Trade Liberalization in Fish Products: Impacts on Sustainability of International Markets and Fish Resources

By

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EXECUTIVE SUMMARY

In many ways, fish as a food commodity is treated as a poor sister to agriculture. For example, fish is not part of the agricultural negotiations of the World Trade Organization (WTO) and continues to be treated as an industrial product in negotiations. Yet, fish is the most important source of protein for many around the globe. Estimates are that, globally, per capita consumption of fish is 14.3 kilograms (kg) per year (Delgado et al, 2003). Per capita consumption in 1997 was led by Japan, with 62.6 kg. per year and China at 26.5 kg per year, up from 8.1 in 1985. The European Union (EU) consumes at 23.6 per year per capita, and Southeast Asia at 23.0 kg per year, up from 19.8 in 1985. Furthermore, per capita consumption of fish by 2020 is expected to rise to 35.9 kg/year in China and 25.8 kg/year in Southeast Asia, while it will remain constant or decline in developed countries (Delgado et al., 2003).

The goal of this report is to present the structure and important features of the fish products market, including illustrations of the complexities of the market, followed by a discussion of the impacts of trade liberalization, with a particular focus on developing nations. Developing nations play a very important role in international seafood trade. Many developing nations rely on exports of seafood as one of the primary sources for export earnings, including the Maldives, Mozambique, Senegal, Peru and Sierra Leone (FAO, 2000a). Fisheries production, captured and aquaculture, has doubled in the last 30 years, and most of that increase has come from developing countries (FAO, 2000a). Over half of global fish exports by value come from Latin America and the Carribean, the developing nations of Asia, and Africa. The majority of those exports go to developed nations (FAO, 2000a). With this growth in production and trade, and dependence on seafood exports for foreign exchange, has come the over-exploitation of fish stocks and a rapid expansion in aquaculture. Both of these have had severe impacts on the environment. Thus, the issues related to trade liberalization in the seafood markets relates directly to sustainability of the production of fish products, and by implication, the sustainability of international trade of fish products.

Summary points are as follows:

- In general, tariff rates on fisheries products are small compared to agriculture. There is tariff escalation in fish products through the processing chain, but it is very moderate and lower than for agricultural trade.

- As tariff barriers in the seafood sector have been reduced, developed countries have increasingly turned to use of countervailing and antidumping petitions as a means to erect trade barriers to seafood imports from both developed and developing countries. The U.S. has a track record of countervailing and antidumping suits in seafood products, including several against developing countries.

- The capital requirements to satisfy Hazard Analysis Critical Control Point (HACCP) and other safety and quality standards in fishery and seafood products

may exclude several of the Least Developed Countries (LDCs). Frequently shipments of seafood to the EU and the U.S. from developing countries are rejected because of food safety concerns.

- Several African countries have failed to capture the opportunities created by international fisheries policies, such as sole jurisdiction over the 200-mile Exclusive Economic Zone, and have instead sold their access rights to EU fishing fleets. This has generally led to overexploitation of fish stocks, especially in Africa.

- Domestic fisheries management policies in most countries are either ill designed or poorly enforced, leading to over fishing. Impacts of trade liberalization on the sustainability of the markets for these fish products may be negative.

- There are significant environmental degradation issues linked to both wild catch and fish farming, leading to unsustainable fish and seafood markets. Little progress has been made on addressing these externalities induced by over fishing and by fish farming.

- Domestic policy reforms regarding fisheries management are a necessary condition for trade liberalization to improve the welfare of producers and consumers in the fish product markets.

- International trade in fish and fish products also has an impact on food security. Often the domestic market retains only the poor quality fish while the higher valued fish are exclusively sold to the export market. A collapse in the stock of the poorer quality fish consumed domestically may lead to significant food security problems.

- There is concern that the sustainability of fish meant for fishmeal and fish oil may be under stress, and will be even more so in the future. The globalized nature of the market for industrial fish products will lead to price rises, particularly if fishmeal remains a large component of feed in aquaculture operations producing, for example, shrimp and salmon. Higher prices for fishmeal will have a negative impact on the food security of some nations as the price of feed for terrestrial livestock rises.

I. INTRODUCTION

In many ways, fish as a food commodity is treated as a poor sister to agriculture. For example, fish is not part of the agricultural negotiations of the World Trade Organization (WTO) and continues to be treated as an industrial product in negotiations. Yet, fish is the most important source of protein for many around the globe. Estimates are that, globally, per capita consumption of fish is 14.3 kilograms (kg) per year (Delgado et al, 2003). Per capita consumption in 1997 was led by Japan, with 62.6 kg. per year and China at 26.5 kg per year, up from 8.1 in 1985. The European Union (EU) consumes at 23.6 per year per capita, and Southeast Asia at 23.0 kg per year, up from 19.8 in 1985. Furthermore, per capita consumption of fish by 2020 is expected to rise to 35.9 kg/year in China and 25.8 kg/year in Southeast Asia, while it will remain constant or decline in developed countries (Delgado et al., 2003).

The goal of this chapter is to present the structure and important features of the fish products market, including illustrations of the complexities of the market, followed by a discussion of the impacts of trade liberalization, with a particular focus on developing nations. Developing nations play a very important role in international seafood trade. Many developing nations rely on exports of seafood as one of the primary sources for export earnings, including the Maldives, Mozambique, Senegal, Peru and Sierra Leone (FAO, 2000a). Fisheries production, captured and aquaculture, has doubled in the last 30 years, and most of that increase has come from developing countries (FAO, 2000a). Over half of global fish exports by value come from Latin America and the Carribean, the developing nations of Asia, and Africa. The majority of those exports go to developed nations (FAO, 2000a). With this growth in production and trade, and dependence on seafood exports for foreign exchange has come the over-exploitation of fish stocks and a rapid expansion in aquaculture. Both of these have had severe impacts on the environment. Thus, the issues related to trade liberalization in the seafood markets relates directly to sustainability of the production of fish products, and by implication, the sustainability of international trade of fish products.

Capture fisheries supply the majority of fish production, but fully 60% of the world's fisheries are either over-utilized or fully utilized (Grainger and Garcia, 1996). Even with the establishment of the 200-mile Exclusive Economic Zones (EEZs) in 1977, which brought one third of the world's oceans under the jurisdiction of coastal states, most fisheries management plans have not achieved their stated goal of maintaining sustainable fisheries. Many countries, mostly developing, do not have management policies. Thus one question is whether or not supply can meet the growing demand in the future.

In addition, many countries, primarily developed, have subsidized their fishing fleets for decades and sometimes even longer. It is widely agreed that these subsidies have contributed enormously to the over-capacity problem experienced by fishing fleets globally, leading to 'too many boats chasing too few fish.' As stocks in developed countries have declined, their fleets have gone elsewhere to capture fish. The governments of the EU, for example, have paid several developing countries for access

rights to their fishing territory. While the developing nations gain access fees, enforcement of fish management policies to limit the catches of the foreign fleets are minimal, resulting in an over-fishing of these stocks as well. Thus, while there is a short-term monetary gain for developing countries allowing foreign fleets to fish in their waters, in the long-run that gain disappears.

A large portion of global fish supply comes from aquaculture, and continued growth in this sector is likely. Aquaculture production is very similar in nature to agricultural production, and takes place in freshwater, brackish coastal waters and marine waters with more than half coming from the latter two (FAO 2002a). The situation is not much better on the production side for aquaculture. Shrimp is the most highly valued aquaculture product, and the majority of the supply comes from developing countries. Bangladesh exported US$330 million of shrimp in 2000, most of it from aquaculture (FAO, 2002a). However, it is estimated that more than 60 percent of Asia's mangroves have already been converted to aquaculture farms, primarily for the production of shrimp (ESCAP and ASB 2000) leading to habitat loss and land degredation.

Both aquaculture and capture fisheries industries face a strengthened environmental opposition to their harvest practices. The environmental organizations are primarily found in developed countries, and their campaign is to educate the consumer about production practices that are not friendly to environmental health, in the hopes that educated consumers will change their consumption habits. In the U.S., the Monterey Bay Aquarium, the Audubon Society, Environmental Defense and Blue Ocean Institute have all published guides for seafood consumers as to which fish are harvested in an environmentally friendly manner and which are not, to assist the consumer in their purchase choices. Included in the 'do not eat' category are shrimp/prawns, both wild and aquacultured. The only species exported by developing countries that are listed in the 'best choices' are farmed shellfish. A few years ago, most in the seafood industry would have speculated that these campaigns would not have a major impact on seafood consumption in the Western World, but momentum seems to be growing. It may be awhile before we see large impacts, but this is not something to brush aside.

The report is structured as follows. First, there is a general discussion of production of fish products globally with a look at the most important producing countries and species harvested. Concurrent with that is a description of aquaculture production. Second, the current picture in international trade is presented, identifying the major players. Third, there is a thorough discussion of the constraints which face international trade in fish and fisheries products, followed by a discussion of the impacts of trade liberalization. Finally, the report draws to a close with a few conclusions.

II. PRODUCTION

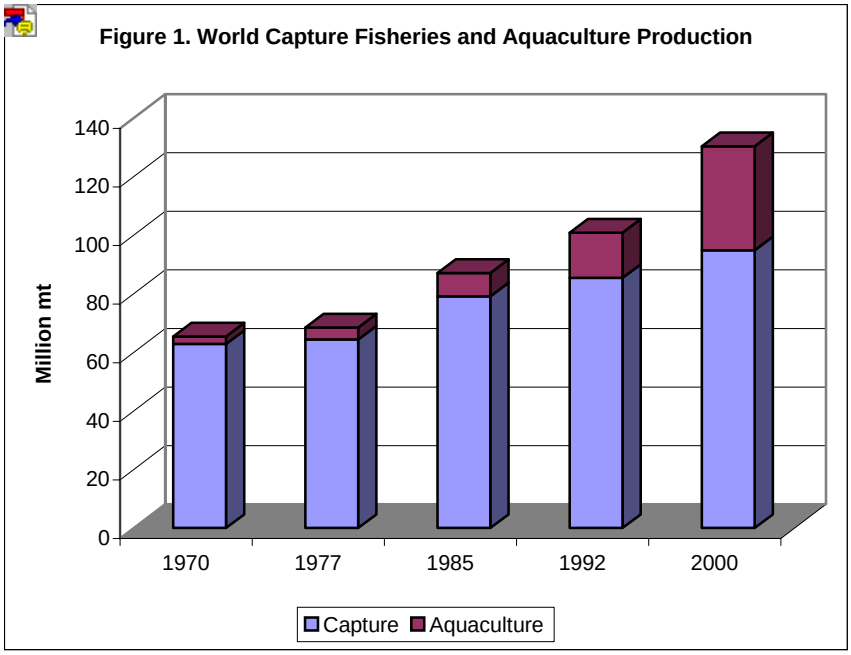
Production of fish[1] takes two forms, aquacultured and captured. The vast majority of captured fish in volume are marine, while the majority of aquacultured fish in volume are freshwater. Table 1 shows production disaggregated by inland and marine capture and inland and marine aquaculture.

The fishing sector has expanded considerably in the past 50 years, with capture fisheries landing only 19 million metric tons (mmt) in 1950, increasing to 130 mmt in 2000, shown in Figure 1. During this time the importance of developed countries in the fishing sector has declined relative to the developing nations. This is due to both a decline in the fish stocks available in the developed world from over fishing, and to an increase in the fishing activities in the developing world. Aquaculture has further expanded the seafood industry, increasing production from 2.5 mmt in 1970 to over 35 mmt in 2000.

It is important to note that captured fish may have one of two general product categories, as food or industrial use (e.g. fishmeal, fishoil). Figure 1 includes all fish harvest, including those destined for industrial use.

A significant amount of the landings of fish globally are fish for industrial use. Fishmeal is created from the cooking, pressing, drying and milling of wild caught, small pelagic fish such as anchovies, menhaden and capelin (Delgado et al. 2003). Fish oil is a by-product. Peru and Chile dominate fishmeal production (FAO, 2000a). Fishmeal is used for feed in the livestock industries, particularly in Asia, as well as feed for farmed fish. Many farmed fish are carnivorous, thus requiring animal protein feed. As fish farming has grown, demand for fishmeal has gone up, although in some farming industries such as salmon there have been significant amounts of research into reducing the percentage of animal protein in the fish feed in an effort to cut costs. Demand for fishmeal has also gone up as the population has increased in Asian countries, and demand has grown for terrestrial livestock products.

[1] For the sake of brevity, fish will be taken to mean finfish, mollusks and crustaceans.



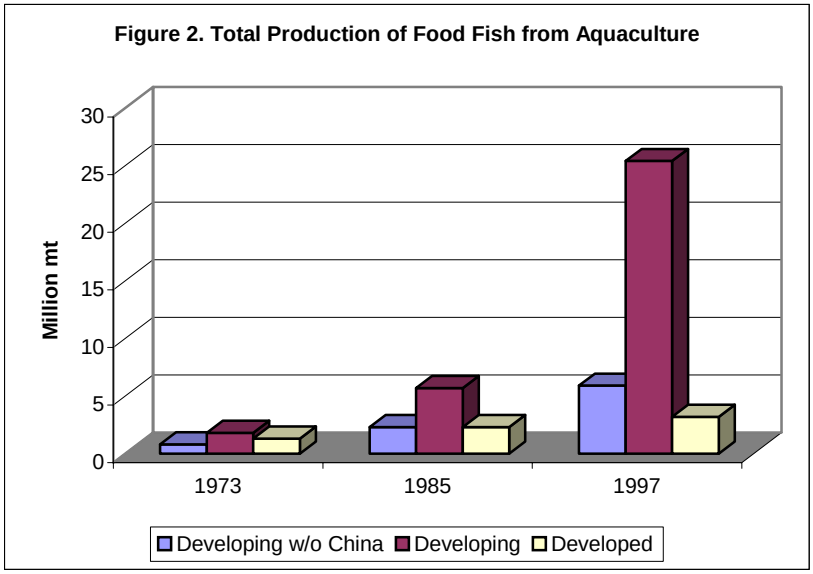
Source: FAO, 2003. Fishstat Database, Rome, Italy.

Table 1. World Fisheries Production and Utilization (mmt)

	1996	1997	1998	1999	2000
PRODUCTION					
INLAND					
Capture	7.4	7.5	8.0	8.5	8.8
Aquaculture	15.9	17.5	18.5	20.1	21.4
Total inland	23.3	25.0	26.5	28.6	30.2
MARINE					
Capture	86.1	86.4	79.3	84.7	86.0
Aquaculture	10.8	11.1	12.0	13.3	14.2
Total marine	96.9	97.5	91.3	98.0	100.2
Total capture	93.5	93.9	87.3	93.2	94.8
Total aquaculture	26.7	28.6	30.5	33.4	35.6
Total world fisheries	120.2	122.5	117.8	126.6	130.4
UTILIZATION					
Human Consumption	88.0	90.8	92.7	94.4	96.7
Non-food uses	32.2	31.7	25.1	32.2	33.7
Population (billions)	5.7	5.8	5.9	6.0	6.1
Per capita food fish supply (kg)	15.3	15.6	15.7	15.8	16.0

Source: FAO, 2002a

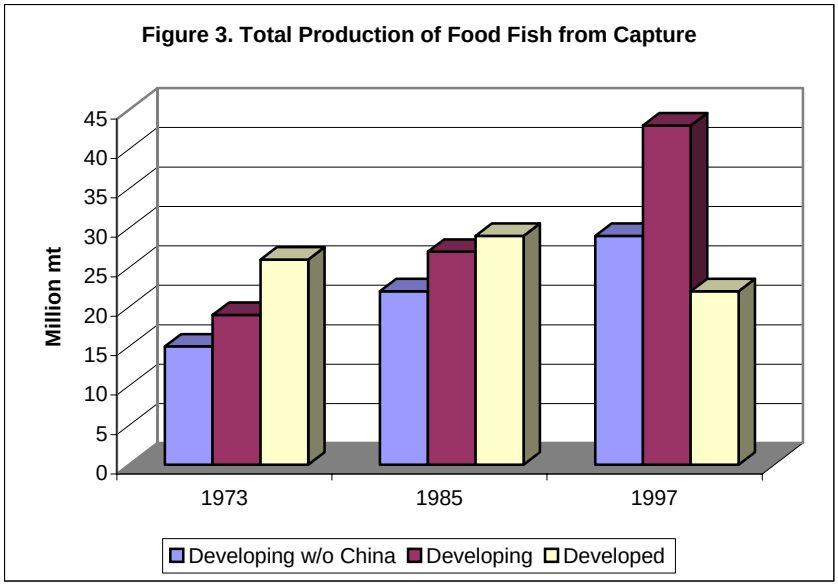
Capture of food fish has increased from 44.5 mmt in 1973 to 64.5 mmt in 1997 largely due to increased investment in the capital such as expansion of the fleet size and technical innovation (Delgado et al, 2003). Figure 2 shows information for food fish produced from aquaculture.[2] Most of the growth in the aquaculture industry is happening in developing countries, especially China, where most of it destined for domestic consumption. Little growth in marine aquaculture is taking place in developed countries, largely due to limited available shoreline for expanded farms due to user conflicts.



Source: FAO, 2003. Fishstat Database, Rome, Italy.

Figure 3 shows world production of fish for food uses from capture fisheries between 1973 and 1997, disaggregated by developing versus developed nations.

[2] There are few, if any, aquaculture operations supplying industrial products.

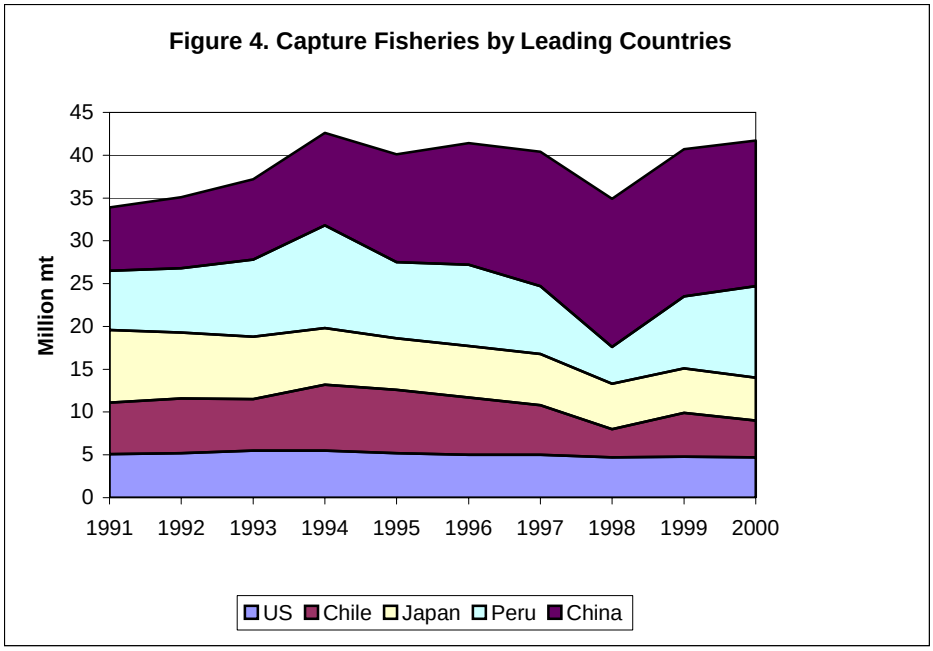


Source: FAO, 2003. Fishstat Database, Rome, Italy.

Figures 2 and 3 differentiate between developing nations, including China and excluding China. This is due to a recent study by Watson and Pauly (2001) that showed that it is likely China has been overstating its catches.[3] We can only speculate as to why China might over-report their landings, but Watson and Pauly believe that China's socialist economy incentivizes increases in production from year to year.

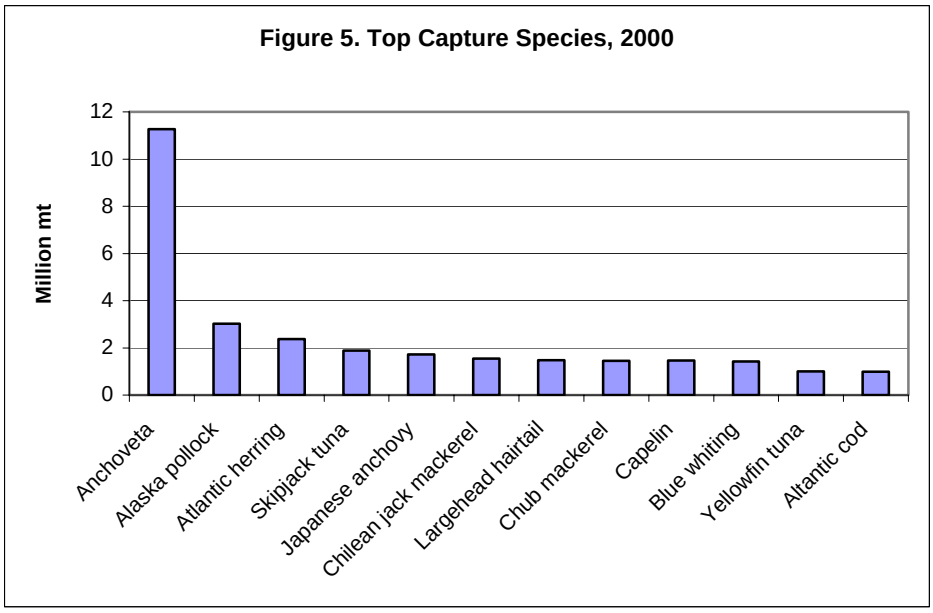
If we assume that China has correctly recorded its landings, China is the world's largest producer of captured fish in terms of volume (see Figure 4). Peru and Chile follow, primarily with captured fish being the anchoveta, largely used to produce fishmeal and fish oil. This is a large volume but fairly low value fishery. Similarly, the U.S. catches large volumes of pollock in Alaska that is another large volume, low value fishery where the product goes into surimi (a refined, stabilized fish protein concentrate used in making such things as imitation crab meat) and processed fish such as breaded fish sticks and patties.

[3] China is separated out of the developing countries' aquaculture production statistics partly to be consistent with the capture data, but also to emphasize how large aquaculture is as an industry in China.



Source: FAO, 2003. Fishstat Database, Rome, Italy.

Figure 5 shows the top capture species by volume in 2000, regardless of whether it goes to food fish or industrial use.



Source: FAO, 2002a.

If we focus more specifically on food fish, Table 2 shows production by region from 1973-1997, with an annual growth rate between 1985 and 1997. This table is taken from Delgado et al. (2003). Again, note that developing countries and developing countries minus China have been differentiated. One of the most important facts to take away from this table is that production has dramatically decreased for Japan and Eastern Europe and

the former Soviet Union, while increasing in China and the developing world. In the case of Japan, the establishment of the 200-mile EEZ is a significant factor. Japan had a very active long-distance fishing fleet, and as a result of the EEZ was generally no longer able to continue fishing in other nations' jurisdiction except where access agreements were negotiated. Even this has declined over the years due to low productivity of the distant water fleet and shrinking fish stocks. The story is somewhat similar for Eastern Europe and the former Soviet Union; they also had a significant long-distance fleet. However, lack of capital to finance the fleet during that time period was likely also a factor in their reduction, as might be the under reporting of catches.

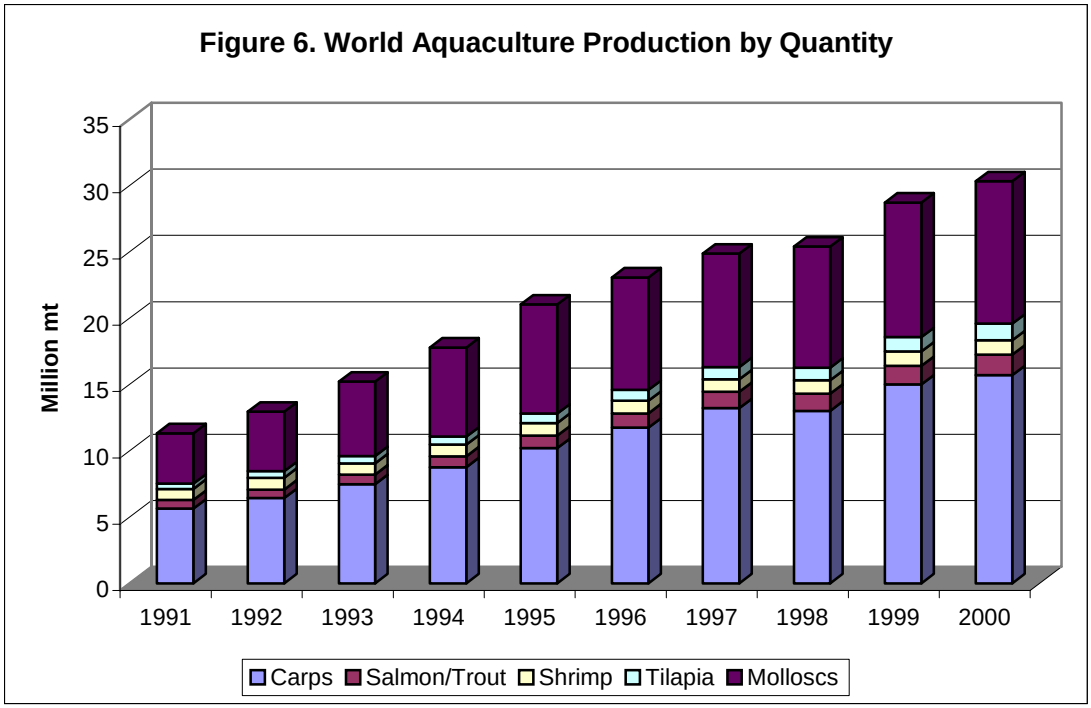
U.S. landings have increased, in large part due to domestication of its EEZ, and in large part due to the Alaska pollock fishery. Production has declined for the EU-15, and most of the rest of the developed world. This leaves the increase in production squarely as a result of increased production in Asia, Africa, and Latin America.

Table 2. Production of Food Fish from Capture, 1973-97

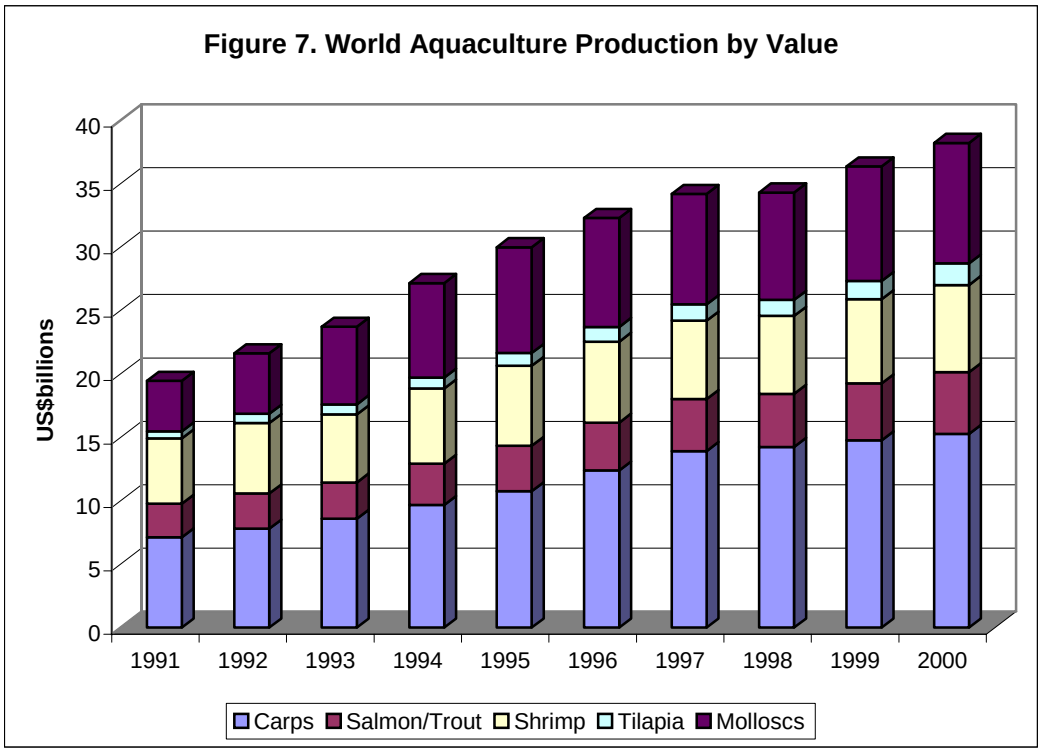
Region	Total Production (million mt)			Annual Growth Rate (%)
	1973	1985	1997	1985-97
China	3.8	5.0	13.9	8.9
Southeast Asia	5.0	6.9	10.4	3.5
India	1.7	2.1	2.9	2.8
Other South Asia	1.1	1.1	1.6	3.1
Latin America	2.3	4.1	5.7	2.9
West Asia and North Africa	0.7	1.4	2.1	3.3
Sub-Saharan Africa	2.1	2.6	3.7	3.1
U.S.	1.7	3.5	4.0	1.1
Japan	7.8	8.4	4.4	-5.2
EU 15	5.6	4.9	4.7	-0.4
Eastern Europe and former Soviet Union	7.7	8.8	4.7	-5.1
Other developed countries	2.8	3.7	4.2	1.0
Developing world	18.9	26.9	42.5	3.9
Developing world excluding China	15.1	22.0	28.7	2.2
Developed world	25.6	29.3	22.0	-2.4
World	44.5	56.3	64.5	1.1

Source: Delgado, *et al.* 2003

Aquaculture production has increased steadily for the last 30 years. Production of carps and mollusks has dominated the quantity of aquaculture production during the 1990s (see Figure 6), however, the value of shrimp on a per kilogram basis is the highest (see Figure 7).



Source: FAO, 2000c.



Source: FAO, 2000c.

BOX 1

Tuna: A truly international fish

The world tuna market can be characterized as a two-tiered market. There are particular species of tuna that are destined for the higher-valued unprocessed tuna market (e.g. sashimi), and other species primarily for the canned market. The major producing countries include Japan, Indonesia, the Korean Republic, Spain, Taiwan and the Philippines. Total global landings of tuna of all species in 2000 were 4.9 mmt. U.S. landings fell by almost 50% as a result of the tuna-dolphin issue as the U.S. fleet moved out of the Central Eastern Pacific.

The primary species caught are albacore, yellowfin, and skipjack. These species are generally destined for the canned market. Bluefin is the species that is often reported as being sold for extremely high prices in the Tokyo wholesale market (in 2000 the unit value for fresh bluefin was US$17.9/kg compared to the unit value of frozen tuna at US$3.5/kg.) Bluefin are found in the Atlantic and the south Pacific.

The largest producer of frozen skipjack tuna is Japan, followed by Taiwan, with a global total of 685,506 mt produced in 2000. Frozen albacore is primarily produced by Taiwan, followed by Japan, with a global total production in 2000 of 130,801 mt. Frozen yellowfin tuna is largely shared equally in production between Taiwan, Japan, Spain, Korea, France, and Columbia. In 2000, the total production of canned tuna was 1.4 mmt, of which the largest producers were Thailand, the U.S. (e.g. in Puerto Rico and American Samoa), and Spain.

Tuna are highly migratory species, and as such are managed in the Atlantic under the International Commission for the Conservation of Atlantic Tunas (ICCAT), and in the Pacific under the Inter-American Tropical Tuna Commission (IATTC) that covers the Eastern Pacific. These management programs are discussed more fully later in the report.

Both Atlantic and southern Pacific bluefin tuna fisheries have been in a considerable population decline. In the south Pacific, Japan, Australia and New Zealand ratified the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) to manage the stocks. However, significant fishing effort on this stock comes from non-CCSBT member nations such as Indonesia, Korea and Taiwan, leading some environmental groups to call for listing southern Pacific bluefin tuna as an endangered species under Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (Cox, et al., 1999). If southern bluefin tuna were listed, it would be the first time CITES was used to manage a highly migratory commercial marine species. This would have important implications for future international management of transboundary fish resources.

Primary Source: FAO, 2000a.

BOX 2

Sustainable Shrimp Aquaculture in Bangladesh

Subsistence shrimp fishing has been occurring over hundreds of years in Bangladesh, but beginning in the mid-1980s shrimp for export, using aquaculture, has grown significantly. In 1972-73 exports of captured shrimp were valued at US$2.9 million. By 1985, the value of shrimp exports was US$90 million, primarily from aquaculture production, and US$300 million in 2000 (FAO, 2000a).

Some of the credit for this rise goes to a structural adjustment program (SAP) in which Bangladesh was given a World Bank loan of US$1.76 billion during 1979-96. One of the outcomes of this program was a series of shifts from policies that had constricting impacts on trade to policies that encouraged exports. The policy changes created an environment where private investments in shrimp culture, shrimp processing and shrimp exports flourished.

Shrimp accounts for almost 91% of fish exports from Bangladesh. However, it is generally agreed that this rapidly expanding export industry has come at considerable environmental costs. The area under shrimp culture tripled in 10 years, from the mid-1980s to the mid-1990s, covering 130 thousand hectares by 1999. As a result, mangroves have been removed and replaced by coastal ponds. The ponds have increased the soil salinity leading to degradation in quality and jeopardizing future productivity of the land. The costs of restoration would likely be very high. Losing mangroves has cost the marine ecosystem valuable habitat and nursery areas for fish reproduction. In addition, any prospect for sustainability for shrimp farming is threatened by its reliance of the collection of wild shrimp fry, which are then 'grown-out' to appropriate sizes for the market. This threatens the sustainability of wild shrimp stocks as well. There are sometimes disease outbreaks in shrimp ponds, which may then spread to the wild shrimp population. Finally, the feed for shrimp is based on fishmeal, which itself may be captured from fully, if not over, utilized stocks of anchovies, herring, capelin, menhaden and sardines.

Recognizing the negative externalities caused by shrimp culture in Bangladesh, a UNEP study recommended that effective environmental policies with proper enforcement are implemented to ensure that trade liberalization does not lead to externalities that reduce overall welfare (1999b, p. xv).

Primary Source: UNEP, 1999b.

BOX 3

Over-fished Fisheries and Unsustainable Shrimp Aquaculture in Thailand

Fisheries exports from Thailand topped US$4.3 billion in 2000 (FAO, 2000a). US$3.2 billion of this was derived from shrimp.

Thailand produced 2.4 million tons of fish for human consumption in 1998, with 1.7 billion of that destined for the export market (FAO, 2000a). The primary sources of production are marine fisheries, inland fisheries and aquaculture.

The marine fisheries yield sardinellas, anchovies, mackerel, scads, threadfin breams and others. The composition of catch is 52% food fish (including those listed above), 6% squid and cuttlefish, 31% trash fish, 5% shrimp, 3% shellfish and the residual are crabs. However, the marine fisheries are in trouble as a result of overfishing. This is evidenced by the increase in illegal fishing by Thai fishermen in waters of other countries, such as Indonesia. In November 2003, two Thai fishing boats were sunk by Indonesian authorities off northern Java; the crews were arrested. This is not the first time an event such as this has occurred. Poor fisheries management by the government of Thailand has been blamed for illegal fishing by Thai fishermen in other countries' waters. There is a system of licenses and other management controls in Thailand to reduce effort and manage the number of vessels, however, forged licenses are relatively easy to obtain and there is little enforcement. Out of an estimated 2,000 vessels in Thai waters, 1,200 are there illegally.

Thailand is the world's largest producer of shrimp, with approximately 23,413 farms with a total area of 72,663 hectares (as of 1996). By 2000, Thailand exported 249,638 mt of shrimp to the world market worth approximately US$2.7 billion. Shrimp production in India, Indonesia and Vietnam combined equals what Thailand produces in export value. The same environmental issues highlighted for Bangladesh apply for Thailand – the huge export market for shrimp from aquaculture has led to significant environmental damage.

One final note, in December 2003, there was a petition filed by U.S. wild shrimp fishermen and some shrimp processors with charges of dumping against shrimp imports from 6 developing countries, including Thailand. Charges include that international institutions have unfairly subsidized the establishment of the infrastructure of shrimp aquaculture operations in these developing nations.

Primary Sources: FAO 2000d; *Bangkok Post* 2003.

BOX 4

Fishmeal and Fish Oil: Controversies in its Industrial Use

Fishmeal and fish oil are processed small, wild-caught pelagic fish – such as capelin from the North Atlantic, anchovies from the South Pacific, and other species such as menhaden and herring which are found around the globe. The processing essentially involves cooking, pressing, drying and milling the fish. The dry remainder is the fish meal, while the fish oil is extracted during pressing.

Fishmeal and fish oil are termed industrial product – i.e. they are used in animal feeds. Those animals might be terrestrial livestock or aquacultured fish such as shrimp and salmon. The farmed fish industry has been increasing its demand for fishmeal dramatically in the last 20 years. Nations with rapidly growing poultry and pig industries, such as China and Southeast Asia, also have strong demand for fishmeal.

The primary producer of fishmeal has long been Latin America, with a total of 2.8 mmt produced in 1997, and an annual growth rate of 1.7% between 1985-97 (Delgado, et al., 2003). Most of that production is from Peru and Chile, but is susceptible to El Niño occurrences. The targeted fish is the Peruvian anchoveta, the most heavily exploited fish in terms of volume (see Figure 5).

World production in 1997 was 6.1 mmt, with the balance after Latin America made up primarily by China, Southeast Asia, Japan and the EU.

In *Fish to 2020* Delgado and others find that the projection for prices of fishmeal out to 2020 is an upward trend (Delgado et al. 2003). If the situation in the world markets and production do not substantially alter over the next 16 years, then fishmeal prices are projected to go up by 18%. If aquaculture expands by 50%, then the price of fishmeal will increase by 42%. If greater efficiency in use of fishmeal in animal feed occurs, prices of fishmeal could go down by 16%. In the worst case scenario, if the world experiences an ecological collapse in those fisheries yielding fish meal and fish oil, the price will rise by 134%. All of these potential price changes would significantly affect livestock production in developing countries.

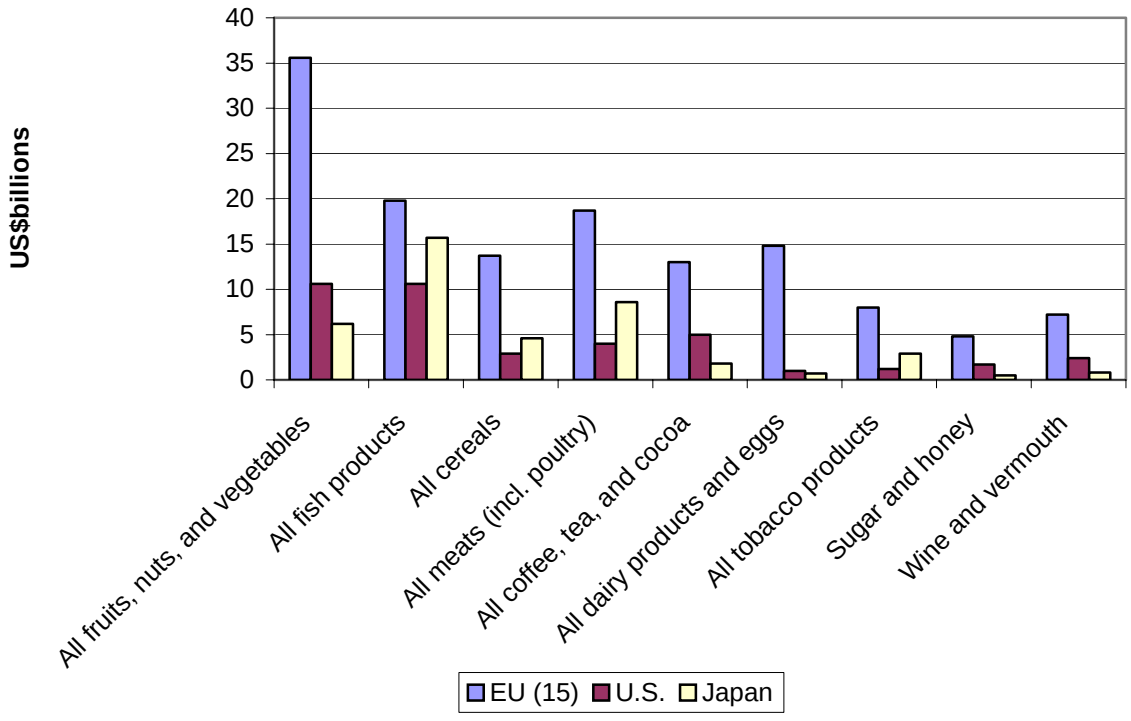
There is concern over the sustainability of the fishery. Environmental groups worldwide are heavily criticizing the farmed shrimp and salmon industries for intensively utilizing fishmeal as feed in their industry. Farmed and wild shrimp are globally a US$10 billion per year export item; farmed and wild salmon constitute an approximately US$5 billion export market, with the majority of that for either species from farmed product. One of the arguments is that there is an inefficient conversion rate from meal to salmon – and ultimately that instead of being used as fishmeal the fish would have a higher valued use as food fish, particularly in developing countries. Secondly, in Europe it is possible to have farmed fish certified for organic production processes. There is controversy, though, because some groups claim that fishmeal is not being harvested sustainably, hence a farmed fish cannot be organic if its feed is unsustainable. Both of these controversies have led some to look at soybean meal as a substitute for fish meal. Since the cost of feed is over half of the production cost for farmed salmon, salmon feed producers have been actively attempting to create a feed formula that contains the necessary animal proteins the salmon need, but to reduce the costs using other potential ingredients such as soybean meal. However, the issue then becomes feeding a product which is mostly genetically modified to a product looking for organic designation. It is a very interesting conundrum.

III. INTERNATIONAL MARKETS

World trade in fish products rivals the value of trade in many agricultural products. Fish is one of the most traded food commodities in the world. The value of world imports of all fish products was US$60 billion in 2000, surpassing the value of international trade of many agricultural products. The most valuable component of seafood trade is shrimp, with total world trade of US$10.6 billion in 2000 (FAO, 2000a).

Imports of fish products are second in value only to fruits, nuts and vegetables. Figure 8 shows the value of imports of fish and agricultural products for the three major importers, the EU, the U.S., and Japan. The EU imports the most of the three in value, followed by Japan and then the U.S. In Japan, fish is the most valuable food import – over fruits, nuts and vegetables.

Figure 8. Imports of Agricultural and Fish Products by Major Importers



Source: Anderson (2003); FAO 2003 Fishstat Database, Rome, Italy.

Fish and fish products have not historically been major internationally-traded products. There have been several influences leading to the rapid expansion in international trade between 1975 and 2003. Certainly the passing of the International Law of the Sea and the institution of the 200-mile EEZ in 1977 had a large impact. The establishment of the EEZs effectively created importers out of countries, such as Japan, with very large distant water fleets, and created exporters out of those countries, such as the U.S., which had

many marine resources and less domestic demand. For example, fish capture by Japan has fallen from 7.8 mmt in 1973 to 4.4 mmt in 1997 (Delgado et al. 2003). In contrast, landings in the U.S. grew from 1.7 mmt in 1973 to 4.0 mmt in 1997. The rapid growth in aquaculture production since the 1970s has also served to increase the amount of international trade in seafood products (see Figure 1).

These two forces have combined to create a global industry in which a large number of developing countries are actively involved, many depending on fish exports for a substantial share of its export earnings. Table 3 shows twenty nations for which fishery exports earnings constitute at least 10% of their total merchandise export earnings.

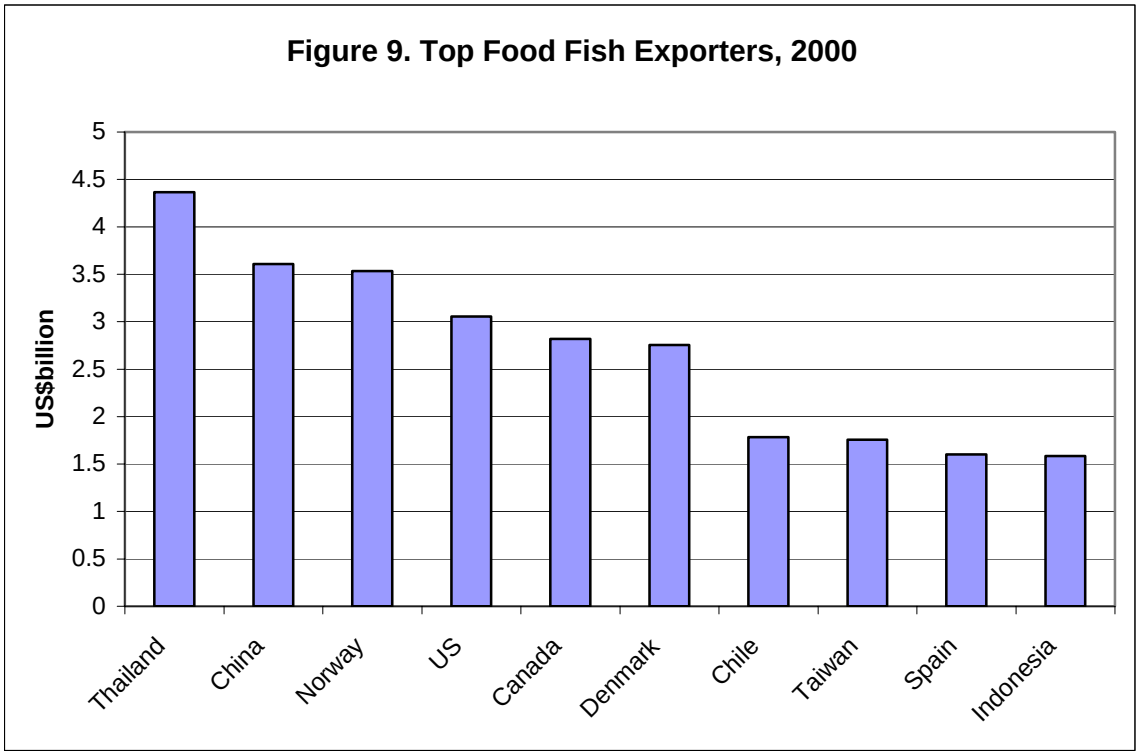
Table 3. The Relative Importance of Trade in Fishery Products in 2000

Nation	Fishery Exports as a Percentage of Total Merchandise Exports
Greenland	93.9
Seychelles	78.2
Faeroe Is.	75.3
Iceland	64.4
Kiribati	58.4
Maldives	53.8
Panama	34.7
Mozambique	28.4
Senegal	27.0
Nicaragua	20.3
Namibia	19.8
Mauritania	16.5
Peru	16.1
Belize	14.4
Sierra Leone	13.3
Myanmar	13.2
Morocco	12.8
Madagascar	12.2
Ecuador	12.1
Vietnam	10.3

Source: FAO, 2000a.

The most important trade commodities, in order in terms of value in 2000 are: Shrimp (US$10.8 billion), salmon and trout (US$5.2 billion), tuna (US$4.8 billion), groundfish (US$4.4 billion), crabs and lobsters (US$3.8 billion), mollusks (US$2.8 billion), cephalopods (US$2.7 billion), fishmeal (US$2.1 billion), small pelagics (US$1.6 billion), large pelagics (US$1.1 billion) and flatfish (US$1.1 billion) (Anderson, 2003).

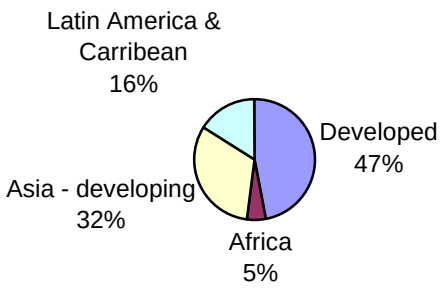
Figure 9 shows the top exporters of food fish in the world. Aquaculture production plays a very large role in exports of the top countries. Seventy-five percent of Thailand's exports are from aquacultured shrimp. Similarly, shrimp in China and salmon in Norway and Chile contribute much to their export values.



Source: FAO, 2000a.

Figure 10 shows the distribution of fish exports by groups of countries. Developed economies are a major exporting source, but Asia is large and growing.

Figure 10. Share in Fish Exports by Country Groups, 2000, by value (US$47 billion)



Source: FAO, 2000a.

Table 4 shows the share of seafood exports with respect to total merchandise trade between industrial and developing countries over the last 20 years. The share of total merchandise exports made up by fish exports between developing and industrial countries during the last 20 years is growing – most likely an impact of growing aquaculture production in developing countries. Roughly 40% of world exports of seafood, by value, are between industrial to industrial, and 40% between developing to industrial.

Table 4. Seafood Exports between Developing and Industrialized Countries*

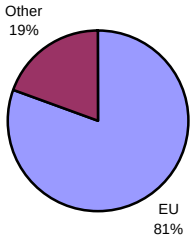
	1980/81	1990/91	2000/01
Industrial to Industrial			
Share of Total Merchandise Exports	7.50%	10.43%	9.71%
Industrial to Developing			
Share of Total Merchandise Exports	3.34%	3.86%	5.96%
Developing to Industrial			
Share of Total Merchandise Exports	13.48%	22.90%	26.15%
Developing to Developing			
Share of Total Merchandise Exports	4.96%	7.07%	8.21%

** Table courtesy of Tarek Soueid*

Figures 11, 12 and 13 show the destination of exports from the EU (US$10.8 billion), Africa (US$1 billion), and Central and South America (US$6.3 billion), respectively. Most of the exports by EU countries are simply exported to other EU countries. Most

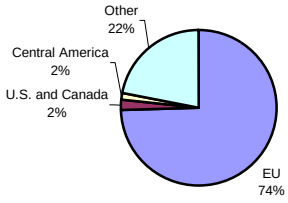
exports from Africa are destined to the EU market, while North America gets a large slice of exports from Central and South America.

Figure 11. Destination of Exports from the EU ($10.8 billion f.o.b.)

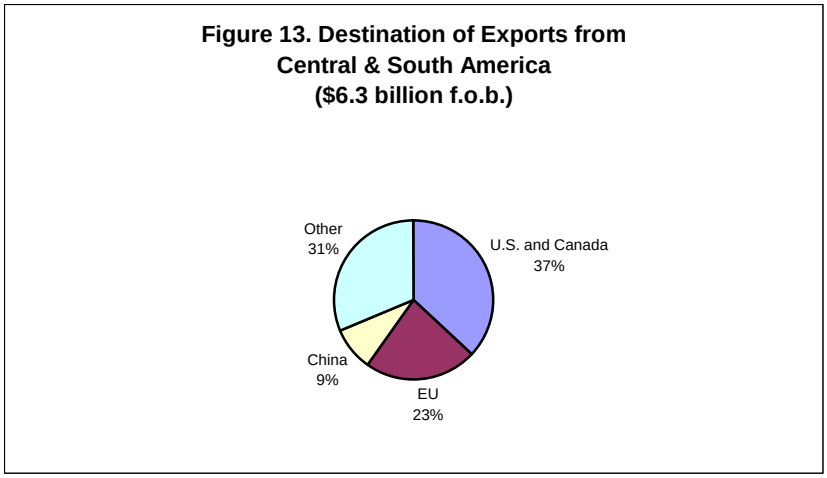


Source: FAO, 2000a.

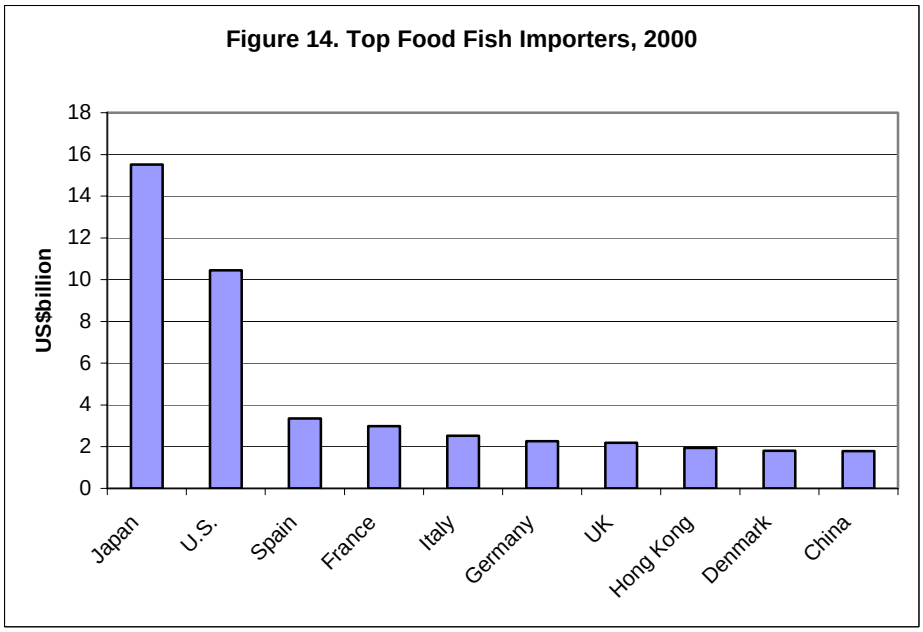
Figure 12. Destination of Exports from Africa ($1 billion f.o.b.)



Source: FAO, 2000a.



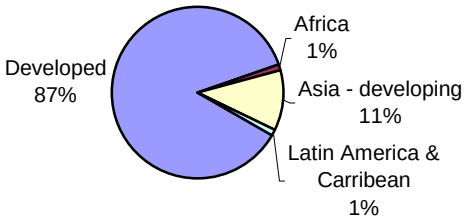
Source: FAO, 2000a.



Source: FAO, 2000a.

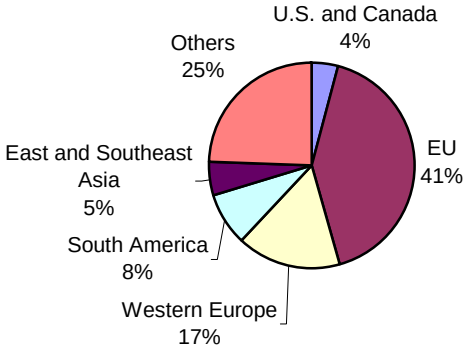
Figure 14 shows the major world importers of food fish. Figure 15 shows that the developed world dominates fish imports, while Figures 16 and 17 show the sources of imports by the EU, the U.S. and Canada.

Figure 15. Share in Fish Imports by Country Groups, 2001



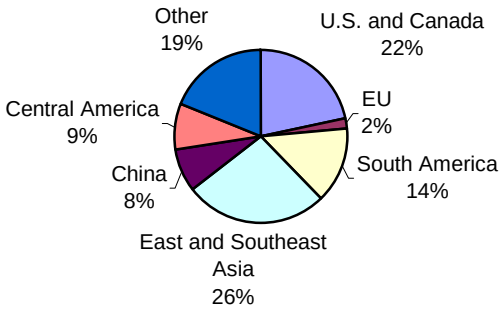
Source: FAO, 2000a.

Figure 16. Sources of Imports by EU, average 1998 - 2000
($19.8 billion c.i.f.)



Source: FAO, 2000a.

Figure 17. Sources of Imports by the U.S. and Canada, average 1998 - 2000 ($11.4 billion c.i.f.)



Source: FAO, 2000a.

Table 5 shows the relative values of some of the most traded fish. Shrimp is by far the most valuable in either real or nominal terms. However, the largest rates of price increases have been for tuna and cod – two species in capture fisheries in whose stocks have been overfished.

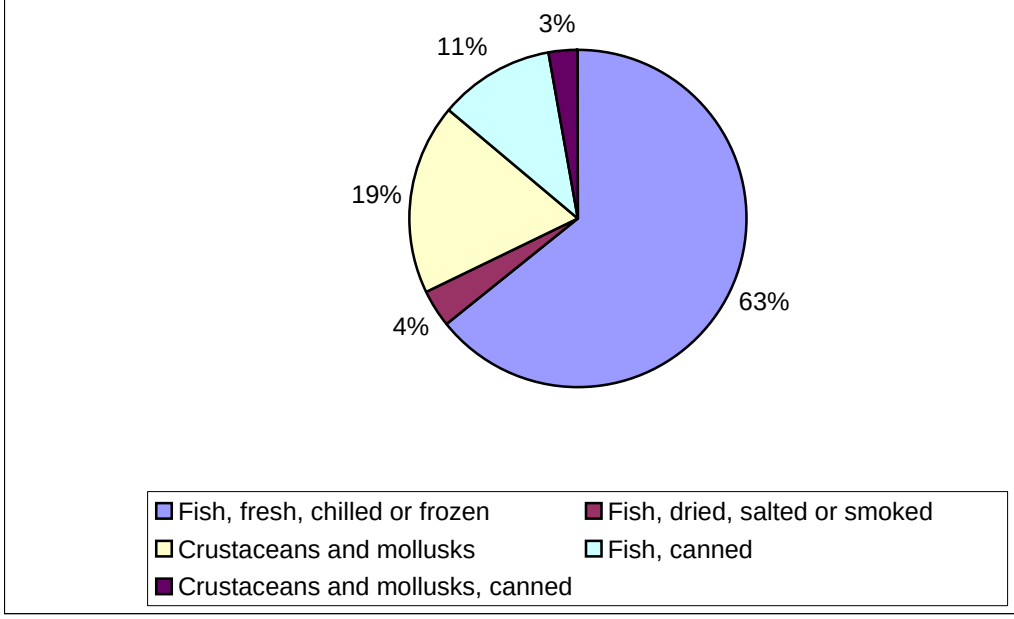
Table 5. Nominal and Real Export Unit Values of Fisheries Commodities, 1973-97

	Export Unit Values (US$/kg)			Change (percent)	
Product	**1973**	**1985**	**1997**	**1977-85**	**1985-97**
Nominal prices					
Frozen shrimp	4.75	6.41	7.87	35.0	23.0
Salmon	3.70	3.90	3.62	5.0	-7.0
Tuna	1.13	1.49	2.42	32.0	62.0
Cod	1.64	1.67	2.67	2.0	60.0
Freshwater fish	1.91	2.60	2.51	36.0	-3.0
Noncephalopod mollusks	1.36	1.89	3.54	38.0	87.0
Real Prices					
Frozen shrimp	7.28	6.26	6.22	-14.0	1.0
Salmon	5.67	3.81	2.86	-33.0	-25.0
Tuna	1.74	1.46	1.92	-16.0	31.0
Cod	2.51	1.63	2.11	-35.0	29.0
Freshwater fish	2.92	2.54	1.99	-13.0	-22.0
Noncephalopod mollusks	2.09	1.84	2.79	-12.0	52.0

Source: Delgado, *et al.* 2003

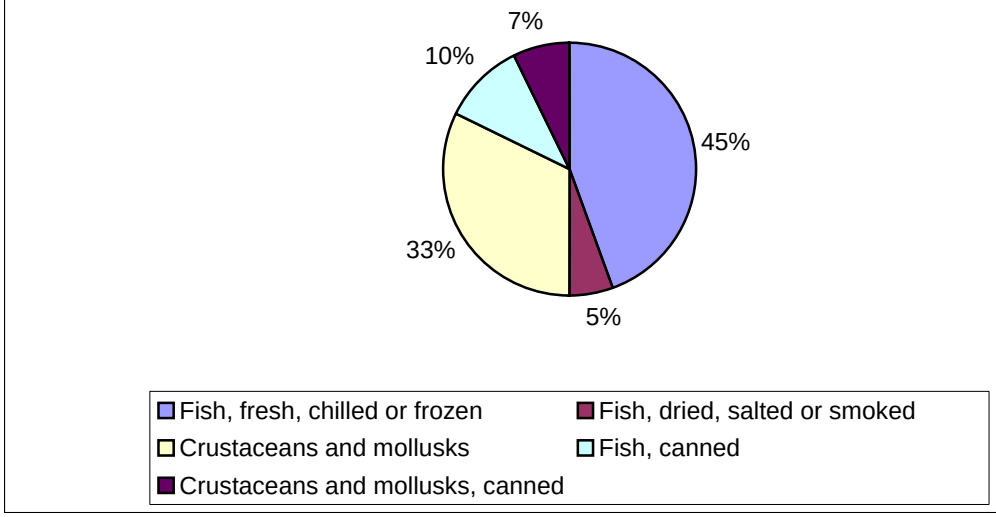
Figures 18 and 19 show world exports by commodity group in weight and in value, respectively. Only 19% of the weight of exports are crustaceans, but composes 33% of the value. In contrast, finfish are 63% of volume, but only 45% of the value.

Figure 18. World Food Fish Exports by Major Commodity Group, 2000 (product weight)



Source: FAO, 2000a.

Figure 19. World Food Fish Exports by Major Commodity Group, 2000 (by value US$60 billion)



Source: FAO, 2000a.

Table 6 shows the percentages of export volumes from developing to developed countries by both species groupings and processed state. It is important to note that the bulk of world trade in seafood is in the fresh, chilled or frozen processed state. Of the total world value of exports, fresh, frozen or chilled fish is 44% and fresh, frozen or chilled crustaceans are 32%. Processed seafood makes up the remainder.

The most widely traded processed seafood products are items such as canned tuna, canned crab and lobster meats, canned herring and sardines, roe (such as caviar), shell-off de-veined shrimp, and dried or salted finfish.

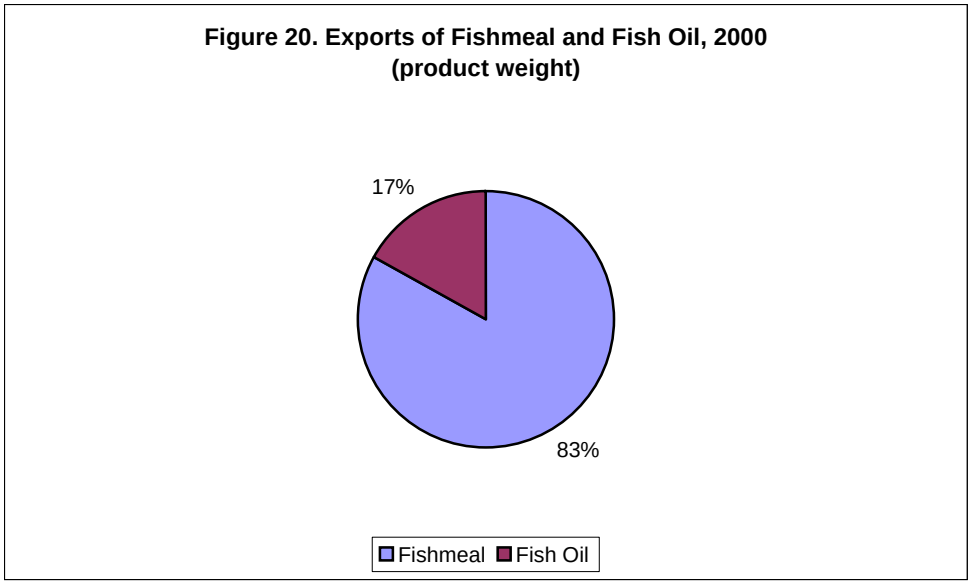
Table 6. Volume Shares of Fish Types in Seafood Exports from Developing to Developed Countries

	1980/81	1990/91	2000/01
Crustaceans and molluscs, fresh, chilled, frozen	43	51	43
Fish, prepared or preserved, including caviar	13	15	14
Fish, frozen (excl. fillets)	19	12	13
Crustaceans and molluscs, prepared or preserved	5	6	10
Fish fillets, frozen	3	5	9
Fish, fresh (live/dead) or chilled excl. fillets	12	9	6
Fillets, fresh	3	1	3
Fish, dried, salted or in brine; smoked	2	1	1

Source: FAO 2003. Fishstat Database, Rome Italy.

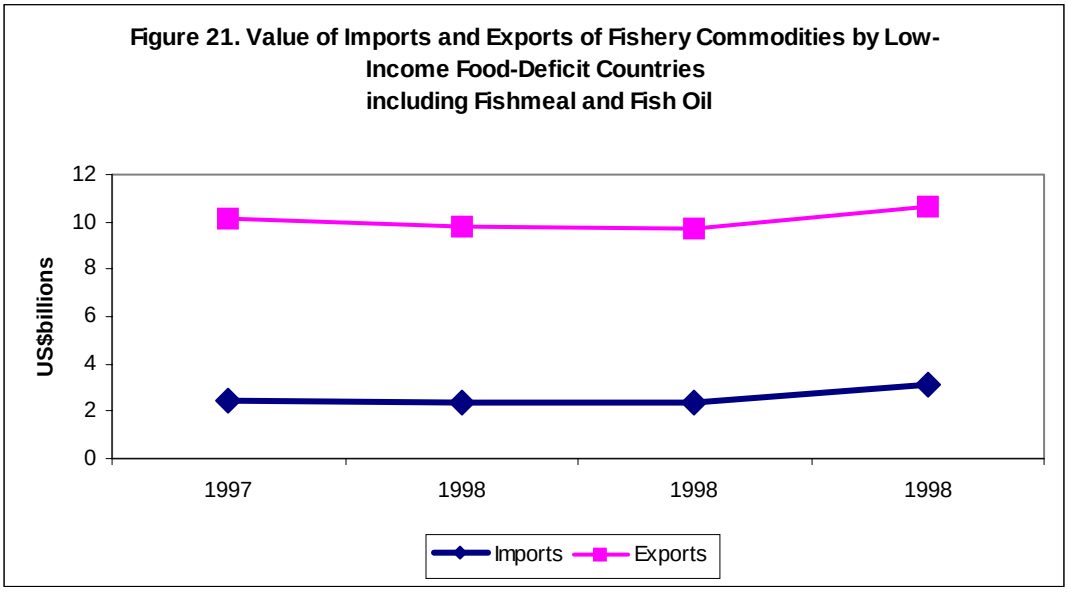
There is a significant amount of exporting and re-exporting in the world seafood markets. For example, Thailand imports a significant amount of the world's tuna catches, processes it into canned product and then exports it. Similarly, China is a major re-exporter of U.S. and Norwegian processed seafood.

Figure 20 shows the composition of exports of the industrial products, fishmeal and fish oil, by weight. Total trade in fish meal was US$1.8 billion in 2000 and US$253 million in trade for fish oil (FAO, 2000a).



Source: FAO, 2000a.

Figure 21 shows that for low-income, food-deficit countries, exports are far larger in value than imports. When fishmeal and fish oil are excluded from the export values, the picture changes only slightly as the value of fishmeal and fish oil is not high, and many of these countries do not participate in fishmeal or fish oil production.



Source: FAO, 2000a.

A. Tuna: The International Fish

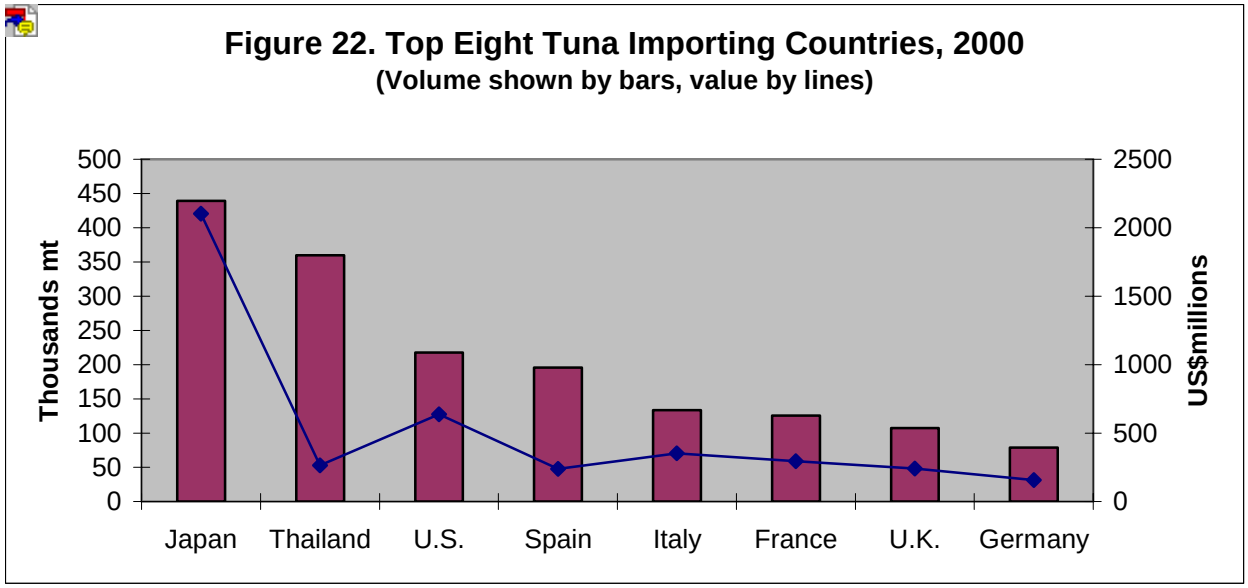
As discussed in the previous section on fisheries production, and specifically tuna, this is truly an international fish. Tuna is highly migratory, in the high seas and within territorial waters. Tuna have total disregard for national boundaries. As a capture fishery, it is one in which many countries from every continent except Antarctica participates. However, once landed, rarely does the tuna remain in the country that caught it – it is a heavily traded fish.

The most dominant processed product traded is canned tuna. Numbers show that several countries, for example, Thailand, import frozen tuna, convert that to canned tuna and then re-export it. There are also canning facilities in Côte d'Ivoire and Ghana, and as such those are the ninth and tenth importers, respectively with re-exports going primarily to France. The other dominant product is frozen tuna, often tuna loins.

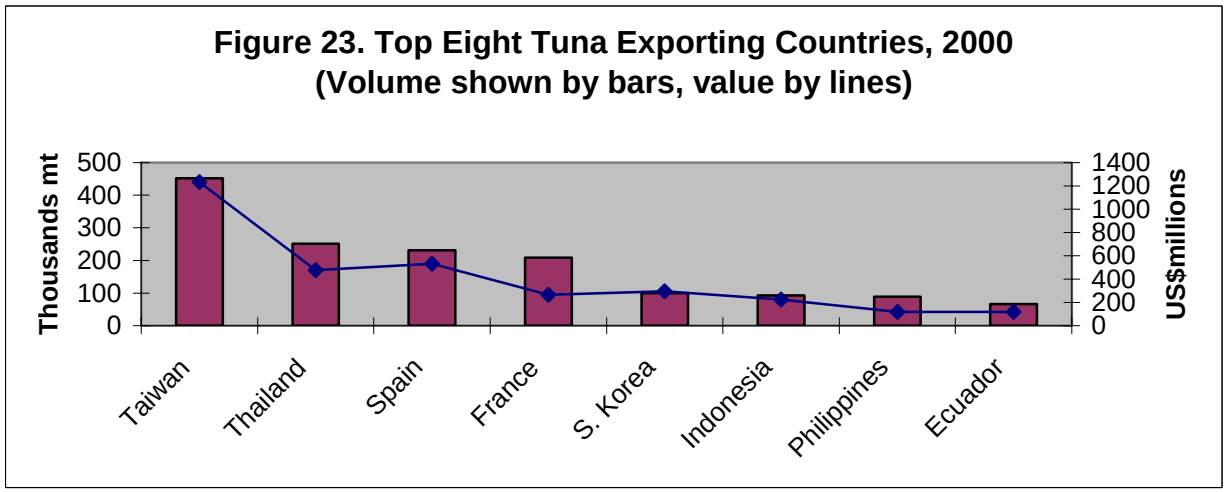
Tariff escalation and preferential tariff treatments are common in the tuna market. Due to these tariffs, most French canneries operate from the Ivory Coast. UK and French canning operations are also in Madagascar and the Seychelles (OECD, 2003a).

An interesting development is that fresh tuna exports are increasing, growing to 171,000 mt in 2000. The primary importer is Japan, with 158,000 mt of imports and a value of over US$1 billion. Fresh yellowfin and other, unspecified tuna species (most likely bluefin) are generally flown by air to Japan from the exporting nations, which include primarily the Phillipines and Indonesia for yellowfin tuna, and Spain, Taiwan and Australia for other tuna. Spain's participation in this industry is partly due to a growing farmed tuna industry.

Figures 22 and 23 show the largest importing and exporting countries, by volume and value. Note that the value for tuna imports into Thailand is quite low relative to the volume. Most of Thai tuna imports are unprocessed, less expensive tuna to be processed into canned product and re-exported. The value is relatively high for Japan due to imports of the expensive bluefin tuna.



Source: FAO 2000a.



Source: FAO 2000a.

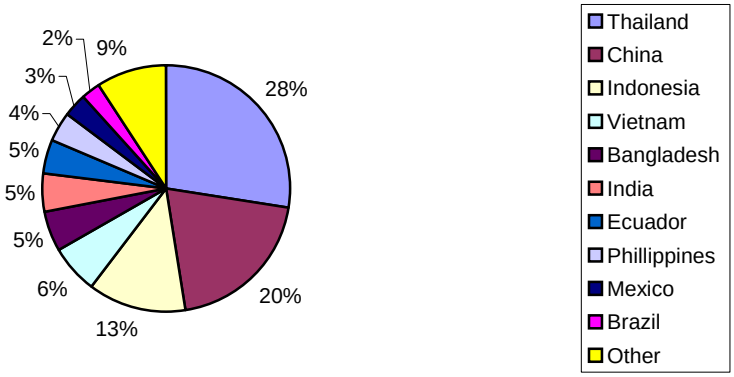
B. Shrimp: The World is Your Oyster

The world shrimp market is very large, with total trade in value at over US$10 billion. There are many different species of shrimp, including Northern Pink, Mexican/Pacific White, Black Tiger, Gulf Brown and White, Pacific White, and California Spot Prawns

(Lee, 2000). Shrimp are found all around the world, and might be generally categorized in two ways: coldwater and warmwater, or farmed and wild. Coldwater shrimp are generally small and not farmed, while warmwater shrimp can become large. For example, black tiger shrimp can become as long as 13 inches, are found in the wild, and are also popular for aquaculture production (Lee, 2000).

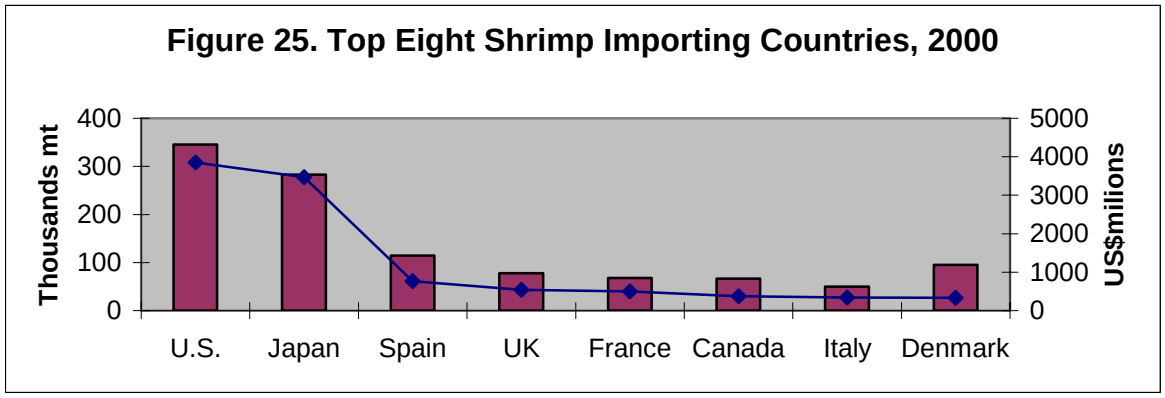
Figure 24 shows the distribution of the major shrimp producers by volume by country. Thailand and China are dominant.

Figure 24. World Aquaculture Production of Shrimp, 2000 by volume

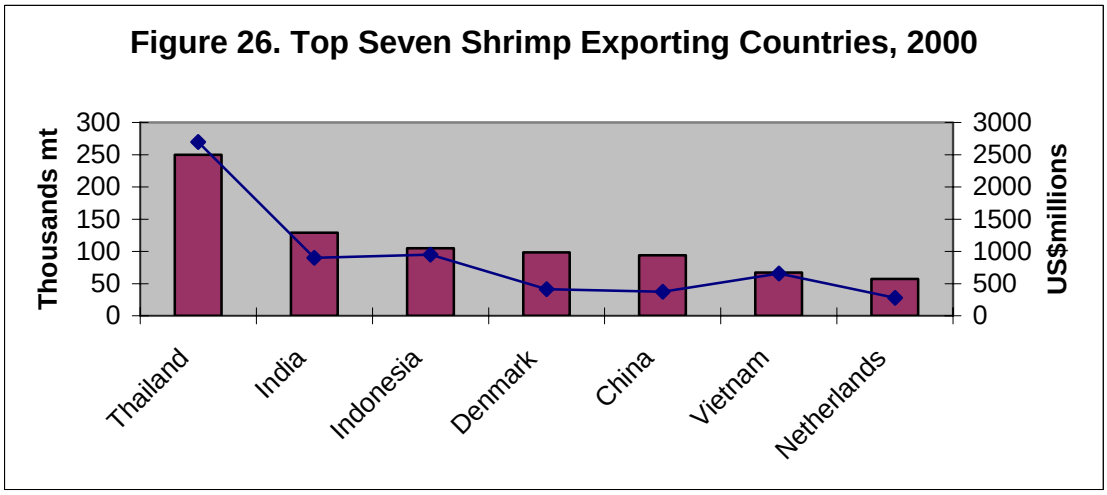


Source: FAO, 2000c.

Half of the shrimp sold in the world market are farmed. The largest producers are China, India, Indonesia, Thailand and Vietnam. The largest importers and exporters are shown in Figures 25 and 26. Shrimp and prawn trade makes up 6.4% of the volume of world fish trade, but 20% of the value (OECD, 2003a).



Source: FAO, 2000a



Source: FAO, 2000a.

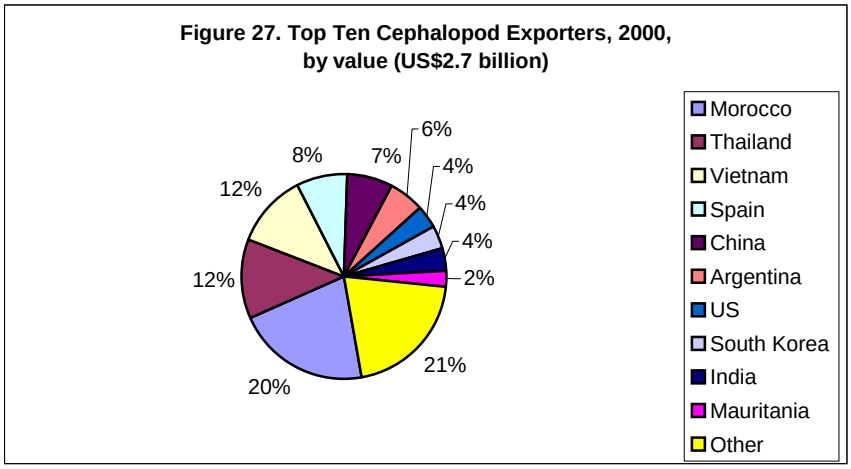
The most common product form is frozen. Only about 12% of world shrimp trade is in cans (OECD, 2003a).

C. CEPHALOPODS: TUBES, TUBES, AND MORE TUBES

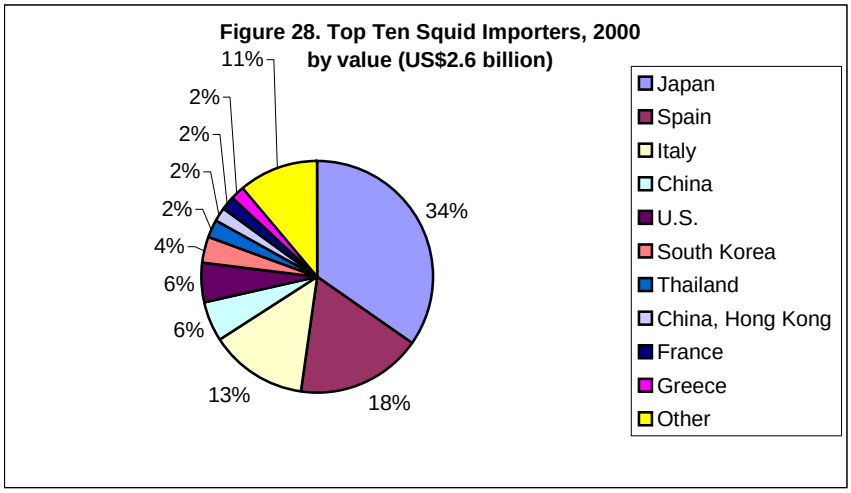
Cephalopods include squid, cuttlefish and octopus, but squid and cuttlefish dominate the catch. Cephalopods are found globally, and as Figures 27 and 28 show, those who export cephalopods are from across the globe as well as the dominant importers. Japan, Spain and Italy are the leading importers. Cephalopod production doubled between 1984 and

1999 (FAO, 2000a). The major producers are Korea, Japan and Argentina. Almost half of squid catch is from the Southwest Atlantic and the Northwest Pacific (OECD, 2003a).

Ninety-two percent of cephalopods are traded as frozen product (FAO, 2000a).



Source: FAO, 2000a.



Source: FAO, 2000a.

IV. INSTITUTIONAL INFLUENCES ON INTERNATIONAL TRADE IN FISHERY PRODUCTS

Even though most caught, farmed and traded fish are clearly food products, fish – regardless of production method - are not included within the WTO Agreement on Agriculture. Therefore, negotiations regarding trade liberalization for fish have proceeded much differently than agricultural commodities. There were nations that wished to include fish in the Uruguay Round of GATT negotiations on agriculture. However, several were opposed, including the EU, Japan and Korea. The concern was that fishing as an industry was not just concerned with market access, but resource access is as well an issue, unlike agriculture, and therefore trade liberalization in fisheries should be treated differently than agriculture.

Similar to agriculture, tariffs have been reduced with every trade round, and the Agreements on Sanitary and Phytosanitary Measures, Technical Barriers to Trade, Anti-Dumping Measures, Rules of Origin, Import Licensing Procedures and Safeguards have all been applied to fisheries trade. However, unlike agriculture, subsidies in the fishing industry fall under the Agreement on Subsidies. One can safely say that the current primary issue within the capture fisheries raised by the Committee on Trade and the Environment (CTE) of the WTO is the application of fishing subsidies. In 2001 at the Fourth Ministerial Conference in Doha, Qatar, the WTO explicitly included fisheries subsidies as part of the negotiating agenda; this as a result of discussions in the WTO's CTE. Fishing subsidies will be discussed in more detail below.

There are several institutional influences on trade and marine resource policies. Every one of the approximately 200 exporter nations of fishery products, whether developing or developed, face constraints to trade from trade barriers. However, there are also domestic and international policies regarding marine resource use that have significant constraints on international trade in fish products. Changing any of these policies will have an impact on quantities traded internationally in fishery products, and the welfare of producers and consumers in exporting and importing countries.

This section of the report will discuss the domestic and international policies and institutions that are most relevant to global fisheries trade. These are:

Domestic Policy Interventions:

- Fisheries management policies
- Fishing subsidies

Trade Barriers:

- Tariffs
- Technical barriers to trade
- Sanitary and phytosanitary measures
- Anti-dumping and Countervailing measures

A. Domestic Policy Intervention - Fisheries Management Policies

To fully understand the impact of trade liberalization on fishery products, one first needs to understand factors that influence supply. The impacts of trade liberalization will differ depending on several factors, including a) production method (capture or aquaculture) and b) domestic fisheries management policies.

Fish in capture fisheries belong to a common pool. Prior to 1977, jurisdiction of most nations over fishing grounds extended only as far as 12 nautical miles from shore. Expansion to 200-mile EEZs was discussed and agreed to by nations at the Third Law of the Sea Convention (UNCLOS-III), in which sessions were held from 1973-1982 (Hannesson 1996). By 1977, nations had agreed to create 200-mile EEZs. In anticipation of the EEZs, many nations implemented the zones in 1977. EEZs cover 40% of the world's oceans and 90% of its living marine resources (Deere, 2000).

UNCLOS assigns the exclusive right to coastal States to manage and exploit marine living resources, and to regulate fisheries resources through a comprehensive management system. Therefore, coastal States have both an exclusive right and an obligation to ensure that marine living resources are exploited in a sustainable manner. States are obliged to conserve marine living resources in their EEZs through the use of total allowable catch (TAC) based on best available scientific evidence. If a coastal State does not have the capacity to harvest its TAC, UNCLOS stipulates that the coastal State shall give other States access to the surplus in return for fisheries-related economic benefits. However, as not all fish stocks are found within EEZs, UNCLOS directs the coastal State and other States fishing in the region to cooperate either directly or through appropriate international organizations, to ensure conservation and promote the objective of optimum use of fish stocks throughout the region, both within and beyond the EEZ (WTO, 2000).

Establishment of the EEZs stemmed from a need for industrial efficiency and enhanced "sustainability" for global fisheries. The U.S. National Research Council (NRC) defines fishing as sustainable when it can be conducted over the long term at an acceptable level of biological and economic productivity without leading to ecological changes that foreclose options for future generations (NRC, 1999b). Economic productivity is defined as the generation of net economic benefits.

There is considerable debate over the effectiveness with which coastal nations have managed their EEZs with respect to sustainable fisheries production. Nations removed foreign fleets from fishing in their grounds, as the U.S. did in the northern Pacific by not allowing Japan to fish for salmon, halibut, sablefish, crab and pollock within the U.S. EEZ. However, creating an EEZ does not remove the common pool property of the resource – it simply re-distributes the use of the resource to new entrants. As a result of domestication, many nations, especially developed nations, encouraged expansion of the domestic fleet to increase capacity to catch fish that foreign nations would otherwise have

caught.[4] However, the expansion has gone too far. In the short run, the capture of fish increased as the number and size of fishing boats increased. In the longer run, the supplies in many fisheries have decreased drastically as the fish stocks have been reduced beyond the sustainable limit, and the remaining fish become harder to find.

Over fishing is not the only problem created by excess capacity. There are a number of multi-species fisheries in which the target species are part of a group of species that congregate together. By-catch, the catch of non-target species, can have large ecosystem impacts. Once the catch is brought up to the boat the non-target species are generally discarded. In the case of groundfish, by-catch are probably dead. By-catch affecting marine mammals, birds and sea turtles is also an important problem.

An often-quoted statistic is that fully 60% of the world's major fisheries resources are overexploited or already exploited at maximum rates (Grainger and Garcia 1996). Fish stocks in OECD countries have been subject to large fishing pressure over the years, and are mostly in an overfished state (OECD 2003b). This overfishing has happened in spite of fisheries management policies that exist in almost every coastal nation. Thus, the problem does not come from a lack of regulations *per se*, but rather from a lack of effective regulations.

In a fishery where there is no restriction on entry into fishing, the management (or lack of it) is referred to as *open access*. It is well known from economic theory and experience that open access will lead to overexploitation of the fish stock – there is little incentive on the part of individual fishermen to restrain their fishing efforts to promote a sustainable fishery, because whatever that fisherman does not capture will simply be captured by someone else. Thus, every fisherman has an incentive to maximize the number of fish caught by over-capitalizing the fishery, leading to over-fishing.

Management policies can be categorized as being either an input or output control. Input controls are the oldest type of fishery management tool, and are designed to either limit the number of people fishing or the efficiency of fishing (NRC, 1999b). Output controls are management techniques designed to directly limit catch.

Input Controls

There are several types of input controls, including season restrictions, gear restrictions, vessel restrictions, and licenses. A closed season is one in which no one is allowed to fish – often during spawning season. Gear restrictions often limit the size of the mesh in a net or type of gear used (purse seine, gillnet, longline, dredging, etc). Vessel restrictions may place a limit on types, size or power of vessels used in a particular fishery. Licenses may be used to certify fishermen or vessels and may or may not be limited. If limited, then their purpose generally is to limit fishing capacity and effort.

[4] Developing nations not able to capitalize on their own EEZs often sell access to foreign fleets (this will be discussed more below).

In a limited entry management system not everyone who wants to participate in a fishery will be granted the right to do so. Licenses, for example, need to be obtained. Once granted, there are often no catch limits set for license holders. Enormous equity issues are spurred by the decision on how to allocate licenses. Who gets a license? Should licenses be given away, should they be sold for a particular price, should they be auctioned? Often what happens is that everyone who can document that they have participated in that fishery for a certain number of years before the limited entry system is introduced is able to obtain a license. This does not alleviate the problem in the short run, but in the longer run it is hoped that the number of license holders will decline, either through vessel-buyback programs of the governments or some other means. Announcing at any given time that a limited entry system is going to be enforced at some point in the future provides incentives for anyone who wants to have a license in the future to fish in that fishery now, even if they had not previously planned to do so. That further exacerbates the problem.

For obvious reasons, input controls generally lead to inefficient outcomes. Input controls raise the cost of fishing, but generally do not meet the goal of reduced effort or capacity. Fishermen will substitute unrestricted inputs for restricted inputs, and management is reactive to those changes rather than proactive in preventing them. The common pool property of fish stocks is not mediated by these inputs controls, leaving us back where we were – too many boats chasing too few fish.

Output Controls

As their name implies, output controls are devices to limit the amount of catch from any given fishery. Total allowable catch (TAC) restrictions are set by managers as the total amount of fish to be caught in a particular time period from a particular fishery, where the TAC approximates an appropriate amount of harvest, aimed at maintaining a sustainable fish stock. TACs are based on stock assessments and other indicators of biological productivity. Too often, from an economist's point of view, TAC is set only on biological conditions, not taking into account economic conditions. It is important to note that there is a significant amount of uncertainty involved in setting TACs. Unlike cattle, it is very difficult to count the number of fish in the wild.

The critical input to this management process is the ability to monitor catch. In some fisheries, managers may have personnel at the dockside to count the number (or kilograms) of fish caught as they are landed. In other cases, there may be observers on board the vessels to monitor catch. In either case, when the TAC is reached, the fishery is generally closed.

The TACs are not distributed across vessels or vessel owners. As such, management by TAC has at least three shortcomings: 1) it encourages an incredible amount of competition between fishers to catch as much as possible before the TAC is reached; 2) as fishers become more and more over-capitalized, the TAC is reached in a shorter and shorter time period, a huge amount of fish are captured at once, leading to a backlog of

fish for processors to process, pushing down fishermen's prices and reducing product quality; and 3) any idle vessels may move to fish in another fishery, leading to over-capitalization in yet additional fisheries (Conrad, 1999).

In recent years, a form of limited entry advocated by some is the introduction of Individual Fishing Quotas (IFQs). An IFQ is an allocation of fish harvesting quotas to individuals or firms, specifying that a certain amount of fish or shellfish of a certain species may be caught within a specific area within a given time frame (NRC, 1999a). IFQs are best suited to fisheries that are managed with a TAC. Iceland, New Zealand and Norway are the leaders in using IFQs, although not always successfully. The U.S., Chile, Australia and the Netherlands also have some IFQ-managed fisheries (NRC, 1999a).

The management agency, typically a government agency, will determine the TAC for the entire fishery, presumably a TAC that represents a sustainable catch. That TAC is then allocated directly to a specific number of fishermen, who are quota holders. The number of fishermen who received quotas was determined at the institution of the system. New entrants can only enter the quota pool if someone already in the quota pool sells his/her rights. This management system generally will minimize costs per unit effort and allow for sustainable management of the fishery.

Lack of success of IFQ management depends on several factors, including non-compliance (poor enforcement), difficulties setting the TAC due to a lack of sufficient data, lack of appropriate models for stock assessments, and political systems. The difficulty with IFQs as a tool to limit access is its potential windfall benefits to the initial recipients, the privileges that IFQs create, and the potential for decreasing employment and changing social and economic relationships among individuals and communities (NRC, 1999a).

IFQs are not necessarily new to developing countries. In the Pacific islands, such as Papua New Guinea, traditional cultures often treated fishing grounds, rights to take certain species, and even rights to use specific gear types as the exclusive property of individuals or families (NRC, 1999a). However, colonial and postcolonial impositions of Western law, as well as profound political, economic and cultural changes have weakened and destroyed many of these systems of sea tenure.

Multi-species management can be very difficult. For example, in Alaska there are TACs for both halibut and sablefish. By nature, sablefish and halibut tend to be found together. Thus, sablefish are often by-catch in halibut fishing and vice versa. If the sablefish TAC is reached before the halibut TAC, there are times when both fisheries may be closed regardless of the fact that the halibut TAC is not fully utilized. Continued fishing would generate a by-catch of sablefish that would push the sablefish catch above its TAC. In some cases, by-catch of non-target species leads simply to unreported discards, particularly if the target species is high-valued and by-catch is regulated with TACs but is of lower value.

It is the management systems of fisheries that have caused considerable trade and environment issues, landing several cases in dispute panel discussions. All the disputes in Box 5 were directly related to fisheries management policies.

Box 5

Recent GATT Panel Disputes Regarding Living Marine Resources

Canada *v*. U.S. - Prohibition of Imports of Tuna and Tuna Products from Canada, 1982.

Canada *v* U.S. – Measures Affecting Exports of Unprocessed Herring and Salmon, 1988.

Mexico *v.* U.S. – Restrictions on Imports of Tuna (Tuna/Dolphin I), 1991.

European Economic Community and Netherlands *v.* U.S. – Restrictions on Imports of Tuna (Tuna/Dolphin II), 1994.

India, Malaysia, Pakistan and Thailand *v*. U.S. – Import Prohibitions of Certain Shrimp and Shrimp Products – 1998.

For more information on these cases, see Robb (2001).

The management systems discussed above are generally systems used for domestic management of fisheries. There are also several agreements between fishing nations on management of fish stocks that are either migratory or straddle political boundaries. There are, for example, many bilateral agreements between neighboring coastal nations. There are also a number of multi-lateral agreements regarding fishing – Box 6 provides a partial list. Multi-lateral agreements are particularly important for highly-migratory stocks such as various species of tuna and swordfish, as well as marine mammals such as whales. Many of these agreements contain trade restrictions.

The Atlantic bluefin tuna has been heavily overfished, largely because of its huge value in the Japanese market. This fishery is carried out mainly on the high seas (outside the 200-mile EEZ). The International Commission for the Conservation of Atlantic Tunas (ICCAT) has banned imports of bluefin tuna from Belize, Equatorial Guinea and Honduras, as well as swordfish from Belize and Honduras, and bigeye tuna from Belize, Cambodia, Equatorial Guinea and St. Vincent (FAO, 2002). In addition, ICCAT member countries determined that any bluefin tuna that is imported into any of the ICCAT member countries must be documented for country of origin. The purpose of this

measure is to determine how many bluefin tuna are caught by countries other than members of ICCAT.

The Northwest Atlantic Fisheries Organization (NAFO) has the authority to request that member countries not allow ships from non-member countries to land their catches in member countries if the non-member country vessel is fishing in contravention of NAFO conservation measures. There are similar consequences in other international marine management regulations, such as trade embargoes on seafood against countries that are fishing to the detriment of the goals of the conservation agreement.

There are also global agreements on fishing, including the United Nations Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks. This Agreement sets out principles for the conservation and management of those fish stocks and establishes that such management must be based on the precautionary approach and the best available scientific information. The Agreement elaborates on the fundamental principle, established in the Convention, that States should cooperate to ensure conservation and promote the objective of the optimum utilization of fisheries resources both within and beyond the exclusive economic zone (www.un.org). Fifty-nine States and entities have signed the Agreement.

The United Nations also drafted two Resolutions having to do with management of large-scale driftnet fishing on the high seas. Resolution 44/225, adopted in December 1989, recommended a moratorium on all large-scale pelagic driftnet fishing on the high seas by June 1992. In addition, immediate action was urged to reduce large-scale pelagic driftnet fishing activities in the South Pacific, leading to cessation of such activities by July 1991. Finally, immediate cessation of any further expansion of large-scale pelagic driftnet fishing on the high seas in the North Pacific and all other high seas outside the Pacific Ocean. Resolution 46/215 was adopted in December 1991 and proposed that a moratorium be fully implemented by January 1993, as nations that use large-scale driftnet fishing techniques had not been able to demonstrate that driftnets could be used without 'unacceptable impacts.' However, there remain nations whose fishermen use high-seas driftnets.

Finally, the FAO in 1991 initiated multi-stakeholder process, and by 1995 over 170 nations with the FAO adopted a Code of Conduct for Responsible Fishing. The Code is the most significant globally-recognized international framework in the realm of the world's marine, coastal, and inland fisheries, including aquaculture. Based on major international agreements (UNCLOS, UNCED, CBD), the Code sets out principles and international standards of behavior for responsible practices with a view to ensuring the effective conservation, management and development of living aquatic resources with due respect for the ecosystem and biodiversity (www.fao.org/fi/agreem/codecond).

Box 6

Regional Fisheries Bodies:

In all, there are 18 regional fishery bodies focusing on management, at least 21 advisory bodies, and at least 6 scientific bodies (www.fao.org/fi/body/rfb). A selection of the regional fisheries management bodies, whose function is to regulate catch, are highlighted here.

Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR): Aim is to conserve marine life of the Southern Ocean, such as Patagonian toothfish, excluding whales and seals which are covered under the International Convention for the Regulation of Whaling (IWC) and the Convention for the Conservation of Antarctic Seals.

International Commission for the Conservation of Atlantic Tunas (ICCAT): ICCAT is responsible for conservation of tunas and tuna-like species in the Atlantic Ocean and adjacent seas. Established in 1969. the agreement covers about 30 species, among them Atlantic bluefin tuna, yellowfin tuna, albacore tuna, swordfish, marlin, sailfish and spearfish, and some mackerel species. There are 37 contracting nations – any government that is a member of the UN may join. Parties include several European, OECD, African and Latin American countries.

Inter-American Tropical Tuna Commission (IATTC): Established by international convention in 1950, the IATTC is responsible for the conservation and management of tuna and other species taken by tuna fishing vessels in the eastern Pacific Ocean. Member countries are Costa Rica, Ecuador, El Salvador, France, Guatemala, Japan, Mexico, Nicaragua, Panama, Peru, the U.S., Vanuatu and Venezuela.

General Fisheries Commission for the Mediterranean (GFCM): Established by the FAO in 1949, the aim of GFCM is to promote development, conservation, rational management, and best utilization of living marine resources, as well as sustainable development of aquaculture in the region. The main measures taken by the Commission is to prescribe minimum fish sizes, to establish open and closed seasons and areas and to regulate Total Allowable Catch (TACs) and fishing effort.

Indian Ocean Tuna Commission (IOTC): Established by the FAO in 1993, the IOTC promotes cooperation in the conservation and sustainable use of tuna and tuna like species in the Indian Ocean and Adjacent Seas. The IOTC may adopt binding conservation and management measures.

To summarize this section it is fair to say that the status of fish stocks worldwide is not good, and is often a result of ineffective management. The implications of trade liberalization for capture fisheries are many, but the most obvious implication should be stated. Namely, the current level of catches of fish from most capture fisheries are unsustainable. Should trade liberalization provide incentives for fishermen to catch even more fish, this will simply speed up the overfishing process and leading to unsustainable international fish product markets as well.

Delgado et al. (2003) estimate that with a 1% loss in annual growth trends in capture production, excluding supply responses to price changes, prices for low-valued food fish will increase 35% by 2020, high-valued finfish by 69%, crustaceans by 70%, mollusks by 26%, and fishmeal by 134%. Given the dependence of developing countries on fish as food security, as a means to gain export earnings, and as a major source of jobs, this projected increase in prices could have serious ramifications. Certainly, fishmeal would become too expensive to use as livestock feed. Consumers in developing countries would find fish has become too expensive to consume and those fish would be shifted to export markets. Thus, more efficient management is imperative.

Furthermore, as we shall see shortly, any trade liberalization that takes place will have different impacts on producer and consumer welfare depending on the system of management currently in place. For those fisheries with efficient 'sole-owner' type management systems results on producer and consumer welfare are similar to what one finds with trade liberalization in agriculture. However, we may have very different results for fisheries with open access management. Hence, an understanding of fisheries management systems, the unintended economic incentives built into the management systems, and their level of success in managing fisheries sustainability are important to understanding impacts of trade liberalization in the fishery sector.

B. Domestic Policy Intervention - Fishing Subsidies

Subsidies exist globally in the fishing sector and have become recognized as having a significant impact on quantities of fish traded, largely as a factor leading to unsustainable fishing practices. At the WTO High Level Symposium on Trade and Environment in March 1999, five WTO member nations (Australia, Iceland, New Zealand, the Philippines and the U.S.) submitted a joint statement on the need to eliminate "environmentally-damaging and trade-distorting subsidies" in the fisheries sector (WTO, 1999; 2000; 2001). In 2001 at the Fourth Ministerial Conference in Doha, Qatar, the WTO explicitly included fisheries subsidies as part of the negotiating agenda; this as a result of discussions in the WTO's CTE. Page 28 of the Doha Declaration states that there is a need to 'clarify and improve WTO disciplines on fisheries subsidies, taking into the account the importance of this sector to developing countries' (WTO, 2003b).

In agriculture, subsidies that encourage excess production impinge on trade only at the market level. In other words, they have no effect on the trading partners' ability to produce the good (Schrank, 2003). However, when resources are shared, as is often the case in fisheries, subsidies not only affect quantities traded, but also limit the ability of

the co-owner of the resource to produce its product. In other words, if by subsidization an industry can capture more than its fair share of fish, then not only does it have more product available to export at a lower price, there are fewer fish for the non-subsidizing nation to capture. This is particularly true for straddling stocks and for highly-migratory stocks.

In an excellent review of fisheries subsidies, Schrank (2003) provides three implications of fisheries subsidies.

> Three implications are noted: (1) countries that do not subsidize and that restrain total catch to maintain the resource lose the extra catch to countries that subsidize and do not restrain total catch; (2) competition from subsidized distant water fleets can make it economically unviable for developing countries to develop their own fisheries and therefore to realize the benefits of their own 200-mile zones of fishery jurisdiction; (3) subsidies can contribute to stock depletion, with negative economic, trade and environmental effects for other countries that have an interest in the stock. (page 49).

It is clear that there is a complex relationship between fisheries subsidies and their environmental and social impacts, especially in the area of fisheries. According to Hussein Abaza, Head of UNEP's Economics and Trade Branch, "It is becoming clear that developing countries stand to gain a great deal from trade in fisheries products, but only if trade and fisheries policies are reformed to support sustainable management of these resources," (UNEP 2002d).

The discussion about fishing subsidies at the WTO first launched in 1999 has continued. A key point in the discussions has been to determine what authority the WTO has in becoming involved in reduction of subsidies in the sector, when those subsidies frequently have deep and direct ties to the fisheries management policies of nations. At the June 2001 CTE meeting, Australia suggested that the WTO itself was the appropriate body to examine the question of how the WTO could contribute to reduction of subsidies. Japan felt it could not support the discussion of fishing subsidies within the WTO, as subsidies are only one of the many factors in management of fisheries and should not be exclusively focused on. In the opinion of Chile, the WTO has the exclusive competence for discussion of subsidies. The U.S. agreed that effective fisheries management should be considered, but did not wish to delay discussion of subsidies, in particular to expand the prohibited subsidies under the SCM to include those fisheries subsidies that directly promote overcapacity and overfishing or other trade-distorting effects. China supports reduced subsidies, except that subsidies in the aquaculture sector should be exempt, given that aquaculture is a contributor to food security and employment in developing countries. The FAO and its Committee on Fisheries desired a joint working relationship with the WTO, and called the WTO the competent body on subsidies. However, the FAO considered itself as taking the lead role in the examination of subsidies and the relationship with responsible fisheries (Schrank, 2003).

Many have been frustrated by the lack of progress in controlling overfishing. The World Wildlife Fund (WWF) and the United Nations Environmental Program (UNEP) have conducted many studies on the issue of fishing subsidies and its relationship to overfishing (Porter 2001; WWF 2001b; UNEP 2002b; Schorr 2001). The universal recommendation is that many fishing subsidies worldwide should be abolished, generating two positive outcomes – trade in fisheries products becomes fairer and the incentive to over-capitalize and over-fish diminishes.

Porter (2001) notes that applying this to developing nations requires some thought. In the case of agriculture, developing countries are allowed to have a multi-year phase out of their subsidies. If the WTO were to follow that precedent with the subsidies found in the fishing sector, particularly those that contribute to over fishing, this policy stance will be only detrimental to the status of their fish stocks by prolonging the over fishing. Porter advocates for a differentiation of subsidies in developing countries into those that contribute to over fishing and those which do not, as well as countries in which fish resources are underutilized and those in which there is serious resource depletion.

Most of the focus in the study of fishing subsidies focuses on the subsidies given in the developed countries to their domestic industries (Iudicello et al. 1999; OECD 1997; Dommen and Deere, 1999; UNEP 2002b; U.S. Federal Fisheries Investment Task Force 1999; WTO 1999; WWF 2000). Removal of these subsidies might thus benefit developing countries to the extent that a reduction in effort by developed countries leaves more fish for developing countries to capture and then trade on the global market. Milazzo (1998) notes that there is little data on how much funding is going toward fishing subsidies in developing nations. He points out that in most cases funding from bilateral and international developmental assistance tends to go toward development of aquaculture, infrastructure and training and not toward programs that enhance fishing effort and harvesting capacity.

1. Global Categorization of fishing subsidies

The following table is found in the *Study into the Nature and Extent of Subsidies in the Fisheries Sector of APEC Members' Economies* (APEC, 2000).

1. **Direct assistance to fishers and fisheries workers**
   - Income support programs
   - Unemployment insurance
   - Worker adjustment programs
   - Fisher retraining
   - Other direct payments
2. **Lending Support Programs**
   - Loan Guarantees
   - Subsidized loans
   - Loan restructuring
   - Other lending support programs

3. **Tax Preferences and Insurance Support Programs**
    - Fuel tax exemption
    - Income tax deferral
    - Accelerated depreciation
    - Favorable tax rates on specific inputs or outputs
    - Vessel insurance and reinsurance programs
    - Other tax preferences
4. **Capital and Infrastructure Support Programs**
    - Development grants
    - State investments
    - Fleet renewal and modernization
    - Foreign access payments
    - Bait services
    - Provision of fish auctions or other sales facilities and services
    - Aid to shipyards
    - Fishing port infrastructure enhancement
    - Harbor facilities and moorage
    - Other capital and infrastructure support programs
5. **Marketing and Price Support Programs**
    - Export marketing programs
    - Fish product promotion programs
    - Market price support
    - Other marketing and price support programs
6. **Fisheries Management and Conservation Programs**
    - Vessel buybacks
    - Permit buybacks or License retirement
    - Stock enhancement programs
    - Fisheries management programs
    - Fisheries enforcement programs
    - Programs to assess fish stocks
    - Programs to identify and develop new fisheries
    - Research and development for fisheries technologies
    - Other fisheries management and conservation programs

2. Examples of Subsidies

a. Direct assistance to fishers and fisheries workers

Canada's fishermen's unemployment insurance system was introduced in 1957 (Schrank, 2003). Newfoundland is a province particularly dependent upon fishing, and in the fiscal year 1991, Canada paid US$98 million to Newfoundland fishermen. Other Maritime Provinces are also eligible for this funding. In 1992, the northern cod fishery collapsed, leading to a moratorium on catches that still remains in 2003. There were several programs created to address the economic problems of the fishing industry, including re-training programs, vessel and license buyback programs. From 1990 –98, the cost of these programs was more than US$3 billion.

b. Marketing and Price Support Programs

The Common Fisheries Policy (CFP) of the European Union has provisions for market support that are closely related to the Common Agricultural Policy (CAP). The primary objectives of the market policy are to: a) establish marketing standards; b) stabilize market prices and avoid the formation of surpluses; c) help support producers' incomes; and d) consider consumers' interests (Holden 1994). To accomplish these goals, there are specifications of marketing standards by freshness and size categories, fixing of guide prices, and management of marketing by producers' organizations (Holden, 1994).

This policy is not nearly as contentious as the CAP, primarily because, in contrast to agriculture's excess supply conditions, there is a trade deficit in the fisheries sector – the EU imports more than it exports. Thus, fish prices have in general remained higher than the guide prices. However, there are circumstances in which provisions of the CFP are used to intervene in trade. For example, when the Spanish distant water fleet returns with squid captured in the South Atlantic, imports of squid from non-EU members are restricted. This is done to avoid an oversupply in the EU market which would lead to price decreases for the Spanish-caught product (Wessells and Wallstrom 1994).

Many fishing nations provide market support in the form of government-supported advertising and market expansion efforts. For example, the EU funds, with member states and industry, a generic seafood product promotion campaign. The U.S. funds the Alaska Seafood Marketing Institute along with other organizations to help promote Alaska seafood in foreign markets. Norway's Norwegian Seafood Export Council similarly promotes Norwegian seafood, from both aquaculture and capture fisheries.

c. Fishing Access

The EU signed its first fishing access agreement with Senegal in 1979, shortly after nations exercised their rights to the 200-mile EEZ. Since many developing nations with

EEZs did not have the fishing capacity to make use of their resources, they opted to sell the access to these resources to third parties. The EU has been the predominate party negotiating these agreements, on behalf of their member countries, and has been paying the access fees.

Fishing access agreements have been predominately created between the EU and several African countries, in addition to a few other nations. In these access agreements, an amount to be paid is negotiated – these payments come from the EU and guarantee access to foreign waters by portions of the EU industrial fleet. During 1999-2000, the EU had agreements with 20 different nations for a total value of over EUR400 million. The countries with the largest negotiated fees in 2000 were Morocco (EUR114 million), Mauritania (EUR54 million), Greenland (EUR37 million), Argentina (EUR16 million), Angola (EUR13 million), and Senegal (EUR12 million) (OECD, 2003a).

The primary beneficiaries of the access agreements are Spain and France. The EU allocated EUR81 million for fishing access for Spanish fleets in 2000, or 59% of total access expenditures. France was allocated EUR31 million or 22.6% of all access expenditures (Institute of European Environmental Policy, 2002b). Portugal, Italy, and Greece also benefited.

The agreements are, however, very controversial. Fishing access agreements have been seen as a way to reduce capacity in the EU while securing employment and supplies of fish for the European Market (Institute for European Environmental Policy, 2002b). On the environmental side, there are generally no catch limits imposed on the foreign fleets or the limits are not enforced, and so the sustainability of the stocks of fish in accessed waters is in doubt in many nations.

Box 9 provides an example of the impacts of fishing subsidies, and Box 10 provides an example related to fishing access.

3. **Quantification of Fishing and Aquaculture Subsidies**

Several attempts have been made to quantify the value of the subsidies applied by nations, including Milazzo (1998) and APEC (2000). Not surprisingly, the difficulty here is a) lack of officially reported data, and b) disagreement among nations over the definition of a subsidy. The World Bank study by Milazzo was the first major effort to estimate the global value of fishing subsidies. Drawing from public data from the EU, Japan, Norway, Russia and the U.S. and other sources, it was estimated that global fishing subsidies totaled between US$11 billion and US$13.5 billion in 1996.

One of the often-chastised parties to the WTO with respect to subsidies, the EU constitutes a significant portion of total world subsidization of the fisheries sector. With the EU's expansion to include Spain and Portugal in 1983, the size of the fishing fleet increased by 75% and the number of fishermen more than doubled (Milazzo 1998). In part because of this expansion, subsidies provided by the EU increased from US$80 million in 1983 to US$580 million in 1990 (Milazzo, 1998). From 1994-1999 the EU

funded fleet renewal and modernization (US$747 million), port facilities (US$224 million), aquaculture (US$329 million), processing and marketing (US$705 million), product promotion (US$101 million) and other programs for a total of US$3 billion (Milazzo, 1998).

In 2000, efforts to collect values on subsidies began in earnest by the OECD. The OECD sent questionnaires to all member countries, requesting information on subsidy programs. The OECD has continued to collect this data, under the heading of 'Governmental Financial Transfers' (OECD, 2003b). In addition, under the Agreement on Subsidies and Countervailing Measures (SCM), nations are required to officially report to the WTO the value of the subsidies they provide each year. Not surprisingly, some countries are better than others at being complete and timely. APEC commissioned a similar study on the use of subsidies by type in 2000.

As a result, there now exists more information on the nature of subsidies, their uses and their costs than there were 10 years ago, providing important information to the discussion of fishing subsidies as contributors to overfishing and their impacts on trade. This information is compiled in Table 7, taken from WWF (2001).

Table 7. Total Officially Reported Fishing Subsidies (US$)

Source (scope)	1996	1997
OECD report (industrialized countries)	6.95 billion	6.38 billion
APEC report (Pacific Rim countries)	1.91 billion	4.45 billion
WTO notifications (Global - WTO members)	5.85 billion	0.82 billion
Combined Total	approx. 13 billion	approx. 8 billion

Source: WWF, 2001.

The total reported subsidies in 1996, reported by WWF (2001), were approximately US$13 billion, and US$8 billion in 1997. This total avoids double-counting (e.g. the U.S. is a member of OECD, APEC and the WTO, but is only included in the OECD values). These numbers compare favorably with Milazzo's study, but the issue remains how accurate the numbers are.

The APEC study finds that the most favored subsidies used in APEC countries have to do with management and conservation of the fisheries resources, followed by capital and infrastructure support, although there is a move away from capitalization as stock sizes have been drawn down to dangerous levels. Very few of the programs or subsidies we categorized as actionable by the WTO. Only 10 of 162 programs have an assessed medium or high risk of challenge. The APEC analysis indicates that the value of the actionable subsidies is only approximately US$370 million. Thus, the challenge to the

WTO is to discuss fishing subsidies that are both trade distorting (not many, according to APEC) and those that contribute to overfishing and overcapacity.

C. Trade Barriers - Tariffs[5]

Tariffs are a form of barrier to trade for exports, regardless of the developing versus developed nature of the economies. Eight of the top 10 importers of seafood are developed nations (the other two are Hong Kong and China – see "General Trade" section of this paper). Thus, tariffs in OECD member countries are very important to the developing nations that export to them. However, there is a good deal of South-South trade occurring as well. This section will explore the tariffs faced by all exporters of seafood, unprocessed and processed.

Tariffs on seafood in major exporters among developing countries are generally higher than those in OECD countries (see Table 8). However, the tariffs are more transparent in developing countries than tariffs in industrial countries. The structures of the tariff regimes, however, differ considerably among developing countries.

Thailand has the highest tariff levels on seafood products among developing countries, followed by India, while Chile and Malaysia apply the lowest duty rates. Yet all developing countries for which we have detailed tariff schedules implement transparent tariff structures with all products lines subject only to *ad valorem* duties.

Tariff escalation is present only in China. While average duties on processed seafood products are generally higher than duties on raw fish in major exporters, many countries (e.g. Malaysia, India) grant the highest level of protection to intermediate goods.

[5] The section co-authored with Mirvat Sewadeh of the World Bank.

Table 8: Average Tariff by Type of Seafood Among Major Exporters in Developing Countries

HSCODE		China	India	Thai	Mex	Brazil	Chile	Argentina	Kenya	Malaysia
	Raw Seafood									
301	Live fish.	12	15	60	24	7	9	4	15	0
302	Fish, fresh or chilled, excluding fish fillets and other fish	18	15	60	30	13	9	12	15	0
303	Fish, frozen, excluding fish fillets and other fish meat	19	15	60	30	13	9	12	15	0
304	Fish fillets and other fish meat (whether or not minced), fresh, chilled or frozen	30	15	60	30	13	9	13	15	0
306	Fish, dried, salted or in brine; smoked fish, whether or not cooked before or during the smoking process; flours, meals and pellets of fish, fit for human consumption	24	15	60	28	13	9	13	15	6
307	Molluscs, whether in shell or not, live, fresh, chilled, frozen, dried, salted	22	15	60	30	13	9	13	15	13
	Intermediate goods									
1504	Fats and oils and their fractions, of fish or marine mammals, whether or not refined, but not chemically modified	22	45	60	8	11	9	10	15	18
	Processed Seafood									
305	Fish, dried, salted or in brine; smoked fish,	28	15	60	30	9	9	9	15	13
1604	Prepared or preserved fish; caviar and caviar substitutes prepared from fish eggs	25	45	60	23	19	9	19	15	18
1605	Crustaceans, molluscs and other aquatic invertebrates, prepared or preserved	24	45	60	23	19	9	19	15	7

After the Uruguay Round, average weighted import tariffs on fish products in developed countries were reduced to around 4.5% (Lem 2003). However, this average hides a number of tariff issues, including some tariff escalation, and tariffs to specific items (such as canned tuna in the U.S.).

The profiles of tariff structures vary widely among industrialized countries in terms of the tariff levels applied, the transparency of the structure, and the presence of tariff escalation. About 68% of OECD fish imports are subject to tariffs that range from 0-5% with only 3% of the imports subject to tariffs higher than 15%.

Table 9 shows Korea and the EU apply the highest duties on seafood and seafood products. They also have the highest occurrence of tariff peaks , with 69% of Korea's tariff lines and 41% of the EU tariffs higher than 15% . Five percent of developing nations' exports to the EU are taxed at rates higher than 15%. In comparison, 4% of U.S. tariffs are higher than 15%, while Japan and Canada do not have any tariff peaks.

Table 9: Average Tariff By Type of Seafood in Industrialised Countries

HSCODE		EU	Japan	US	Korea	Canada
	Raw Fish					
301	Live fish.	7	2	0	10	0
302	Fish, fresh or chilled, excluding fish fillets and other fish	13	5	1	20	0
303	Fish, frozen, excluding fish fillets and other fish meat	14	4	1	10	0
304	Fish fillets and other fish meat (whether or not minced), fresh, chilled or frozen	10	4	1	14	0
306	Fish, dried, salted or in brine; smoked fish, whether or not cooked before or during the smoking process; flours, meals	11	4	1	19	3
307	Molluscs, whether in shell or not, live, fresh, chilled, frozen, dried, salted	7	7	0	19	1
	Intermediate Seafood Products					
1504	Fats and oils and their fractions, of fish or marine mammals, whether or not refined, but not chemically modified	4	2	1	33	3
	Processed Seafood					
305	Fish, dried, salted or in brine; smoked fish,	13	10	2	20	0
1604	Prepared or preserved fish; caviar and caviar substitutes prepared from fish eggs	18	9	5	20	5
1605	Crustaceans, molluscs and other aquatic invertebrates, prepared or preserved	18	8	3	20	3

Source: WTO Database and OECD (2003a)

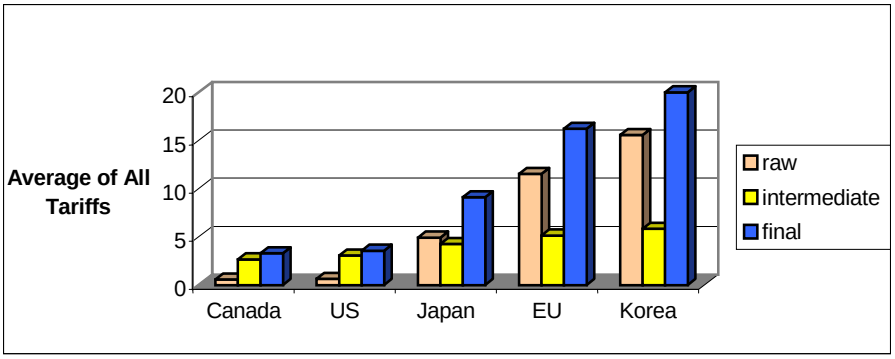
But despite their relatively high tariffs, both Korea and the EU have very transparent tariff structures, with all tariffs applied on seafood products in the form of *ad valorem* duties. In comparison, Japan and the U.S. implement more complex tariff structures. In Japan, about 20% of the tariff lines on intermediate seafood products are either per unit specific or compound duties. Similarly, 38% of U.S. tariff lines on intermediate seafood products are also compound or per unit specific. The compound and per unit specific tariffs in the U.S. do not seem to be aimed at concealing protection. The average *ad valorem* equivalent of such tariffs is only a little over 2%. At the same time, the products that receive tariff protection in the U.S. such as canned tuna are protected only through high *ad valorem* tariffs.

In the case of Japan, we were unable to compute the equivalent a*d valorem* rates of compound and per unit specific rates. Hence, it is difficult to state with certainty whether the tariff structure does conceal high duties.

Tariff escalation, where duties increase with the level of processing, is present in the U.S. and Canada. Figure 29 shows the tariff levels for 5 OECD countries. The EU,

Japan, and Korea implement "partial" tariff escalation. Tariffs on processed seafood are on average higher than tariffs on raw fish, but tariffs on intermediate products are lower than those applied on raw fish. It is important to note here that all of Japan's compound and per unit specific tariffs are applied on intermediate goods. Since we were unable to compute the *ad valorem* equivalent of these duties, our estimation of the average tariff on intermediate goods contains a downward bias. Prepared and preserved crustaceans along with "unspecified"[6] types of fish are subject to the highest tariffs in industrial countries.

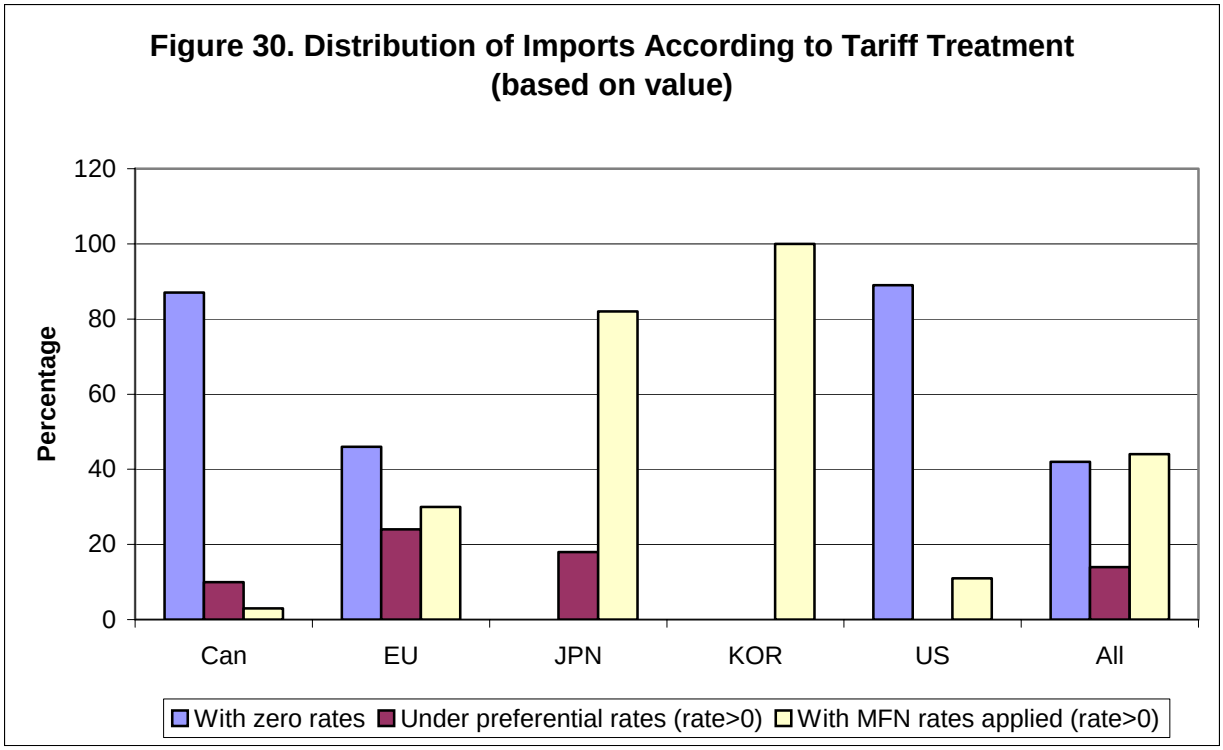
Figure 29: Tariff Structure by Level of Processing



Source: OECD, 2003a.

Most industrial countries offer preferential access to developing countries seafood exports. The EU offers free access to all seafood products from LDCs and partial tariff exemption to most seafood exports from ACP and other developing countries. The U.S. grants free access for all developing countries, and for all seafood products. Japan also grants free access to some seafood imports from LDCs and to only one seafood tariff line for other developing countries.

[6] "Unspecified Fish" includes all types of fish, such as caviar, that are not specified under other tariff lines.



Source: OECD, 2003a.

Figure 30 shows the distribution of tariff treatments by 5 OECD countries to other countries.

Table 10. Trade weighted tariff averages for developing countries' exports to OECD countries, by processing stage

	LDC	DEV	All other
		(Percent)	
All	2.5	2.9	3.2
Unprocessed	2.5	2.5	2.5
Fillets	2.8	2.5	2.0
Semi-processed	0.5	1.9	1.4
Processed	1.7	4.3	8.0
		US$ Million	
Total value	437	10689	21992

Source : OECD, 2003a.

Table 10 indicates that the trade-weighted tariff averages across the OECD countries show trade escalation for developing countries and for all other importers, but not for the LDC.

According to OECD, the weighted tariff averages applied to seafood imports from developing countries (excluding LDCs) to the EU, Japan and US are 7.6, 4.0 and zero, respectively. The comparable rates for LDCs are zero for the EU and the U.S., and 3.6 for Japan.

Table 11 shows tariff averages for OECD countries by species for all countries. The species shown here are the most important to developing nations as exports. In most cases, the trade-weighted tariff averages are lower than simple tariffs.

The EU has shifted its tariffs on shrimp in the past few years and is again revising its tariff concessions (Integrated Framework, 2001). Under the EU's new Generalized System of Preferences, for January 2002 to December 2004, EU nations will collect tariffs on frozen shrimp exported from Indonesia, Vietnam, Burma and India at 10.9%, compared with the current rate of 4.5%. However, the import tax on shrimp exports from Madagascar, Senegal and French Guinea remains unchanged at 0%.

Table 11. Tariff averages and trade values for the eleven OECD countries, by species

	Tariff Average (%)		Trade Value (US$ million)		
Species	Trade-wieghted	Simple (MFN)	Import	Export	Trade Balance
Tuna	4.5	9.4	3658	992	2666
Herring	6.2	6.7	194	386	-192
Sardines and anchovies	3.8	7.9	286	189	97
Mackerel	4.4	7.9	398	449	-51
Shrimp	1.9	8.2	8693	1398	7295
Shellfish	5.4	8.7	1921	1166	755
Cuttlefish	4.6	5.4	1410	295	1115

Source: OECD, 2003a.

D. Trade Barriers - Technical Barriers to Trade

In recent years, there has been a large increase in polices that could potentially come under the heading of technical barriers to trade. Among them are labeling programs and the resultant traceability capability it requires. The programs are typically found in developed nations and can have potentially large impacts on developing nations.

Among the labeling programs are: ecolabeling, country-of-origin labeling, and other production process labeling, such as organic. There is currently much happening in the U.S. and EU from a regulatory perspective on country-of-origin labels. Ecolabeling and organic labeling are voluntary programs, but the WTO is interested in whether or not voluntary labels such as fair trade, organic and ecolabels constitute a non-tariff trade barrier. Currently, these labels are not considered as trade barriers as long as they are non-discriminatory (WTO, 2003a).

1. Ecolabeling:

Ecolabeling programs evaluate the production process of a fishery with regard to established environmental standards set by an independent third party. If the process meets these standards, the producer or marketer may buy a license to use a specific ecolabel in marketing efforts. In effect, the label conveys to the consumer otherwise unobservable information concerning a product's environmental impact.

The best example of this kind of program is the Marine Stewardship Council (MSC). The MSC was created in 1996 through a cooperative effort of the World Wildlife Fund (WWF) and Unilever, a multi-national corporation. The goal of this partnership was to provide a standardized mechanism for certifying and labeling seafood products worldwide, thereby providing a market-based incentive to maintain sustainable fish stocks. The MSC has long since moved away from funding from WWF and Unilever toward funding from a large variety of sources, and is moving toward self-sufficiency from sales of licenses for the MSC logo (www.msc.org).

The MSC created standards which fisheries must meet before they can become certified. Certification is voluntary. Having set those standards, the MSC has accredited a number of certification firms (third-party independent entities) that judge the fishery against the standards. Once the fishery is certified, the MSC's trading company, MSCI, licenses the use of the MSC logo. Fisheries certified to date are Western Australian rock lobster, Thames (UK) herring, Burry Inlet (UK) cockles, Alaskan salmon, New Zealand hoki, and the South West (Cornwall - UK) mackerel handline fishery. Several fisheries are currently in full assessment and more than two dozen fisheries are at other points in the process – among them, the South Georgia toothfish fishery and the largest fishery in the US - the Alaska pollock fishery.

Gardiner and Viswanathan (2003) reviews developing country concerns on the basis of already certified fisheries. The paper suggests that ecolabeling as it is currently presented is unlikely to be widely adopted in Asian countries. At issue is the lack of resources to satisfy the requirements of 'sustainable fisheries' as defined by the MSC. Obstacles in developing nations are not only the cost of the certification process, but the much larger costs of monitoring biomass, setting TACs, and the enforcement of the management policies. As we have discussed above, developing countries need to tackle the difficult questions of access to domestic fisheries and building infrastructure such that chain-of-custody and traceability can be managed as well. To their credit, the MSC is working hard with developing nations to structure the determination of sustainability of small local fisheries. The Packard Foundation is providing funding for small-scale fisheries to pay for the certification process. The FAO recently held a consultation on ecolabeling, trying to determine if the FAO might set standards and create a competing ecolabel to the MSC that considers developing nations' fisheries and their sustainability, more specifically.

However, developing definitions for sustainable fisheries is only part of the issue. If developing nations do not become a part of a successful ecolabeling program(s), the issue of a two-tiered market arises. In other words, will ecolabeled seafood products only be

traded amongst more affluent developed nations while the non-labeled product is primarily traded between developing nations? Developing countries have requested that the FAO take a role in developing sustainability standards such that products from their countries are not prevented market access to the more highly priced ecolabeled product market.

It should also be noted that there is currently an ecolabeling program for aquarium fish – which are important live fish exports for many nations in the South Pacific.

2. Country-of-origin labeling

Country-of-origin labeling is already required in the EU market and is looming for the U.S. market. According to EC No. 2065/2001 the label must also state the catch area for those products caught at sea. The U.S. agricultural industries led the way lobbying for country-of-origin labeling on food products within the U.S. In the U.S., legislation in the 2002 Farm Security and Rural Investment Act (generally known as the 'Farm Bill') allowed for two years of voluntary compliance with the country-of-origin labeling, with mandatory compliance for fish and shellfish by September 2004.

The U.S. Department of Agriculture (USDA) produced guidelines in 2002 that apply to fresh and frozen meat (beef, pork and lamb), fish and shellfish, peanuts and perishable produce (fruits and vegetables). After 2004, firms supplying covered commodities to retailers will be required to maintain a verifiable record-keeping audit trail that identifies the country of origin. Mandatory implementation of this bill has been delayed for all agricultural products, but will not be delayed for farmed and wild fish. Significantly processed seafood products (fish sticks, frozen fish dinners) are exempt.

3. Farmed versus Wild Production Process

In addition to the country-of-origin, both the U.S. and the EU requires seafood be labeled as either wild or farmed. To obtain a "U.S. Product" label, farmed seafood much be hatched, raised, harvested and processed in the U.S.; wild-caught seafood must be either harvested in the waters of the U.S. or by a U.S. flagged vessel, and must also be processed in the U.S. or aboard a U.S. flagged vessel.

4. Organic

Organic food is produced by farmers who emphasize the use of renewable resources and the conservation of soil and water to enhance environmental quality of future generations (www.usda.gov). Organic meat, poultry, eggs, and dairy products come from animals that are given no antibiotics or growth hormones. A certifier inspects the farm where the food is grown to make sure the farmer is following all the rules necessary to meet organic standards. The term 'organic' on a food product describes a complete system of production that begins on a farm, according to the Organic Trade Association in the U.S.

Current organic standards in the U.S. apply only to agricultural products, and in the EU apply to agricultural products and farmed fish. Recently in the U.S., Senators from the State of Alaska requested that the National Organics Board investigate the possibility of creating standards that would allow for organic wild-caught seafood. At this time there are no standards in the U.S. for organic seafood. The National Organics Board convened two committees, one for wild-caught and one for farm-raised, to determine the answer to this question. The findings of the two committees were that neither wild nor farmed seafood could qualify to be certified organic under the current set of standards. In addition, groups representing organic farmers vehemently opposed either qualification.

Why do wild-caught fish not qualify? Organic requires that the producer be in control of the product from the start, to control its environment and its nutrition sources. Wild fish swim through uncontrolled water and eat uncontrolled food. The danger with water is its quality – there is no control whether a fish swims through clean or polluted water.

Uncontrolled water and food are not an issue with aquaculture. The EU allows for organic farmed fish, with only salmon and trout being readily available. In the U.S. the Organic Trade Association and the Natural Organic Standards Board have indicated a willingness to apply the organic label to farm-raised fish because their diets can be monitored, an important requirement for organic livestock that is not possible for any wild fish. However, the U.S. requires that the feed also be 100% organic, which standard fishmeal cannot meet for the same reason wild fish cannot meet organic standards.

There is now a Congressional mandate on the USDA to generate standards for organic wild fish. The USDA has two years to develop organic standards for wild fish. The Organic Trade Associate in the U.S. is against this, because in their view 'organic' is not a synonym for 'natural.'

E. Trade Barriers - Sanitary and Phytosanitary Measures

Import regulations based on HACCP principles, adopted by many of the major importing nations, have been regarded as non-tariff barriers by many developing countries, as the investment required to bring processing plants up to code can be substantial (Filhol 2000). During the period 1997 – 1998, the EU imposed bans on the import of seafood from India, Bangladesh and Madagascar, Kenya, Tanzania, Mozambique, and Uganda citing food safety concerns both in processing and in possible contamination prior to catch (Filhol 2000).

Box 7 and 8 demonstrate the effects of food safety barriers on a developing nation.

The FAO has highlighted the need for a more rapid harmonization of fish safety and quality standards in accordance with rules of the WTO Agreements on the Application of Sanitary and Phytosanitary Measures (FAO, 2002c). Developing countries are at a disadvantage because of insufficient national capacity and resources.

The issues with respect to food safety differ somewhat depending on wild capture or aquaculture. In both cases, sanitary storage and processing are issues, but in aquaculture there are some of the food safety issues similar to agriculture while capture fisheries products are different. For example, in aquaculture there is regulated use of antibiotics, pesticides, and other chemicals somehow entering and perhaps remaining in the product. Marine farms combat disease among crowded fish. The U.S. Food and Drug Administration (FDA) has identified more than 30 drugs used in foreign aquaculture. Federal law bars seafood containing drugs from entering the country. For example, the U.S. and Canada have seized shipments of farmed salmon from Chile due to the presence of residues of malachite green, a banned fungicide. The U.S., EU and Canada have also found chloramphenicol, a banned antibiotic, in Chinese crawfish and shrimp, and Vietnamese shrimp.

At issue, other than food safety, are costs of production. One might think that costs of production would preclude the use of expensive antibiotics, but in fact not using them may lead to much larger costs in the form of diseased and dying fish. Through the history of shrimp farming, disease has decimated farms in China, Ecuador, and the Philippines. The shrimp farming industry has moved production to places such as Madagascar where disease is less likely to occur. Thus, the use of chemicals is the alternative to less densely stocked ponds and other production practices. Most shrimp farmers want to stock their ponds as densely as possible because the product is very valuable on the international market.

Another issue in aquaculture related to food safety is genetic modification of fish. To date, there are no genetically modified food fish products on the market in any part of the world, although there is a genetically modified salmon currently in a review process by the U.S. FDA. There is a genetically modified fish currently being sold called the "Glofish" – an aquarium fish derived from zebrafish that are modified to be fluorescent.

In capture fisheries, food safety issues are predominately sanitary processing issues. However, the news is full of the increase in concerns about mercury contamination in several species of fish, some of which are important export products for developing countries. The list of species with the highest level of mercury includes: tilefish, swordfish, king mackerel and shark. To this point, most of the action taken by governments regarding these products has been to issue warnings to consumers, particularly pregnant women, to only rarely consume any of these fish species.

Traceability

One of the important issues from the developing country's perspective, in addition to the possible barriers these labeling (voluntary and mandatory) programs have on their market access, are the costs related to maintaining traceability of the product, which is required under most labeling schemes. Traceability is defined by the International Organisation for Standardization as the 'ability to trace the history, application or location of an entity by means of recorded identification.'

Traceability is an identity preservation system. It involves being able to identify the origin of a particular unit and/or lot of products within the supply chain, and the capacity to track the path of a particular unit (USDA/ERS, 2002; Carvajal, 2003). The Norwegian Institute of Fisheries and Aquaculture is coordinating an EU project called TRACEFISH, or 'Traceability of Fish Products Concerted Action Project.' This project recommended standards addressing what, how and where data should be recorded for full-chain traceability, with specific measures for wild and farmed fish (Drouin and Warren, 2003).

The EU, in its regulatory framework for providing consumers with information regarding seafood products, requires that the information concerning the commercial designation, the production method, scientific species name, and the catch area shall be available at each stage of marketing of the species concerned.

How is this accomplished? For example, a wild fish processor would need to know the country of origin, and segregate and label product accordingly. Records which help ensure traceability might be transportation records, receiving records, processor plant identification system, sales receipts, shipping manifests, inspection records, segregation plan, production records, inventory records, UPC codes, location of harvest, etc. For a processor of farmed fish, the list might look very similar. An owner of a grow-out pond would have to identify and segregate fingerlings as to the origin, properly label and identify all marketable size fish sold, maintain the integrity of the identification and maintain ownership transfer records. Clearly, this is not costless. ' The supplier that can clearly trace the journey of his seafood from sea to plate will be a valued friend of buyers who are now facing lawsuits (such as US supermarket chains) and new regulations pertaining to the labeling of the seafood they sell consumers,' states John Fiorillo, the editor of *The Wave News Network*.

There is a cost to maintaining traceability – a cost that developing countries' fishing industries will have to bear to retain market access. However, it is possible that consumers will be willing to pay more for organic, ecolabeled, or country-of-origin labeled fish products, and so producers may receive more for their product in the export market.

F. Trade Barriers – Anti-dumping and Countervailing Measures

As tariff barriers have been relaxed, and the aquaculture industry has boomed globally, more and more fishing industries in the U.S. have found themselves competing with lower priced imports. Thus, the U.S. in particular has been quite active in pursuing anti-dumping and countervailing duty suits against foreign fish product competitors. The U.S. has brought forward anti-dumping and countervailing charges against imports of Norwegian farmed salmon in 1990, Chilean farmed salmon in 1997, crawfish from China in 1997, and farmed catfish from Vietnam in 2003. There was a petition filed with the U.S.

International Trade Commission (USITC) in December 2003 against 6 exporters of farmed shrimp.

1. Crawfish from China

The imported product was defined as freshwater crawfish tail meat in all its forms, grades, and sizes. China dominates the source of imports into the U.S., with 62% of all imports by the U.S. in 1997, and 92% in 2001. U.S. production of crawfish in 1996 was 12.5 million pounds and in 1997 was 23 million pounds (U.S. DoC, NMFS, 1997). Meanwhile imports of crawfish from China were 2.6 million pounds in 1996 and 5.8 million pounds in 1998 (www.st.nmfs.gov/webpls). The average value per pound of import from China was $1.85 per pound in 1997 compared with a price of $5.82 per pound for domestically produced product. As a result, antidumping duties imposed were 223.01% (USITC, 2003b). However, Chinese crawfish continue to dominate the import picture in the U.S. market with sales of 8 million pounds in 2001 and 7.5 million pounds in 2002, worth a total of US$38.7 million in 2001 and US$22.2 million in 2002 (www.st.nmfs.gov/webpls). The ruling was reviewed in 2003 and it was determined that the antidumping duties should remain in place.

2. Catfish from Vietnam

In 2002, individual catfish processors and the Catfish Farmers of America, a trade association of U.S. catfish farmers and processors, brought a petition to the USITC regarding dumping of frozen catfish fillets into the U.S. market by Vietnam.

Catfish farming is the largest aquaculture industry in the U.S. Production in 2000 was 150.6 million pounds (USITC, 2003b). The primary producing states are Mississippi, Arkansas, Louisiana and Alabama. Prior to 1999 imports were largely absent from the U.S. market. In 1999, Vietnam exported less that 2 million pounds of what they called 'catfish' into the U.S. market. By 2001 that number increased to 15.9 million pounds.

The Vietnamese product was successfully marketing in the U.S. under the name 'catfish' and was labeled as such. The Latin names of the species imported from Vietnam were *Pangasius Bocurti*, *Pangasius Pangasius* and *Pangasius Micronemus.* American catfish are from the *Ictaluridae* family.

A problem in world markets for fish is that, once processed, it is very difficult to determine the exact species being sold. Therefore, some fish are marketed as, for example, red snapper although they are not red snapper. The real red snapper is a high-valued fish. Due to many cases of intentional and unintentional fraud perpetrated in seafood markets, falsely leading consumers to believe that what they were buying is one product when in fact it is another, or marketing the same product under different names causing consumer confusion, the FDA has become more rigorous in its regulations of appropriate names for fish.

Given this, Vietnam was first required to begin labeling their fish not as 'catfish', but instead with the actual names of 'basa' and 'tra.' The domestic industry in the U.S campaigned to get labeling laws in place to prevent the misnaming of basa and tra, and were successful in doing so. The Farm Security and Rural Investment Act of 2002 ('Farm Bill') states that for the purposes of the Federal Food, Drug, and Cosmetic Act, 'the term 'catfish' may only be considered to be a common or usual name (or part thereof) for fish classified within the family *Ictaluridae*' (USITC, 2003b).

However, Vietnamese basa and tra were still found to be a like product to American catfish, and judged to be dumping product into the U.S. market. Imports from producers in Vietnam were levied anti-dumping duties between 36.84% and 63.88%.

3. Shrimp from Some Developing Countries

As of December 2003, the Southern Shrimp Alliance (SSA), a group of shrimp harvesters and processors in the U.S. filed anti-dumping petitions with the USITC, alleging that Thailand, China, Vietnam, India, Ecuador and Brazil are dumping shrimp (primarily farmed) with an approximate value of $2.4 billion into the U.S. market. The SSA is petitioning that there be tariffs applied to imports of shrimp from these countries ranging from 30% to 267%. The SSA cited "a variety of financial incentives provided by national governments and international institutions over a number of years have over stimulated the infrastructure and production of farm-raised shrimp in these countries" (McGovern, 2003). Thus it seems that the investment by organizations such as the World Bank and others in helping build an export industry in some of these countries is perceived to have created unfair subsidies for these now successful shrimp exporting nations.

BOX 7

Seafood Safety in Kenya: Implications for Trade

Most of the fish caught in Kenya are from Lake Victoria, and the majority of that catch is Nile perch (FAO, 2000a). Nile perch is also the main export from Kenya, earning about US$50 million annually. Of the 18 fish processing and exporting firms now in Kenya, 10 specialize in Nile perch and 8 in marine products such as shrimp, crustaceans and tuna.

In 1997, the EU became concerned about the safety of fish form Kenya when Spain and Italy both banned fish imports due to the presence of salmonella. Some other members of the EU continued to import from Kenya, but exports declined by 34% between 1996 and 1997. In 1998, the EU banned imports of fish from Kenya due to a cholera outbreak. In 1999, the EU banned fish from Lake Victoria yet again due to the presence of pesticides. In 1997 Kenyan exports were US$52 million, in 1998 US$39 million, in 1999 US$32 million, but back up to US$39 million in 2000 (FAO, 2000a).

In response to the widespread requirement of a HACCP program in order to export to many nations, Kenya has instituted stringent quality control procedures consistent with HACCP. The Fisheries Department controls quality though provisions of the Kenya Fisheries Act and the Fish Quality Assurance Regulation of 2000. However, fish quality comes at a cost – there are strict regulations on production, handling, processing, packaging, and transportation of fishery products. In addition, there are strict regulations regarding construction of buildings, equipment, purification tanks and storage facilities. Costs were incurred to train workers in hygiene related to fish handling. There is also the additional cost of electricity from maintaining strict temperature controls. Finally, the cost to fishermen is also significant in that they must invest in newer boats that have chillers to maintain the quality of fish after catch.

Kenya has adapted to this by restricting the number of facilities handling fish to be exported. Only 5 fishing villages (out of nearly 300) are authorized to handle fish landings. This causes fishermen from elsewhere to incur higher transportation costs to land their catch.

The costs of exporting to nations with strict quality controls are not trivial, and Kenya has had to incur those costs to remain in the international market. As long as Nile perch continues to be in demand in the world market, it is possible that Kenyan producers can cover their costs. Should the prices rise too far, substitution to other white-fleshed fish will occur. The international seafood market in white-fleshed fish is very competitive, particularly now that farmed tilapia and farmed catfish are available in large numbers.

Source: Abila, 2003.

BOX 8

Impacts of Trade Liberalization in Uganda's Fishing Industry

The fisheries industry in Uganda has become one of its most important in terms of employment and export earnings. Adjustments in policies related to economy-wide liberalization and reforms in its trade regimes induced a large-scale fishing and fish processing sector. The fisheries sector is the second largest national export producer with export values growing from US$1.4 million in 1990 to US$78 million by 2001 (UNEP, 2002a). More than 1 million workers are directly engaged in the harvesting, transport, processing, distribution and marketing of fish (UNEP, 1999a).

Yet, events have unfolded in Uganda's fishing industry that mirrors many of the problems fishing industries in the rest of the world have encountered. In Uganda, fisheries products are fresh water, coming from the many lakes and rivers within the country. Under existing legislation, the Lake fishery is one of open access. There are relatively few restrictions on who may fish, and few technical measures to control fishing mortality. Poor data have led to difficulty determining the amount of fish that can be taken without depleting the stocks beyond a sustainable level, particularly difficult for Lake Victoria, given that the riparian parties are Uganda, Kenya and Tanzania. Thus, it has been difficult to establish harvest limits. UNEP recommendations are that Uganda should determine the level of fish stocks it currently has, establish a TAC that is in line with sustainable harvests in each of the major water bodies, and implement an ITQ system.

Overfishing is not the only problem in Uganda. According to UNEP, the use of unsustainable fishing practices in the country has grown, as the catch of native fish has declined. For example, exotic species are being introduced to lakes and rivers. In another example, poisons are being used to stun the fish, bringing them to the surface, making them easy to scoop up in nets. Legislation prohibits this technique. The poisoning has led the EU to impose a ban on fish exports from Uganda due to food safety concerns.

Other issues related to food safety include a lack of refrigeration facilities to preserve fish after harvest, and transportation to processing facilities is made difficult and slow by poor road conditions further degrading the quality and safety of the fish prior to processing.

In addition, other environmental problems are occurring, such as effluent pollution from fish processing industries of predominately of raw, untreated waste – going directly into those very rivers and lakes from which the fish are coming. The effluents lead to biologically toxic water environments for fish.

Social problems also threaten the fishing industry as most of the products are targeted to export markets, from which higher prices are obtained. Much of the local population can only afford fish rejected by fish processors for the export market. Food security concerns are raised, as Nile perch feed heavily on freshwater shrimp that are also caught and used as animal feed.

Source: UNEP, 1999a.

BOX 9

Argentina: Subsidies and Declining Stocks

In Argentina, domestic subsidies along with subsidies from other countries supporting foreign vessels' fishing in Argentine waters, joint international fishing ventures, and various payments to the Argentine government dramatically increased fishing effort. Between 1985 and 1995, exports grew by 478 %, and during some periods, represented 90% of all fisheries production. Total exports in 2000 were US$ 747 million, with roughly half of that as frozen fish filets (hake), and half in squid and shrimp. The subsidies in this case were directly responsible for fishing vessel overcapacity and overfishing. In 1997, the fishing of hake, the primary capture species, was found to be twice the sustainable yield. By 1999, total fish catch had fallen by 25% as stocks were being depleted.

Source: UNEP, 2002c.

BOX 10

Importance of Fish and Fishing in Senegal

Fish and fish products constitute the largest export category in Senegal, contributing to an average of 37% of total exports during 1996-2000. The fisheries sector accounts for about 2% of GDP and employs about 600,000 people. Industrial fishing has been replaced by small-scale fisheries, accounting for 90% of all fish produced in Senegal in 2000, up from 65% in 1993-1995. The decline in industrial fishing is due to depletion of the fishing resources.

The bulk of fishery landings in Senegal are sardinella which are relatively low valued and are consumed domestically. The bulk of the export earnings come from exports of tuna, squid and octopus, shrimp and sole. Of US$260 million in fish and fish product exports from Senegal in 2000, US$126 million came from the exports of fresh, chilled or frozen miscellaneous fish species, and US$107 million from crustaceans and mollusks (FAO, 2000a). The latter is largely made up of frozen squid and miscellaneous crustaceans (FAO, 2000a).

The artisanal, or small-scale, fisheries currently operate under an open access management system that has led to resource depletion. The number of artisanal fishing vessels, which are generally old and poorly equipped, has expanded greatly in recent years as large numbers of former agricultural workers have invested in artisanal fishing. The sector has adjusted to the resource depletion by fishing in neighboring nations' waters, as well as moving out to deeper waters.

Industrial fishing vessels are increasingly traveling to fishing grounds in neighboring countries as well from where they obtain (sometimes illegally) up to 30% of their catch. About 65% of the industrial boats landing fish in Senegal are Senegalese, while 28% are EU-flagged vessels. The EU fleet mostly lands their fish in Europe, by-passing processing facilities in Senegal.

Government assistance to the small-scale fishing sector, both direct and indirect are:

- Modernization assistance through the creation of infrastructures (fishing wharves, Central Fish Market), a policy of tax reductions on fishing equipment (motors), fuel subsidy, setting up of structures to finance the sector.
- Assistance to marketing (support to the fish and seafood trade, export subsidy, devaluation, Lomé Convention, alignment with international standards, duty-free export companies, fishing agreements) aimed at achieving greater competitiveness and a stronger penetration of foreign markets.
- Assistance to small-scale processing.

Source: www.integratedframework.org; UNEP, 2002d.

BOX 11

Foreign Fishing Access Agreements on Mauritania

The fishing sector in Mauritania accounts for more than 40% of exports and about 6% of GDP. The only major export items are squid and octopus, with an export value of US$68 million in 2000 (FAO, 2000a). Only US$639,000 in fish products were exported in processed form and that was for dried, salted or smoked products. Total fish product exports were US$74 million.

The primary source of earnings from the fishery sector in Mauritania is not from exports but from access fees the EU pays for their fleet to fish in Mauritanian waters. In a sense one might say that Mauritania exports its fish resources while they are still in their habitat, directly to the EU fishing fleet. Eighty percent of fish in Mauritania, or 450,000 tons, were landed by industrial vessels in 2001 (WWF, 2003). A new agreement on fishing access by the EU was enacted in 2001, and is effective until August 2006. The EU is paying 430 million euros, creating access to Mauritanian water for 248 vessels, targeting hake, squid, crawfish and tuna. The EU vessels are predominately from Spain and France, but also from Italy, Portugal, Greece, the Netherlands, Germany and, to a minor extent, Ireland.

In addition to the access fees, vessel owners are required to pay EUR 29 per ton of catch taken by freezer tuna seiners, and EU 19 per ton for catches from pelagic fish trawlers. A license fee is also payable, based on tonnage per year in some cases and a flat annual fee for tuna vessels.

In response to critics, the EU has begun to a) increase the value of the access payments (for Mauritania up 61% over the previous agreement); and b) to work toward agreements that promote sustainable development of the fisheries in the target nations. To that end, the agreements have built into them the ability of the Mauritanian authorities to inspect and control fishing activities – requiring a daily log of catches by the foreign vessels and for a system of observers on board vessels. These opportunities for Mauritania are not fully taken advantage of. Restricted fishing zones have increased in size, but there remain no catch limits.

Determining economic benefits for either party to the agreement is uncertain, as there are few catch statistics available. However, based on the previous agreement between the EU and Mauritania, for each euro paid to Mauritania in 1996, the value of the catch was two times greater. In 1997, the value of the catch was three times greater than the cost of access. Little of the access money appears to be utilized to build within Mauritania a domestic infrastructure to nationalize its resources rather than selling foreign access. In addition, reports from non-governmental organizations, such as the World Wildlife Fund, indicate that the agreements have negative effects on local communities and on sustainable development.

Primary sources: Institute for European Environmental Policy, 2002; www.integratedframework.org.

BOX 12
The Shrimp Industry in Madagascar

Madagascar's shrimp industry is the country's leading foreign exchange earner, with growth in exports from US$20 million in 1980 to US$102 million in 1999, and accounts for 7% of GDP. Approximately one-half of the shrimp produced are from capture fisheries, while the other half is from aquaculture. The industry provides direct employment for approximately 53,000 people and indirectly for another 30,000 people.

In the shrimp capture industry, there are three types of fisheries, traditional, artisanal and industrial. The bulk of the employment occurs within the traditional fishery, in which fishers have no motorized equipment. Entry into the fishery is open with no licenses required. The majority of catch of these fishermen is consumed domestically. Production was about 3,400 tons in 2000.

Artisanal fisheries include a license program and the cost of the license depends on the power of the motor. Most of the artisanal boats belong to a company as opposed to individual ownership. Industrial trawlers that fish in Madagascar's waters are mostly foreign owned, and have processing facilities on board. Between these two fisheries, about 10,500 people are directly employed. In 2000, approximately 8,200 tons of shrimp were captured by artisanal and industrial fisheries. Virtually all of the shrimp captured in these two fisheries are exported, with France and Japan as the primary markets.

Any future growth in production is likely to result from increased aquaculture production, rather than capture fisheries. Aquaculture production is a result of foreign investment in Madagascar – namely French and Japanese. Firms are highly integrated spanning production, processing and distribution. Madagascar is a very small part of a very large international market for shrimp, but the future looks good for its aquaculture industry if the quality of the shrimp can be maintained.

Source: www.integratedframework.org.

BOX 13

Impact of WTO Membership on Vietnam's Seafood Exports

Aquatic products are Vietnam's source of major export earnings – with exports of US$2 billion in 2001 (FAO, 2000a). Vietnam exported US$820 million in 1998, which jumped to US$1.4 billion in 2000, a 58% increase. This is attributed to Vietnam's investment in aquaculture, and focusing production on high-valued species such as black tiger shrimp, basa and tra catfish, and blue prawns. There are over 300 processing mills, with 60% of those meeting international sanitary standards.

V. IMPACTS OF TRADE AND DOMESTIC POLICY REFORMS

Looking back on the previous section, it is clear that the primary trade barriers for capture and aquaculture fisheries are tariffs, countervailing and anti-dumping measures, as well as the potential for non-tariff barriers to trade from ecolabeling, country-of-origin labeling, and sanitary and phytosanitary measures for seafood safety.

To analyze the impacts of trade liberalization on trade in seafood, particularly on seafood to or from developing countries, it makes sense to distinguish between the impacts of trade liberalization on seafood derived from capture fisheries and on seafood from aquaculture. This is because of their unique attributes: capture fisheries are generally ill-managed and as such changes in trade polices may create changes in welfare that differ between the short and long run due to the sustainability of fish stocks. Aquaculture is more similar to agriculture in the effects of trade liberalization. However, to the extent that aquaculture is dependent on fish feed derived from capture fisheries or seed stock from wild fisheries there will be a difference between trade liberalization in agriculture and aquaculture.

While there is a lengthy list of research articles on markets for fish (Wessells and Anderson 1992; Kinnucan and Wessells 1997), there is little empirical analysis of impacts of trade liberalization via tariff reductions related to fish and fish products. This is partly due to the complex nature of the global seafood market, partly due to lack of data, and partly due to a governmental and academic focus diverted away from the markets for seafood toward the economics of management of capture fisheries. In addition, while there are many studies on trade liberalization and its impacts on the agricultural sector for developing countries published by non-governmental organizations and international development agencies, there is a spectacular lack of quantitative information on impacts of trade liberalization for developing countries with respect to fish.

Cox et al. (2000) and the OECD (2003a) are the notable exceptions. This section will begin by discussing the Cox et al. (2000) study on trade liberalization in APEC countries.

A. Trade Liberalization in APEC Countries

Cox et al. (2000) investigate the short run effects of trade liberalization with respect to seafood products within the APEC. Countries within the APEC have a variety of trade barriers in place for fish and fish products. Tariffs are certainly one of those barriers, but there are also quantitative restrictions, and sanitary and phytosanitary restrictions which are often not transparent.

With the conclusion of the Uruguay Round, there was an agreement by WTO member nations to lower tariff rates. However, the APEC agenda was more ambitious than the Uruguay Round. Under the 1994 Bogor Declaration, the commitment was made to fully liberalize all markets by 2020 with 2010 as the deadline for developed countries. This was followed by the Early Voluntary Sectoral Liberalization (ESVL) proposals in which

nine sectors including fisheries would accelerate its tariff removals beyond the Bogor Declaration. Rather than having 2010 and 2020 as deadlines for developed and developing countries, respectively, the timeline moved to December 31, 2005.

Cox et al. (2000) developed a simulation model to evaluate the impact of seafood tariff removals under the Bogor Declaration, ESVL, and under another scenario where only the developed countries in APEC would remove their tariffs while those in developing countries remained the same. The model included all the APEC countries and the rest of the world as sources and destinations. Seafood products were generally grouped together except for a focus on species particularly important to Australia such as tuna, lobsters and shellfish.

As expected the results show that there would be significant increases in export volumes (and prices) under the Bogor Declaration and the ESVL relative to the baseline. If only the developed countries removed their tariffs, the simulation shows that there would be little difference from the baseline. Recall from Section III that tariffs in Asian developing economies are relatively high. The most change would occur under the ESVL scenario, at least initially. By 2020, the effects of the Bogor and ESVL agreements would be the same.

Table 12 shows the simulated changes in the real value of world exports, taken from Cox et al. page 32, and Table 13 shows the simulated benefits of tariff reductions, by country, from Cox et al. (page 33).

Table 12. Simluated changes in the real value of world exports (in 1995 prices)

	Annual growth in base (1995-2020)	EVSL		Bogor		Developed APEC countries only	
		2010	2020	2010	2020	2010	2020
	%	%	%	%	%	%	%
Unprocessed							
Tuna	1.3	5.0	4.8	1.5	4.8	1.6	1.5
Other fish	8.2	32.4	28.0	0.4	28.0	-1.9	-1.9
Rock lobster	1.4	1.5	1.5	0.7	1.5	0.7	0.7
Prawns	2.6	11.3	15.5	0.4	15.5	0.4	0.4
Other crustaceans	7.1	38.5	51.2	1.3	51.2	1.3	0.7
Abalone	3.4	20.2	21.9	2.6	21.9	2.6	2.0
Scallops	6.2	15.5	23.5	0.5	23.5	0.6	0.1
Other mollusks	3.9	22.5	23.7	1.3	23.7	1.3	1.4
Processed							
Tuna	2.4	0.4	0.8	0.3	0.8	0.3	0.3
Other fish	4.4	11.7	17.0	2.6	17.0	2.6	1.5
Rock lobster	0.4	0.0	0.0	0.1	0.0	0.1	0.0
Prawn	1.2	0.6	0.7	0.3	0.7	0.3	0.3
Other crustaceans	1.6	0.4	0.4	0.4	0.4	0.4	0.4
Mollusks	3.0	8.4	9.4	4.0	9.4	4.0	3.9
Total	5.1	20.4	24.1	1.0	24.1	0.2	-0.4

Source: Cox, et al., 2000.

Although grouped as "Other APEC" countries, there are significant benefits from import tariff reductions for Brunei, Indonesia, Malaysia, Mexico, New Zealand, Papua New Guinea, the Philippines, the Russian Federation, Singapore and Vietnam.

Table 13. Simulated benefits from tariff reductions, by country*

	2010				2020	
	Growth in base (1995-2020)	EVSL	Bogor	Developed APEC countries only	EVSL and Bogor	Developed APEC countries only
	%	%	%	%	%	%
Australia	2.7	0.0	0.1	0.1	0.7	0.1
Canada	2.4	1.9	0.1	0.0	5.9	0.1
Chile/Peru	0.2	0.0	0.0	0.0	0.4	0.0
China	9.1	0.0	0.0	0.0	-0.3	0.0
Hong Kong	4.8	-0.3	0.0	0.0	-1.4	0.1
Japan	1.9	-0.3	-0.2	-0.2	0.0	-0.3
Korea	3.7	1.1	0.1	0.0	2.5	0.0
United States	1.7	0.6	0.0	0.0	2.9	-0.1
Other APEC	4.6	1.0	0.0	-0.1	0.9	-0.2
Total APEC	5.4	0.2	0.0	0.0	0.2	-0.1
Non-APEC	1.8	0.2	0.0	0.0	0.7	0.0
Total World	4.0	0.2	0.0	0.0	0.4	0.0

* These benefits represent changes in the sum of consumer surplus, producer surplus and import tariff revenue.

B. Removing Subsidies in Capture Fisheries

Section IV discussed the types of subsidies found in the fishing sector and the concern of the WTO CTE about fishing subsidies both as a potential distorter of trade and as a contributor to the unsustainability of many fish stocks around the globe. In order to analyze the trade impacts of these subsidies, a logical place to begin might be in the calculation of Producer Subsidy Equivalents (PSEs). In the agricultural sector, various methods have been developed for measuring subsidies in relation to trade distortions, including use of PSEs. According to the OECD "the PSE is an indicator of the value of the transfers from domestic consumers and taxpayers to the producers resulting from a given set of agricultural policies at a point in time" (FAO, 2003).

One might then suppose that this would be a useful tool to assess the advantages of producer subsidies in the fisheries sector as well. The complicating factor here, which we have returned to over and over again, is the fisheries management. In agriculture, it is assumed that the subsidies are compared to a subsidy-free world in which that subsidy-free world is the economically efficient allocation of goods at various prices. However, if a fishery is managed under an open access system, for example, then the subsidy-free world is not economically efficient, since the fisheries management system itself does not lead to an efficient allocation. To be truly economically efficient, the subsidies would not

exist and there would be perfect management of fish stocks such that all negative externalities are incorporated into the price of each fish. In addition, if one is interested in PSEs for fresh fish, the reference prices for fresh fish are difficult to ascertain since a) fresh fish is a highly perishable good, and b) is very heterogeneous (across species for example). Thus, for these reasons, PSEs for fisheries products have not been calculated.

We can look at the impact of removal of subsides according to the type of subsidy. For subsidies in which the costs of production are lowered (government-paid fishing access fees, low cost vessel construction loans, tax exemptions), removal of the subsidies will increase costs of production. A large portion of the world's subsidized fishing fleet is from the EU, Japan, Russia, China, and others (Milazzo 1998). A reduction in these subsidies would almost certainly benefit the fish stocks.

For example, the EU fleet captures squid, under foreign access agreements, within the waters of Morocco, Senegal and Mauritania. If fishing access agreement fees were no longer paid for by the EU, what might the outcome be? There may be fewer EU vessels fishing for squid in that area, decreasing the effort. Decreased effort at the current time would likely be a good thing as many of those fisheries are overfished. However, the question in this case is whether or not the departure of some EU vessels would be made up by the inflow of Moroccan, Senegalese or Mauritanian vessels. This is uncertain as the primary reason for selling access rights to foreign fishing fleets is not changed – there is not sufficient capacity in some developing countries to utilize the resources in their 200-mile EEZ. Reduction in effort in these EEZs is positive if fish stocks are over utilized. By the time these developing countries currently selling access rights increase their fishing capacity targeting these deep water resources, the fish stocks may have recovered to a sustainable level.

Milazzo (1998) provides an excellent summary of the benefits removing subsidies has on developing nations' welfare.

- Subsidies that pay for access arrangements support continued operations by primarily European and East Asian distant-water fleets off Africa and in the Western Pacific. These subsidized operations reduce the fishing opportunities available to local fishermen, and in most cases, the payments do not compensate adequately for the full economic value of the resources.
- There is scattered evidence that subsidized access arrangements are beginning to compromise local food needs.
- The combination of developed countries' subsidies to their distant-water fleets and to their domestic coastal fleets minimizes to some extent trade opportunities that should be available to developing countries.
- Fishing subsidies are highly non-transparent in the sense that more than about 75% is not budgeted, and a good share of budgeted subsidies are controlled by governmental agencies other than those responsible for fisheries.
- Environmentally harmful subsidies outweigh the effect of subsidies that are environmentally benign or positive. Milazzo's estimates show that possibly no more than 5% of all subsidies provided support conservation.

C. Trade Liberalization in Capture Fisheries – Impacts by Management Regime

An alternative means of looking at impacts of trade liberalization then is to directly address the implications under different management programs. Rögnvaldur Hannesson, in OECD 2003a, investigates effects of liberalizing trade in fish, fishing services and investments in fishing vessels. Three styles of fisheries management are defined: open access, catch control, and efficient management. As we saw earlier, under open access the fisherman is free to respond to prices by increasing or decreasing his/her catch. Increased prices will invite entry into the fishery by more participants such that in the long run the fishery will be overfished. Under catch control and efficient management, total supplies are fixed and will not change with changes in prices. This is because a TAC has been established which guides the fishing effort and guarantees a sustainable fishery. The difference between catch control and efficient management is that under catch control, even though the TAC is set, there is no catch constraint on each fisherman. Each has the incentive catch as much as he can, as fast as he can, before the fishery is closed by reaching the TAC. Thus, catch control is economically inefficient because there are too many fishermen in the fishery and the capitalization and effort are too high.

If we remove trade barriers – the fish importing country lifts its barriers, prices decline in the importing country and rise in the exporting country to a global equilibrium (accounting for transportation costs). What are the impacts of this, given management measures? Table 14 shows the outcome.

Table 13. Effects of relaxing trade barriers

	Fish Exporting Country			Fish Importing Country		
Regime	Open access	Catch control	Efficient management	Open access	Catch control	Efficient management
Short Term Effects	Increased effort, larger catches, more trade, gains from trade	Increased effort, no change in catch, higher profits, gains from trade	No change in effort unless higher allowed catch, gains from trade, higher market value of quotas and licenses	Lower effort, smaller catches, more trade, gains from trade	Lower effort, no change in catch, lower profits, gains form trade	No change in effort unless smaller allowed catch, gains from trade, lower market value of quotas and licenses
Long term effects	Fish stocks decline, catch may decline, possibly loss from trade	Increased investment in fishing boats, no change in catch, small gains from trade	Same as above	Fish stocks recover, catch may increase, 'double dividend' from trade	Reduction of fishing fleets, no change in catch, 'double dividend' from trade	Same as above

Source: OECD (2003a) page 170.

The 'double dividend' refers to the gain to the importing country from both getting fish at a lower price, and reducing the resources that are used in the fishing industry, re-allocating them toward a higher-valued use. More generally, there is no reason to assume that both the importing and exporting countries share the same type of management regime. If both have an effective management regime then the results will be very similar to the classic outcome of agricultural trade liberalization.

It is the change in prices that induces increased effort in the exporting country under open access and catch control. It is conceivable that a country could end up worse off with trade liberalization (Brander and Taylor, 1997a, 1997b, 1998; Hannesson 2000). The total quantity caught in the open access fishery in the short run will increase in the exporting country, but in the long run will decline as the fishery becomes overfished. However, with the decline in prices the effort in the importing country might actually decline, allowing fish stocks a chance to recover. This is not necessarily the likeliest outcome – there are anecdotes that in many cases as the price of fish has decreased, fishermen have actually increased their effort to maintain total revenue, at least in the short run.

The results above were premised on two separate stocks of fish – one in the importing country and one in the exporting country. This discussion can be made much more complicated by assuming that several countries share the resource.

Another angle from which to look at trade liberalization is to look at eliminating tariffs on raw and processed fish products, particularly those in which the raw product is the input into the processed product (OECD, 2003a). Assume that the raw product can also be sold as fresh fish. Assume that there is a positive tariff on the processed product but a zero tariff on the fresh fish. If the tariff on processed fish is lifted in the importing country, then the price of processed product will decline in the importing country, and rise in the exporting country. Depending on the relative prices there might be more or less processed product as the producer will allocate raw product into two markets (processed and fresh) based on their relative marginal profits. Removing a tariff on processed fish would increase the amount of processed fish supplied and traded. If the quantity of raw fish, the input, were fixed as in the case of catch control and efficient management, then the problem is primarily one of optimal decision making on what market to sell the fish to. However, if there is open access, then the quantity of the raw product can increase in response to the increase in prices derived from the processed product. Table 14 summarizes the primary implications.

Table 14. Effects from relaxing barriers to trade on highly protected fish products

Exporting Country	Open access	Catch control	Efficient management
Supply of highly protected products	Share of total supply increases but total amount may decrease in the long run if the total catch falls	Increases	Increases
Supply of less protected products	Share of total supply decreases but total amount may increase in the long run if total catch increases	Decreases	Decreases
Price of raw fish	Rises	Rises	Rises
Total catch	Increases, but falls in the long term if the stock was exploited beyond maximum sustainable yield.	Remains the same	May increase due to improved profitability
Importing Country	**Open access**	**Catch control**	**Efficient management**
Domestic supply of highly protected products	Falls in the short run, as less of domestic supplies of raw fish are processed, but may increase in the long run if total catch increases	Falls	Falls
Domestic supply of less protected products	Increases in the short run, as more of domestic supplies of raw fish are processed, but may fall in the long run if total catch falls	Increases	Increases
Price of raw fish	Falls in the short run, as less of domestic supplies of raw f	Falls	Falls
Total catch	Falls, but increased in the long term if less fishing effort allows stocks to recover above maximum sustainable yield, in which case there is a double dividend	Remains the same	May fall dur to less profitability of fishing

Source: OECD (2003a) p. 175.

The conclusion that can be drawn from this discussion is that the fisheries management regime is the most important factor in the outcome of liberalization of trade. Given that most developing countries continue to have open access regimes, or in some cases catch control regimes that are not well managed, trade liberalization will encourage faster depletion of the stocks. There will be inefficient use of the resources put into fisheries in an effort by each fisherman to catch as much as possible.

D. Impact of Trade Liberalization in Aquaculture

One can expect that the implications of trade liberalization in aquaculture may be very similar to agriculture, and they are. Certainly, to the extent that tariffs in the EU, Korea and Japan were reduced, there would be an increase in aquacultured products sold to those countries.

Aquaculture production is constrained by many of the same factors as agriculture. These include availability of sites to locate the aquaculture operation, whether it is land-based or sea-based, the negative effects of disease, point and non-point source pollution, risks of growing fish from larvae to market size, costs of feed and other inputs, etc. There are negative externalities caused by production, such as pollution from product inputs such as pesticides and antibiotics, and land degredation.

The concern among many is that increased trade in aquaculture products has had a large and negative effect on the environment, as discussed in Boxes 2 and 3 with respect to the shrimp industry. The same is true for salmon farming – Chile, Norway, Scotland, Canada and Ireland are the largest producers of farmed salmon, however, Chile and Norway are larger by a significant margin over the others. Concerns by environmental groups include

not just pollution concerns, but also an impact on the genetic diversity of wild fish as a result of escapes of farmed fish which may not be indigenous to the area (Porter, 2003).

Both salmon and shrimp production rely on fishmeal as a large component of its feed. Any increase in aquaculture production of either species will have an impact on demand for fishmeal. We have already discussed the various issues associated with fishmeal production, including the growing concern that the stocks of fish from which fishmeal is produced (herring, anchovies, capelin, menhaden) are themselves overfished. Unless effective management of total catch in those fisheries is created, then the sustainability of aquaculture is dependent on the sustainability of fishmeal production. Table 15 shows the effect of price rises on aquaculture output.

Table 15. Effect of a rise in the price of cultivated fish on aquaculture output and the output of capture fisheries if feed is a constraint

Management regime in capture fisheries	Effect on output in aquaculture	Effect on output in capture fisheries for consumption fish
Open access	Output rise for sufficiently low prices but as the price of feed fish increases the stocks will ultimately be exploited beyond MSY, supply of feed falls and aquaculture output falls.	Lower stocks of feed fish lead to less growth of consumption fish. Higher price of consumption fish leads to less supply as stocks are pushed beyond MSY.
Capture fisheries for feed fish and consumption fish managed separately	Outout rises and flattens out as supply of feed cannot be further augmented	Output of consumption fish falls as the price exceeds a certain level.
All capture fisheries managed as a whole	As above, but aquaculture is initiated at a higher price	All above, but output of capture fisheries continues to rise with price longer than as above.

Source: OECD (2003a) p. 204.

The other face of aquaculture is farmed shellfish, which makes up a good proportion of aquaculture production worldwide (see Figures 6 and 7). In Thailand, production of green mussels, blood cockle, oysters and other shellfish doubled from 73,976 mt in 1988 to 138,202 mt in 2000 valued at approximately US$47 million (Chalermwat et al. 2003). The primary concern with these products is placement of farms in unpolluted areas, and thus the Agreement on Sanitary and Phytosanitary is likely to have the largest effect on this sector.

E. Summary

To summarize this section, Table 16 relates the changes in trade policies in the importing country (reduce tariffs, remove quotas, remove fishing subsidies, etc.) to the price and quantity effects in both the exporting and importing country, based on management system. Assumed here is that both the importing and exporting country have stocks of a particular species of fish, but those stocks are separate from each other so that one country does not impose a negative externality for the other.

Table 16. Effects on price and quantities of market liberalization - relaxing border measures in importing country - two country situation

	Exporter	Importer
I. Fishery managed by TAC set without reference to economic factors	increase price, no change in quantity	decrease price, no change in quantity
II. Open Access		
a) Stock above MSY	increase price and quantity	decrease price and quantity
b) Stock at MSY	increase price, decrease quantity	decrease price and quantity
c) Stock less than MSY	increase price, decrease quantity	decrease price, increase quantity
III. Aquaculture		
a) Feed available without significant price rise	increase price and quantity	decrease price and quantity
b) Managed fishery for captured feed fish	increase price and increase or leave unchanged quantity	decrease price and decrease or leave unchanged quantity
c) Open access fishery for captured feed fish	same as II above	same as II above

Source: OECD (2003), page 200.

VI. CONCLUSIONS

In this report, we have explored the global seafood markets, found that they are truly international markets with production, consumption, imports and exports covering the globe, and with several species of fish migrating around the globe. It is no more sufficient to say that there is a global market for fish and fish products than it is to say there is a global market in agriculture. Of course there is. However, understanding the impacts of trade liberalization in agricultural goods requires understanding the markets of the various crops. It is the same in fish – a fish is not a fish is not a fish. We must be more focused, looking at the many internationally-traded species if we are to understand and, more critically, estimate the effects of trade liberalization.

There are several key aspects of trade liberalization on global seafood, fishmeal and fish oil markets that have come out of the discussion in this report.

Impacts of trade liberalization on the welfare of the nations is critically dependent on the fisheries management systems of the producing countries. Open access, which is the management regime in many developing countries, leads to over-fishing. Fisheries management is not successful if there is little enforcement. Any event creating rises in prices for fish from exporting (developing) countries creates incentives to fish even more, exacerbating overfishing, and leads in the longer run to stock collapse. Even trade liberalization in the aquaculture industries worldwide is not immune from the effects of fisheries management regimes if the feed for that production is itself from a poorly managed capture fishery.

Increased trade in aquacultured products, independent of issues with feed, can lead to increased environmental degradation from conversion of land from benign agricultural use to less benign aquaculture use. Little has so far been done to internalize the externalities caused by aquaculture operations.

As stocks in developed countries have declined, their fleets have gone elsewhere to capture fish. The EU, for example, has paid several developing countries for access rights to their fishing territories. While the developing nations gain access fees, enforcement of fish management policies to limit the catches of the foreign fleets are minimal, generally resulting in an over-fishing of these fish stocks. Thus, while there is a short-term monetary gain for developing countries allowing foreign fleets to fish in their waters, in the long-run that value disappears.

Removing foreign access from developing countries' waters may not be the complete answer, even though foreign access is usually subsidized by the foreign fleets' government. Developing countries have fisheries resources within their EEZ. Removing foreign fleets from those waters is good for the fish stocks, but if the country itself has no means to capture the value of the resource themselves through fishing, then there is little benefit to the developing country. There are two options: a) renegotiate better fishing access agreements to ensure that the true value of the resource is being paid to the developing country, or b) invest in the developing country's fishing capacity such that it

can take advantage of the resource it has a right to. It should go without saying that in either of those cases there must be an effective management system put in place to prevent overfishing.

Tariffs in global seafood markets have come down significantly, and may no longer be a prime trade barrier, except perhaps for South-South trade. As the markets for certain seafood species has become more competitive, industries in the U.S. have increasingly turned to anti-dumping and countervailing duty measures to protect themselves from competition from developing countries.

The WTO has the opportunity to use its purview over subsidies through the Agreements on Subsidies and Countervailing Measures to discourage fishing subsidies, to remove the trade distortions caused by the subsidies, as the same time encouraging sustainability of fish stocks globally. In addition, from the developing countries' perspective, an important focus in WTO negotiations would be the Agreement on Technical Barriers to Trade and the Agreement on Sanitary and Phytosanitary Measures. The processes of imposing technical barriers to trade and seafood safety measures by developed countries must be transparent and imposed measures cannot be arbitrary. Developing countries need resources to assist them to meet current sanitary and phytosanitary measures by building infrastructure that insures they meet the requirements and provide training to workers who can maintain the proper measures.

Finally, international trade in fish and fish products also has an impact on food security. Often the domestic market retains only the poor quality fish while the higher valued fish are exclusively sold to the export market. A collapse in the stock of the poorer quality fish consumed domestically may lead to significant food security problems. Similarly, if fishmeal prices were to rise for any reason, this will have an impact on the ability of some nations to feed its terrestrial livestock.

We all have an interest in ensuring that fisheries and aquaculture are managed in a sustainable way. As externalities are internalized into the production process, and the value of the externality is incorporated into the prices of the final products, then it is likely that trade liberalization will bring about a net benefit to trading partners. The allocation of benefits across countries, producers and consumers, can best to judged after effective management is in place, but less easily judged today.

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