisations could deliver traceability in the future**, implement responsible fishing and/or processing methods and be financially sustainable with assistance and capacity building. As shown in Diagram 7 – *Issues related to supply chains* on p42, the focus of attention should be between the time of catch and landings and between domestic processing and exports, where the current systems stop.

Capacity building needs at these two leverage points would be the dissemination of information on the reality and complexity of the supply chains, the development of low tech but reliable tracing methods and their implementation. Additionally, there would be a need for technical assistance in compliance with HACPP requirements, including conservation methods and hygiene management.

Some **organisations will never meet traceability requirements**. In a context where:

- fish stocks are dwindling;
- the fish and fish products sector is becoming consolidated; and
- the structural requirements and associated costs are increasing.

There is absolutely no doubt that the sector will see dramatic changes. One of these could be the complete marginalisation of the small producers, to a point where the smallest will lose access to lucrative markets and would thus be better off diversifying their activities.

While it is obvious that some will see their fishing livelihood dwindle, it is much less clear where the line can be drawn between those who may adapt to new conditions, and thus fall in the second category above, and those who will never be able to meet the traceability requirements and should diversify. There is thus a need to develop objective and adaptive tools to allow this distinction to be made.

A certain number of tools can be used to resolve the crisis. Market and financial instruments have proven to be very fast, responsive and effective in changing commercial practices, if they are used on a sufficient scale. This has been experienced in the textile/apparel/footware domain through company-specific mechanisms, principally B2B activity, or in the forest certification sector, amongst others.

The potential role of certification, business to business initiatives, responsible investment and

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private public partnerships are reviewed below. It is clear that not all instruments have the same effectiveness in all situations. In some cases one or the other may not be applicable at all.

5.1 Certification

Organisations that can deliver traceability now

Certification for this type of company should not be much more of a problem than it is for large companies in other sectors. It is mostly a question of political will. The robustness of the Chain of Custody (CoC) system is also key and should extend to the time and location of harvest.

The public commitment of retailers or food services, such as Wal-Mart or Sainsburys and MacDonald's, is a very important signal and should help certification to take off. Retailers should be aware that their own requirements in terms of certification should not stop at traceability, but should extend to real sustainability as their own investment in one scheme or another may have different returns according to its credibility with the public.

One scheme which is starting to gain broad recognition is MSC. Boosted by its success, it tries to address small-scale and artisanal fishing, but still only large-scale fisheries are currently certified. Friend of the Sea (FoS) is a growing stakeholder in the field. It proposes both aquaculture and wild capture certification and is supposed to be simpler than MSC. FoS seems to have come to light partially as a reaction to MSC, thus mirroring a phenomenon that happened in the forestry sector.

The competition between MSC and FoS may end in the former streamlining some of its procedures and the latter improving and being able to bring about positive changes on the ground. One distinctive trait of the fishery sector compared to forestry is that the crisis is much deeper and the timeframe to resolve it much shorter. It will thus be interesting to follow the development of the two schemes under such a time constraint.

Besides considerations of environmental aspects and long term yield, certification should address the issue of access rights and address situations where industrial fishing makes it impossible for local populations to access their traditional fishing waters. Examples include:

- Iceland, where transferable quotas have gradually gone to only large companies (see Icelandic cod fisheries example, p36)
- Mauritania, where access rights given to European and Chinese fleets deprive the local population of fish, even for subsistence (see p40 – depletion of stocks in Mauritania)

Organisations that could deliver traceability in the future

Certification is arguably the most innovative and effective tool for positive change that has been used since the late 1990s. For example, in the forestry sector, over 100 million ha have been certified, which implies that at least 10 million ha (or 2.5 times the area of Switzerland) of productive forest are now protected worldwide[3]. No other initiative, private or governmental has been able to achieve similar results[4].

[3] This is only one indicator of environmental achievement and does not reflect achievements in the socio-economic domain or the mindset of the trade.

[4] Based on the author's information: WWF/World Bank estimation of productive forests worldwide: 600 – 800 million ha, FSC certified area (2008) more than 100 million ha. FSC certification requires the establishment of protected areas. The average requirement can be conservatively estimated at 10%

However, certification does not come without its problems, including:

- It is principally a pass/fail test and is not well adapted to recognise progress. Organisations that are far from complying with the certification requirements and don't have the financial resources to undertake radical changes in the short term, have little incentive to improve and are thus not easily influenced by certification.
- It requires management practices that are derived from western culture, and may either not be feasible for very small fishing operations or completely outside their cultural background.

This means that certification is traditionally not well adapted to small organisations. This is a recognised fact and efforts are being made to solve this problem by developing group certification schemes and a gradual approach to certification, amongst others. To be effective, gradual approaches (or stepwise approach as it is often called) should be verified and connected to markets (e.g. by allowing products from organisations under such a scheme as temporarily acceptable in the procurement policies of buyers).

However, they run the risk of undermining certification as they relieve the pressure to comply on producers and on buyers to purchase certified products. The complexity of running an effective gradual approach requires a formal structure to run it, either within the certification scheme or outside, but in collaboration with it.

A system of gradual approach to certification does not currently exist in the fishery sector [5].

Ensuring equitable benefit sharing and transparency along the supply chain would be most desirable to make certification a real incentive for SMEs. This does not exist either.

5.2 Business-to-business

Organisations that can deliver traceability now

Business to business relations may be less visible than on-product labelling but they can be very powerful and flexible instruments. Purchasing policies such as Unilever's who want to be able to trace "the raw material back to the captain for almost everything" (Roheim and Sutinen, 2006), can go a long way towards pushing sustainability concerns up the chain, if they are enforced. It must be noted that Unilever's ambitious target set in 1996 to source only sustainable seafood by 2005 has only been half met, showing the difficulty in implementing such policies.

By requiring their providers to implement their own procurement practices that are consistent with sustainability, buyers can ensure the safety of their supply chain. They do not need to make this known on the product. Business to business practice can be accompanied or based on third party assessments or schemes. Examples include the Common Code for the Coffee Community or the Union for Ethical BioTrade. Both systems have attracted large stakeholders. Sometimes companies rely on third party certification schemes but do not publicise this on the products, even if the scheme allows it.

[5] True for the two main capture certification programmes (MSC and Friend of the Seas), but considering the number of schemes that exist in aquaculture, a thorough review of each of them would be needed to check this assertion – an exercise that is outside the scope of this work

5 Leveraging change

Organisations that could deliver traceability in the future

A business-to-business approach offers more flexibility to encourage progress as it is not linked with on-product claims and there is also less chance of misleading consumers. Organisations like the Common Code for the Coffee Community (undated) and the Union for Ethical BioTrade (undated) have set up systems by which membership is conditional on verified achievement of a roadmap towards sustainability. The latter organisation includes shared responsibility for compliance with the requirements over time throughout the supply chain. This means buyers in the Union are more likely to buy products from producers or processors who are also in the Union. The Union has equitable benefit sharing along the supply chain as one of its main objectives (along with conservation and sustainable use, the three CBD objectives).

These characteristics mean that, in addition to attracting large corporations, the initiatives are also joined by some small producers – particularly members of the Union.

Both initiatives offer the benefit of a structured approach, with multi-stakeholder input, which makes them much more credible than systems that are company specific, as is common in the textile industry, for example.

It would be worth exploring the possibility of developing a similar approach for fish and fish products.

Organisations that will never meet traceability requirements

These organisations are likely to disappear, so B2B cannot do much. However, single businesses can launch projects, or help finance projects of their own, that can help develop alternative revenue sources for communities. The Katosi women's project (see p57) is an example of such a project financed by Carrefour.

The rolling out of similar initiatives would be welcome in reducing the impact the market will continue to have on the livelihood of some artisanal fishing communities and the pressure they may exert on often scarce fish resources.

5.3 Responsible investment

Organisations that can deliver traceability now

The seafood sector is rapidly expanding and, despite the collapse of stocks, investment continues to flow in (Davidson, 2007). This investment is an important driver for over capacity, both in terms of fishing vessels and in terms of processing. It contributes further to stock depletion. Subsidies to fishing fleets are another such driver but depend more on governmental action than on supply chain management.

Directing financial resources (and incentives) only to organisations that commit to, and implement sustainable practices, would go a long way in counteracting the perverse incentive represented by current practices.

The success of responsible investment and aid in curbing current practices would depend at least on the following factors:

- Guidelines to define responsible investment and aid in the fishing sector. This would help avoid a multitude of different (and maybe contradictory) approaches and claims of responsible investment. The Equator Principles, a benchmark for the financial industry to

manage social and environmental issues in project financing (2008), may be a good starting point for this, but would need to be specified further for the fish product sector.
- The adherence of major investment organisations and donor institutions (public and private). A specific application of the Equator principles would probably facilitate the adherence of the more than 60 banking institutions that have adopted them (Equator Principles, 2008).
- The connection with markets. For example, receiving funds from an institution that adheres to the guidelines could be considered as a step towards certified responsible practices.

Organisations that could deliver traceability in the future

Responsible investment as it is traditionally understood may be less effective for SMEs. The Equator Principles, for example, only apply for investments of US $10 million or more. However, if a specific guide were to be developed for the fish and fish products sector, it could be adapted to smaller amounts, even to micro finance initiatives and to development aid programmes.

Organisations that will never meet traceability requirements

In the strict sense, responsible investment would have no role to play. However, development aid funding could. Shifting from a traditional fishing activity to others (e.g. agriculture or handicrafts) will require the production of tailored information to the communities on the trends of the fish trade, analysis of possibilities within specific regions, whose discussions with local people and the development of specific projects. This requires resources that will not bring returns (thus that are not investments) but whose attribution could be directed by principles of sustainability, maybe derived from the ones responsible investment should implement.

Once new activities are developed, micro-(responsible) finance could come into play.

5.4 Private Public Partnerships

Private public partnerships can be around specific projects, with relatively limited scope or can be broader and be long lasting. Considering the dimensions of the fishery crisis, only large scale and long lasting PPPs are considered below. Such partnerships should not decline to address global policy issues.

Organisations that can deliver traceability now

In general terms, public private partnerships (PPPs) should be focused where other approaches would not be able to deliver well. Because large organisations are well connected with, and dependent on markets, the use of market tools should, in principle, be preferred. However PPPs have a powerful uniting power that can be used. For example:

- To initiate a discussion on the development of a structure of the kind of the Common Code for the Coffee Community (4Cs) or the Union for Ethical BioTrade. The former was initiated as a PPP between the German cooperation (GTZ and BMZ) and the European Coffee sector association. The latter emerged from the UNCTAD BioTrade Initiative, in collaboration with private sector organisations. Such discussions should not be the initiative of only one party, e.g. intergovernmental organisations or the private sector, because this can limit the buy-in of different stakeholders in the future.
- To engage the retail sector, the banking and development aid institutions and NGOs on the development and adoption of guidelines on responsible investment in the fishing sector.

5 Leveraging change

Organisations that could deliver traceability in the future

PPPs could clearly play a major role in developing a B2B initiative of the kind described above. Their flexibility is business-friendly and can support progressive implementation of good practices. PPPs that involve SMEs, can be extremely efficient in promoting good practices by the interchange of ideas and experiences between organisations of different styles and sizes. In the examples of the 4Cs and the Union for Ethical BioTrade, they also favour commercial interactions between producers and buyers of different sizes, even if this is not detailed in the objectives of the organisations. In itself, this is an important incentive for better practice.

A PPP including SMEs could manage the development of responsible investment guidelines for example, ensuring that these would be applicable to smaller investments.

Organisations that will never meet traceability requirements

PPPs would seem the best mechanism to link the responsibility of trade towards people who will lose their revenues and maybe their livelihoods and allow coordinated action.

While it may seem utopian to think that businesses would finance the diversification of revenues of communities, this has happened and is happening in many sectors. During the coffee price crisis, largely due to global overproduction, (itself the result of less than careful funding of development aid agencies and the World Bank) large stakeholders of the sector and governments have participated in the reduction of production by developing alternative revenue schemes for producers. In the cosmetics sector, transnational groups are financing the business education of some of the communities that are providing their raw material, even if this happens through several intermediaries, with the purpose of making them less dependent on one source of revenue or one client. Finally in the fish product sector, Carrefour is doing exactly this in the case of the Katosi Women's project.

The scale of these initiatives may be however too limited for them to have a significant impact on a global scale, but a broader PPP could help upscale them to a significant level.

The Carrefour example of levying a fee on each fish or fish product sold to finance the shift to alternative revenue schemes, is only one way, when probably many others exist. A systematic review of possible alternatives should be undertaken to identify and rank them by their potential in different circumstances. Once identified, they should be implemented. All this would require the active participation of both public institutions and the private sector.

5.5 Recommendations

A certain number of missing tools for implementing and promoting sustainable practices are identified in this document. The list is not exhaustive and only concerns instruments that are needed in the relatively short term. These include:

- A method to determine objectively whether organisations would best benefit from capacity building in relation to fishing activities or to changing revenue patterns. Such a method would minimise the risk that donor's or investor's money is badly directed, its use is inefficient or, worse, that it leads communities in a direction where their livelihoods suffer.
- Traceability methods that allow tracking the fish from the net to the shelves. These should ensure that socio-economic and environmental

information on the production process travels with the products. It is particularly important that this information is integrated from the starting point of the chain, as it is very difficult to reconstruct afterwards. The method(s) should have special mechanisms that allow a relatively low-tech implementation and thus, their use by SMEs without jeopardising their robustness.

- A progressive approach to certification linked to some market benefits. Without it, it will be extremely difficult to attract organisations that are far away from certifiable levels. The mechanism does not need to be necessarily linked with certification and might benefit from a more flexible B2B approach.
- Guidelines for responsible investment practices. These should be applicable to SMEs (thus also consider small investments) and could also guide the use of development money.
- The promotion of an ecosystem approach in managing fisheries. This needs to be a core strategy from local to global levels.

Capacity-building needs related to sustainable capture fisheries are identified in this report. Particularly, numerous SMEs would benefit from a better understanding of traceability and HACCP requirements. Groups likely to be excluded from the fish trade that would be better off looking for alternative revenue sources may need assistance in identifying and implementing the new activities that this would entail.

The elements outlined above play an important role in the sustainability of fish products and there is a need from the sector's stakeholders to evaluate and install mechanisms to support these elements. A global partnership is the first step to achieving this and must be a collaboration that is accepted by all to ensure significant progress.

There are numerous examples of such partnerships with some more successful than others. The Common Code for the Coffee Community and the Union for Ethical BioTrade provide good examples of such partnerships. They are both organisations that stemmed from governmental or intergovernmental institutions, bringing together different parties and aiming to resolve specific issues related to the sustainability in their sector. Both offer B2B progressive approaches and work in collaboration with certification institutions.

Discussion on certification standards must include traceability from the start, equitable benefit sharing and access rights that are crucial in protecting SMEs and local livelihoods. A further recommendation is that any discussions about fisheries should encompass the topic of aquaculture as capture fisheries depend directly on the capacity of aquaculture to provide sustainable fish products without adding to the burden on the oceans.

Global fish stocks are in crisis. By taking these recommendations into account UNEP can contribute to a growing awareness through promoting sustainable fishing practices and also traceability in fish supply chains through certification of Chain of Custody requirements. A global partnership can offer support and go a long way to helping achieve these aims. However, a partnership must not try to please everybody but rather provide direction and leadership in making tough but necessary decisions to ensure that the global wild-caught fisheries sector is here to stay.

Annexes

Annexes

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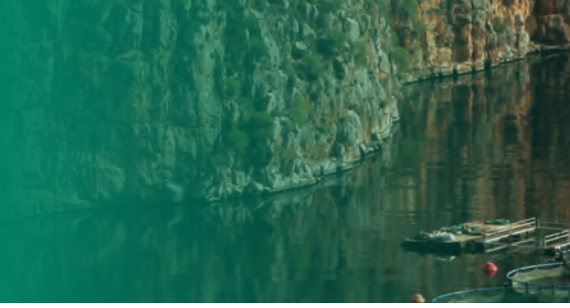

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About the UNEP Division of Technology, Industry and Economics

The UNEP Division of Technology, Industry and Economics (DTIE) helps governments, local authorities and decision-makers in business and industry to develop and implement policies and practices focusing on sustainable development.

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This publication provides guidance to the various stakeholders in the fisheries sector on the tools and actions necessary to address the challenges contributing to the global seafood crisis. The document reviews the complexities surrounding the current decline, and in some cases collapse, of global fish stocks. It promotes the need for a multifaceted approach to overcome the current challenges necessary to facilitate enhanced sustainability within the sector. It outlines the role various stakeholders play in addressing the key issues and impacts and highlights the importance of certification schemes, business to business relations, responsible investments and private/public partnerships in collective action within supply chains to address the current crisis. The recommendations presented in this publication are the result of an extensive review and analysis of current initiatives, research, expert interviews and case studies in the fisheries sector and its associated supply chains.

DTI/1218/PA