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Who's Eating All the Fish?
The Food Security Rationale for Culling Cetaceans

A Report to Humane Society International
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Cover photo by Jennifer Nichols, Oceana, in Baja California, Mexico, 2008.

Executive Summary

In response to the global fisheries crisis, characterized by falling abundances of resource species, falling catches, increasing habitat destruction, and extremely high subsidies, the advocates of whaling have been advancing a new rationale for hunting of marine cetaceans. They claim that marine mammals, particularly the great whales, compete with humans for fish resources; that efforts to protect these whales from extinction have led marine ecosystems to be "out of balance;" and that such balance can only be re-established by large-scale culling.

This argument flies in the face of numerous observations on the widely different ecological impacts of fisheries (which tend at first to concentrate on large fishes wherever these can be caught) and marine mammals (which, if they feed on fish, tend to consume smaller individuals). Thus, the decline of the mean trophic levels of fisheries catch over the past 50 years (which is largely similar to mean sizes, as big fish eat smaller ones), is a signature of "fishing down marine food webs" and leaves marine mammals exonerated.

Although scientific support for the claims that whales are causing the decline of the world's fisheries is nonexistent, these claims may appeal to officials in various developing countries, where the difficulty and cost of addressing the real causes of the declines of their fisheries resources and fisheries may appear overwhelming. Hence, the reframing of the long-running whaling debate as a global food security issue has proven to be a powerful lobbying tool in enlisting the support of developing countries, although most have no direct interest in whaling.

Here, we present another framework for understanding why developing countries experience diminishing supplies of fish: competition from the international market. The rapid economic integration of the world fisheries market over the later half of the 20th century, combined with the expansion of the distant-water fisheries of the developed countries, fuelled by government subsidies, has resulted in the acceleration of the trend wherein fish caught along the coast of developing countries gravitate toward the markets of affluent developed countries. Indeed, one can speak of fish migrating from "the more needy to the less needy."

Our analysis, which identified the final destinations of the fish caught within the Exclusive Economic Zones (EEZs) of the coastal countries in the South Pacific, Caribbean, andWest Africa, shows that in all three regions, domestic markets accounted for less than half of the catch, with a majority of the catch supplying markets of affluent countries in the EU, Japan, North America, and increasingly China.

The issues of economic development and food security in developing countries are multifaceted. The necessary debates, however, do not benefit from the confusion that the "whales-eat-our-fish" argument generates. On the contrary, the scarce scientific and administrative resources of developing countries are invested in a non-issue, their public media are being misled, and a tremendous amount of ill will is generated for no reason.

It is time to put this non-issue to rest.

Introduction

"When the missionaries came to Africa, they had the Bible and we had the land. They said 'let us close our eyes and pray.' When we opened them, we had the Bible, and they had the land."
-Bishop Desmond Tutu

A re-packaging of the whaling debate

Faced with diminishing returns from the world's fisheries, some whaling nations, including Japan, are increasingly advocating the resumption of commercial whaling as a solution to the global food crisis. Their rationale is based on the claim that recovering populations of marine cetaceans, especially great whales, are competing with fisheries for increasingly scarce marine food resources. Although the ecological assumptions underpinning such a claim are highly suspect, the reframing of the long running debate on whaling vs. conservation, as a food security issue, i.e., 'whales vs. fish for human consumption' has proven to be a powerful lobbying tool for enlisting the support of developing countries, many of which have no direct interest in commercial hunting of marine cetaceans. This is especially true for many coastal Low-Income Food-Deficient Countries (LIFDCs[1]) for which the seafood and/or the foreign exchange they derive from their marine resources are matters of grave concern, not to speak of millions of jobs in often impoverished fishing communities.

This report examines the relationship between cetaceans, fisheries and food security and argues that the diminishing availability of fish in the domestic markets of LIFDCs is not due to increased competition with marine cetaceans, but rather a direct result of competition with consumers in the industrialized countries of North America, Europe and Japan, as well as from the growing demands from increasingly affluent new consumers in countries such as China, South Korea and Russia.

To support our contention that the great whales are not the problem but that humans are, we will first highlight the major flaws in the so called 'whales-eat-our-fish' rationale promoted by whaling advocates. Next, we will examine the current patterns of the (human) fish consumption and food security implications of the rapid globalization of fisheries over the past decades. Finally, we present a summary of resource competition between various markets for three selected regions (South Pacific, Caribbean and West Africa) where many countries are currently supporting the pro-whaling agendas proposed for the International Whaling Commission (IWC) and discuss the broader implications their misguided efforts may have on the long term prospect for their domestic fisheries.

Fish and food security

[1] For a list of LIFDCs and the listing criteria, see FAO Country Profiles and Mapping Information System (www.fao.org/countryprofiles/lifdc.asp).

Advocating false science for short term political gains should not be tolerated, especially when it involves a serious global challenge such as food security. The United Nations Food and Agricultural Organization (FAO) uses the following definition of food security, following its adoption at the World Food Summit of 1996:

> *Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO 2003).*

This widely accepted definition emphasizes the three dimensions of food security: availability of sufficient quantities of food; access by individuals to adequate food; and stability of access to food. Food insecurity, thus, results not only from a lack of food in the community (or in the world if we are concerned with global food insecurity), but also from the skewed distribution of the food resources that are available, leaving some sections of the population with too little food or too little diversity to meet their nutritional needs (Table 1). This skewed distribution occurs because some people (or countries) are too poor or too powerless to make an adequate claim on food that is available. Conversely, some countries consume beyond their needs to the point of gluttony. Oddly, this 'over-nutrition' also defeats the United Nations goal as it also leads to health problems.

For many coastal LIFDCs, the problem is exacerbated by the fact that they have no ready alternative to their declining fisheries. Although not considered an important food source in terms of calories, fish contribute more than 20% of the animal protein intake in LIFDCs, and this share can exceed 50% in the poorest countries (FAO 2006). Moreover, in countries where starchy staples such as rice, maize and cassava constitute the bulk of the diet, the contribution of fish as a source of essential micronutrients, minerals and fatty acids not found in these staples can be very important.

Table 1 Total and per capita food fish supply by regions (from FAO 2006). Per capita food fish supply (i.e., consumption) is highest in the industrialized countries and lowest in Africa and LIFDCs. While reasons for the inequality in per capita consumption may be cultural (i.e. no culture of fish consumption), the lack of access or economic means to purchase food fish is also an important factor.

Area	Total food fish supply (10^6 t live weight)	Per capita food fish supply (kg/year)
World	104.1	16.5
World excluding China	71.1	14.2
Africa	7.0	8.2
North and Central America	9.4	18.6
South America	3.1	8.7
China	33.1	25.8
Asia (excluding China)	36.3	14.3
Europe	14.5	19.9
Oceania	0.8	23.5
Industrialized countries	27.4	29.7
Economies in transition	4.3	10.6
LIFDCs (excluding China)	23.8	8.7
Developing countries excluding LIFDCs	15.8	15.5

The generation of income derived from the fisheries sector also constitutes an important source of indirect food security for many LIFDCs. Globally, over 41 million people are estimated to be engaged in fisheries and fish farming, the majority of these in developing countries (FAO 2006). For many rural communities, small-scale fisheries and related activities represent the only option for earning a livelihood, and income generated provides protection against the volatility of food prices, harvest failures and other factors that could threaten their food stability.

Fish (and food security) in crisis

The demand for fish has more than doubled over the past thirty years and the increase in the world's population clearly contributed to the growth in demand. Still, global per capita fish consumption has also increased considerably, rising from 9.0 kg in 1961 to 16.5 kg in 2003 (FAO 2006). Increase in income and urbanization in many developing countries, most notably in China, and health concerns about other sources of animal products are expected to fuel the global demand for fish in the near future.

However, the consumption of fish is not distributed evenly, and considerable regional differences occur. In 2003, the annual per capita fish consumption of developed countries stood at 29.7 kg, more than double that of the LIFDCs (14.1 kg). If China is excluded, the annual per capita consumption in LIFDCs is even lower, 8.7 kg (FAO 2006), and the per capita consumption of fish in developed countries reaches over three times that of LIFDCs.

A superficial glance at the world's 'fish production' may give the impression of continuous growth (FAO 2006). However, this is the result of adding sharply increasing aquaculture production, notably in China, to the stagnating landing from capture fisheries.
When the landing from China, which are systematically over-reported, are adjusted to realistic levels world fisheries landings turn out to be declining since the late 1980s (Watson & Pauly 2001).

Figure 1 shows that nominal landings (that part of the catch that is recorded in statistics and used by humans) have declined; also there is an apparent decline in discarded bycatch.[2] Note that these declining trends are partly obscured by uncertainty about IUU[3] catches (Figure 1).

Although this is becoming increasingly more difficult, the present, slowly declining levels of overall marine fisheries catches are maintained only by the progressive exploitation of deep water species that were previously commercially unattractive, and intensification of fishing effort (Pauly *et al.* 2002, 2003, 2005).

Moreover, the global catch does not adequately portray the severity of overfishing in the coastal waters of developing countries in what has been termed the 'paradox of abundance and decline' (Hannesson *et al.* 2000). As a result of sustained, increasing fishing pressure, most wild fish

[2] The 'catch' from a fishery consist of landing + discarded bycatch; the decline in discard is not due to more bycatch being retained (as this would increase the landings), but, apparently, to inconsistencies in the methods for quantifying discarding levels. This is why the write of an "apparent decline" (Zeller and Pauly 2005, and see above). By-catch consists of non targeted groups. It may be discarded (as 'discarded bycatch', or 'discards') or landed, depending on its value and fisheries regulations.
[3] IUU is the United Nations' acronym for 'illegal, unreported and undocumented catches'.

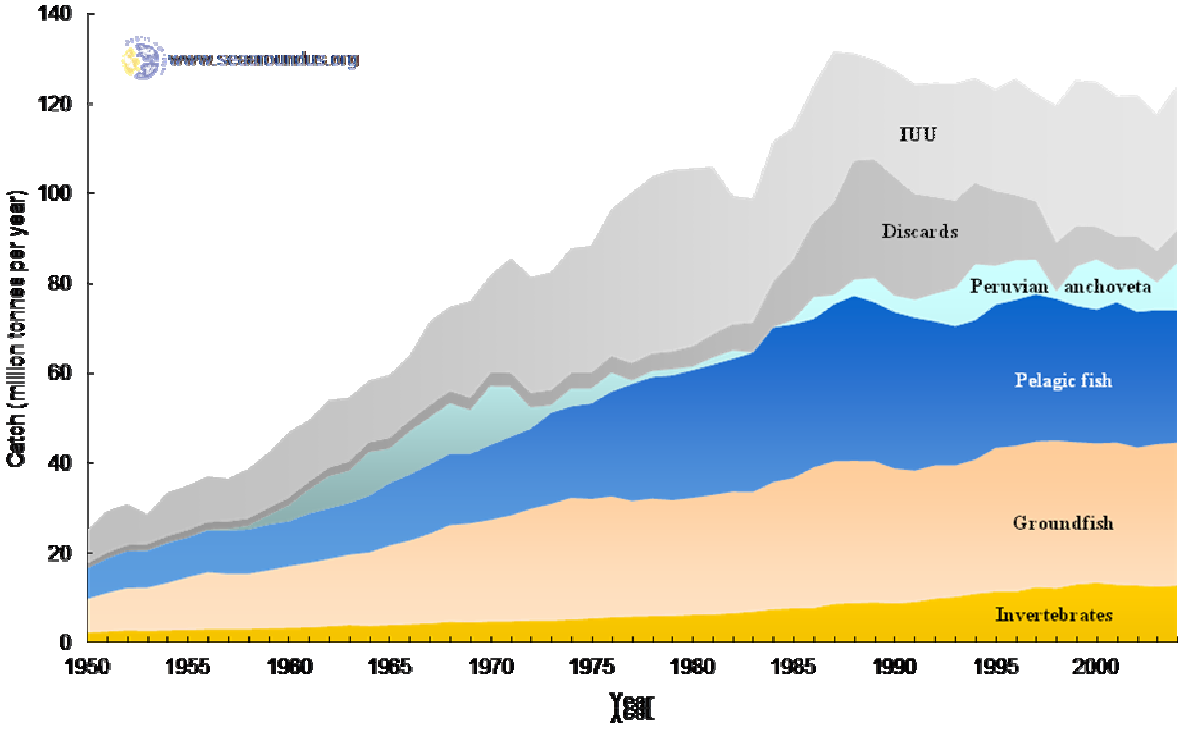


Figure 1 Trends in global marine fisheries catch and discards from 1950 to 2004 (adapted from Watson & Pauly 2001, Pauly *et al.* 2002, and Zeller & Pauly 2005). Note that there is high uncertainty in IUU (Illegal, Unreported and Undocumented) catch levels, and that it is now recognized as a major emphasis of fisheries research.

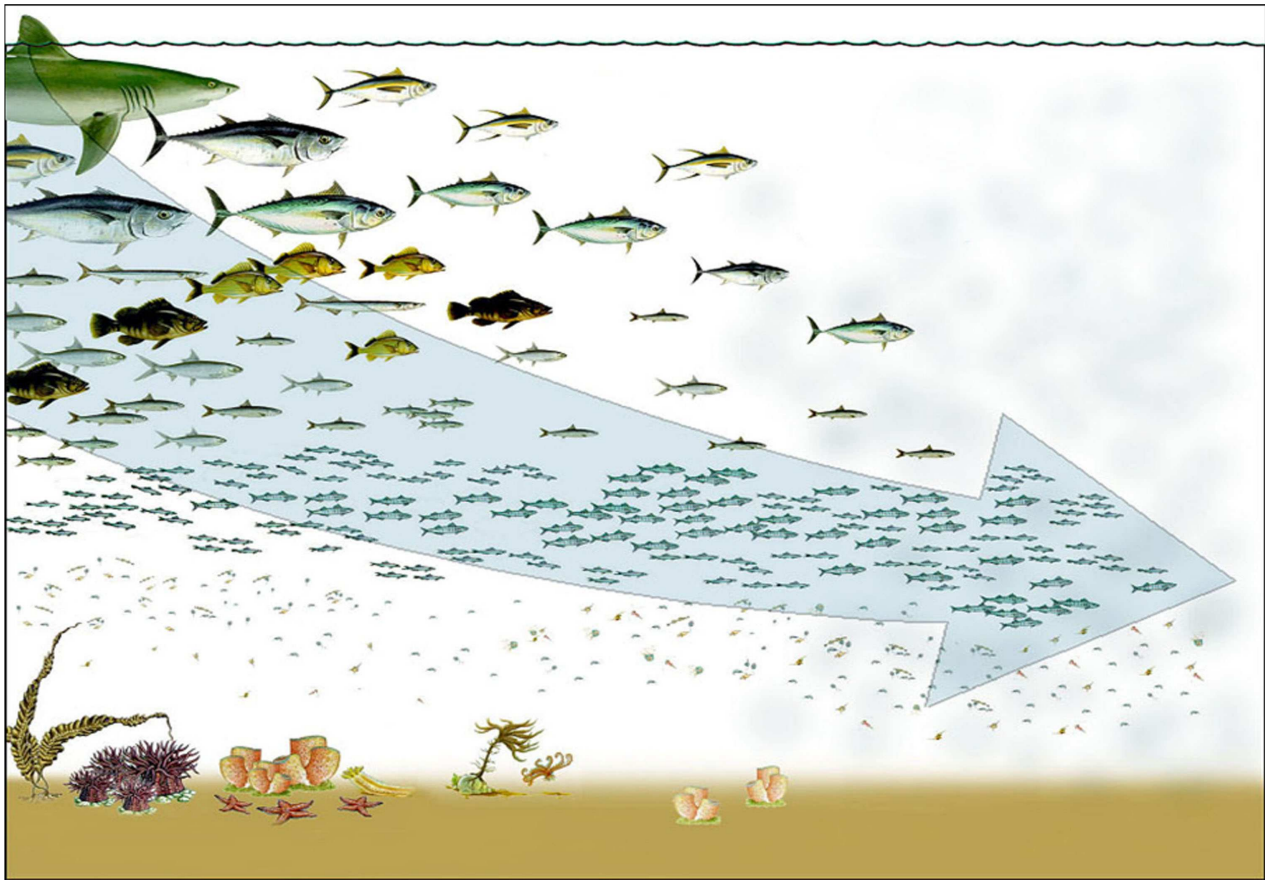
stocks today are classified as fully exploited, with an increasing number deemed over-exploited, in collapse, or in recovery (FAO 2006). Several major studies have showed that exploitation of marine fish resources can greatly impact the overall health of the targeted stocks and have the capacity to drastically alter their supporting ecosystems (Jackson *et al.* 2001, Christensen *et al.* 2003, 2004, Myers & Worm 2003). There have been many recent examples of fishery collapses, including the decline of Northwest Atlantic cod stocks through the 1980s and 1990s (Myers *et al.* 1997) with considerable social and economic implications, in addition to the obvious, ecological ones. In fact, a number of authors, extrapolating current trends, have suggested that the world's fish resources will collapse by the middle of this century if the current patterns of exploitation continue (Worm *et al* 2006).

In addition to causing an overall decline in marine fisheries catches, the excessive effort that characterizes most fisheries has led to landings consisting increasingly of smaller fishes, a result of top predators, and the older individuals within species being targeted and depleted. This has resulted in fisheries increasingly landing smaller fishes, from the lower end of the food web, and thus generating the phenomenon now widely known as 'fishing down marine food webs' (Pauly *et al.* 1998, Pauly and Watson 2005, see Figure 2). Interestingly, this now ubiquitous phenomenon is in itself an indication that the great whale, and marine mammals in general are not responsible for the major transformation that marine ecosystems have experienced in the last decades, as marine mammals, if they consume fish at all, concentrate on smaller species, and on the younger stages of larger species (e.g. Etnier & Fowler 2005). Indeed, marine mammals have

the evolutionary effect of encouraging rapid growth to larger size in fish (because they are then immune to marine mammal predation), while fisheries have the opposite effect of selecting for the evolution toward small size and low productivity (Conover & Munch 2002).

Meanwhile, the use of fishmeal and fish oil in feed for farmed fish has prompted concern about the rise of aquaculture which could place even greater pressure on capture fisheries (see Alder

Figure 2 Schematic representation of the process now know as 'fishing down marine food webs' in which fisheries invariably first exploit the larger fish in an ecosystem (insofar as the current gear technology allows it), then gradually move down as the higher trophic levels are depleted (Pauly *et al.* 1998, Pauly & Watson 2005). This mode of 'predation' is the converse of the predation by marine mammals, which, to the extent that they prey on fishes, tend to target the small ones (Etnier & Fowler 2005). The latter mode of predation is what leads to the evolution of fast growing, larger fish, a trend now reversed by fisheries (see text).



and Pauly 2006). While many believe aquaculture can meet the shortfall in the fish supply from marine capture fisheries and thus, as the phrase goes "relieve the pressure on overfished stocks", this can only be so if the cultured species do not require fishmeal or fish oil for their production (as is the case for clams and mussels, and for the herbivorous tilapia or catfish). The farming of carnivorous species such as salmon and shrimp requires the catches of small pelagic fish as feed input; thus, their net contribution to the global food supply is in fact negative (Naylor *et al.* 2000).

Marine Mammals: Threat to Food Security?

The 'whales-eat-our-fish' argument

Faced with the drastic decline in the world's fisheries, the advocates of whaling have advanced a new rationale for commercial hunting of marine cetaceans. Simply put, this 'whale-eat-our-fish' argument states that marine mammals, and in particular the great whales, compete with human for fish resources. Moreover, so the argument goes, marine ecosystems are presently 'out-of-balance', i.e., contain too many great whales, and this balance can be re-established only by culling (i.e., killing) whales. It is further claimed that these arguments are self evident, and that disagreement reflects an emotional bias. Thus, overcoming this 'emotionally biased' protection of whales under the current IWC moratorium on commercial whaling would enable us to overcome the imbalance of marine ecosystems. Plus, a reduction of the numbers of cetaceans through commercial whaling would result in more fish becoming available for human consumption (Morishita & Goodman 2003). This line of argument, besides its apparent straightforwardness, has the added attraction of providing a scapegoat for the current overexploitation of the world's marine resources by humans, especially those who live and eat in the developed countries.

The sources for this line of arguments are two papers released by the Institute for Cetacean Research (ICR) in Tokyo: one a global review of the food consumption by marine cetaceans (Tamura & Ohsumi 1999) and the other, a regional review (Tamura & Ohsumi 2000), neither of which were published in a peer-reviewed journal[4]. In theses papers, the authors took three different estimates of the daily prey consumption, based on assumptions on the relationship between body mass and daily energy required to sustain a given body mass, and multiplied the value by the population estimates and 365 days to compute the annual food consumption for each species. They then aggregated these estimates to determine, in their view, total food intake for all marine cetacean species.

The estimates thus derived put total marine food resources consumed globally by cetaceans at 'approximately three to five hundred million tonnes, i.e., "some 3 to 6 times more than are fished for human consumption" (Tamura & Ohsumi 1999). Using crude 'surplus yield' assumptions, these estimates are then used by the supporters of commercial cetacean hunts to claim that the cetaceans are outcompeting humanity for marine food resources by a significant amount. Then appealing to the fear they have engendered, they postulate that a reduction in the cetacean population, by hunting, will translate into a corresponding increase in prey species which would then be available to fisheries (Morishita & Goodman 2003).

Flaws of the argument

While this line of argument may appear to have some superficial logic, there are many problems associated with it—so many, in fact, that the scientific community has effectively refused even to

[4] The first paper, though circulated as an information document, was not formally submitted to the IWC Scientific Committee for discussion and was not considered at the meeting. A modified version of the second paper, which was submitted to the IWC Scientific Committee in 2000, was published in a compilation document from the Conference of Responsible Fisheries in the Marine Ecosystem (Sinclair & Valdimarson 2003).

consider a discussion about hunting cetacean species if these crude estimates are to serve as the basis.

It is easy to see why the scientific community has rejected the studies. The first, deadly flaw in this argument that 'whales are eating our fish' is that, the further back in time one goes, the higher the fish biomass AND the number of marine mammals – even if a precise knowledge of their number still eludes us (see below) . Thus, large mammal populations are compatible with high fish biomasses; if we now don't have high fish biomasses, it is because of fishing. The overall biomass of marine mammals may now slowly recover from past massacres (see e.g., Ellis 2003), but all indications are that they remain severely depleted (Figure 3), while some species of cetaceans, such as the Atlantic right whale, hovers at the brink of extinction (IUCN 2008).

The second problem lies with the estimated figure for the annual food consumption itself. In order to compute the total food consumption by cetaceans, we need to know how many of them there are, by species, and what and how much they individually eat. However, we still lack reliable and comprehensive abundance estimates for the majority of cetacean species throughout much of their distributional ranges and many global estimates are tentative at best. Moreover, we still know very little about the factors that influence the relationship between body size and energy requirement in these species. Thus, by relying solely on the average body size in calculation of daily food intake, the authors of the above papers are effectively ignoring the large variations among individuals and species associated with differences in age and seasons, and the proportion of time spent on different activities, to mention only a few of the variables that must be considered (Holt 2006)[5].

Even if adequate estimates of total annual food consumption by cetaceans were to become available, it is simply incorrect to claim that the food consumption of cetaceans would be available to fisheries if not consumed by these animals. The habitat and specialized feeding habits of cetaceans imply that the geographical and dietary overlap between their prey species and the 'prey' of the fisheries is very limited, and that the overwhelming bulk of the food consumed by cetaceans is of no commercial interest to the fisheries, due to their inaccessibility to fishing gear, or, to human tastes, inedible nature (Kaschner & Pauly 2004).

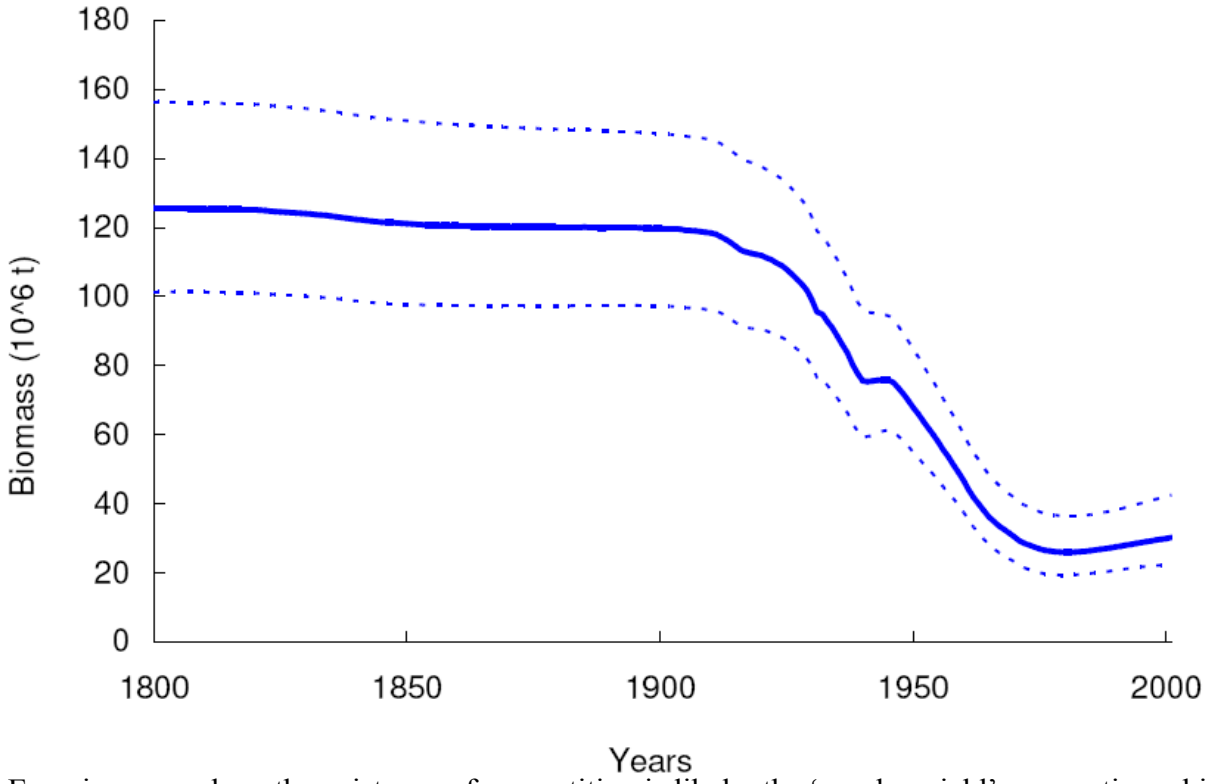
For example, most of the squids and fish consumed by cetacean diet are deep-water species not fit for human consumption, nor indeed catchable in commercial quantities using current technologies. Indeed, the tiny lantern fish which make up the bulk of the mesopelagic community consumed by marine mammals in oceanic areas contain high levels of wax esters (i.e., alkoxydigliceridae) rendering them unfit for human consumption even if their size, appearance and consistency allowed for it (Gjøsaeter and Kawaguchi 1980).

As a result, a global analysis of marine mammal consumption in the 1990s, which took into account both the spatial distribution of marine mammals and fisheries, and of their diet, respectively, catch composition, found that on average, only about 1 percent of all food taken by

[5] The estimates presented by the ICR have often been criticised for their use of outdated and highly speculative population estimates; also, the assumptions in their daily food consumption models have been shown to greatly inflate the food consumption estimates, which are then presented without estimates of their associated errors (Holt, 2006).

any marine mammal groups (baleen whales, large toothed whales, dolphins and pinnipeds) was consumed in areas where this group competed with one or several fisheries. Thus, there is no evidence that food competition between marine mammals and fisheries is a global problem, even when the uncertainties associated with the available information are considered (Kaschner & Pauly 2004). We recognize, however, that in local area, the pinnipeds (i.e., the seals, sea lions, etc) can strongly interact with fisheries (a problem which can, in most cases, be resolved by zoning, rather than culling). This however, is generally a matter for the countries concerned to resolve, as these interactions almost always occur within the Exclusive Economic Zones (EEZ) of countries[6].

Figure 3 Decline in the biomass of marine mammals (cetaceans and pinnipeds). The solid line is the median and the dotted lines represent the 95% credible interval. The methods and assumptions used in the deriviation of this graph tends to be optimistic, and may suggest recoveries where none occurred. It is emphasized that this graph applies to all marine mammals (including some which have never been hunted down), and that the biomass of the great whale is much more reduced, relative to 1950, than suggested by this graph (Christensen 2006).



Even in areas where the existence of competition is likely, the 'surplus-yield' assumption which underpins the 'whales-eat-our-fish' argument fails to account for the intricacy of food web dynamics in oceans. Thus, while the structures of marine food webs and ecosystems are complex and understudied, various mechanisms have been identified which completely invalidate the 'surplus-yield' assumption. Among these mechanisms, notably, is 'beneficial predation' (Yodzis 2001).

[6] The exception is Antarctica, where there are no EEZ, and lots of pinnipeds. However, pinnipeds are outside of the scope of the International Whaling Commission, and hence of this report.

Important for the concept of 'beneficial predation' is the fact that there is intense competition among predators. The species that are to be eliminated are rarely the only species consuming prey species targeted by the fisheries. In the marine food web, there are usually many competing predators, including large squids and seabirds, but especially other fishes (including some cannibalism where adult fishes feed on the young of the same species). In fact, the most significant consumers of marine fish are other predatory fish, not marine mammals (Trites *et al.* 1997). Therefore, any possible 'gain' in the population of prey species from reduction in one predatory species is as likely to be eaten by other marine predators, rather than as fisheries catches. Furthermore, the diversity in prey species consumed implies that predators also feed on the competitors and, in many cases, predators of their prey. The existence of such top predators then is beneficial to the prey species since the top predator also keeps the population of other predators in check. Removal of such top predators, e.g., a cetacean species, therefore, may not result in an increase in the biomass of prey species, but may lead to a decline due to the intensification of predation from other predators that are now freed from predation by the top predator.

In fact, reduced beneficial predation has been proposed as one reason for a stagnation in global demersal (= bottom) fish landings since the 1970s. In this scenario, the reduction of toothed whales and other high-level predators, which feed on desirable fish species, but also on various squids, which in turn feed on juvenile demersal fish, may have indirectly contributed, through an increase of consumption of juvenile fish by squids, to the inhibition of demersal fish population recovery (Caddy & Rodhouse 1998).

There is as yet no model of a marine ecosystem that is detailed enough and meets sufficiently stringent scientific requirements to allow for a reliable investigation of the effects, positive or negative, that the reduction of cetacean populations might have on fisheries catches. The task is not impossible, but it would require a dedicated research effort, involving specialists on the various groups to be included in such model, and recognized expert in ecosystem modelling. In the absence of such work, gross estimates of the total amount of fish consumed by cetaceans presented by the hunt advocates provides no information about the net 'gain' in fisheries catches that might result from a reduction in numbers of any marine mammal population (Lavigne 1996), and contribute at best to confusion.

Political success of the 'whales-eat-our-fish' lobby

Despite its scientific shortcomings, the 'whales-eat-our-fish' hypothesis has proven to be a valuable tool for the whaling nations in enlisting the support of coastal and even landlocked LIFDCs for their pro-whaling agendas. Since the idea was first circulated at the IWC meeting in 1999, cetaceans have increasingly become the scapegoat with the result that the IWC has experienced a surge in its membership by LIFDCs countries, particularly among the countries of the Caribbean, West Africa and the Pacific (Table 1). Most of these countries cite as their reason for accession their concerns over the state of their fisheries and its implication for their domestic food security.

For example, Amadou Diállo, Guinea's then-alternate IWC Commissioner claimed in 2004, "we believe that developing nations have a place and voice at the IWC because of the importance of fisheries to all of us and the need to feed our people and export fish to other countries." (BBC

2004). Similarly, Marlene Moses, Nauru's Permanent Representative to the United Nation was cited in an official press release as saying "some whale species have the potential to devastate our tuna stocks, and, as a country whose food security and economy relies heavily on fishing, it is our responsibility to ensure the sustainability of our people's livelihoods" (Permanent Mission of the Republic of Nauru to the United Nations 2005). Similar statements, similarly lacking a biological basis (whales don't eat tuna), were made at a recently held international meeting in Dakar, Senegal, devoted to the interactions between whales and fisheries in Northwest Africa (see Box 1).

The pinnacle of the success of the 'whales-eat-our-fish' lobbying campaign came at the 2006 meeting of the IWC when the pro-whaling camp won majority support, albeit a majority of one, in adopting the resolution known as the St Kitts and Nevis Declaration (see Box 2).

Although it is merely a declaration and did not commit the IWC or its members to specific actions, the adoption of the resolution represents the first time in more than two decades that a majority of members voted in favour of the whaling nations. The resolution included the following statement:

> *ACCEPTING that scientific research has shown that* ***whales consume huge quantities of fish making the issue a matter of food security for coastal nations*** *and requiring that the issue of management of whale stocks must be considered in a broader context of ecosystem management since ecosystem management has now become an international standard.*

The majority won at the 2006 meeting in St Kitts did not hold in the 2007 meeting in Anchorage, Alaska. However, active lobbying for vote consolidation appealing to the food security fears of LIFDCs continues. In March 2008, the Government of Japan held a one-day seminar bringing together delegates from 12 developing countries[7], most of them not IWC members, to discuss the 'sustainable use' of whales in the hope of persuading them to join the IWC (MoFA 2008).

A simple majority of pro-whaling nations at the IWC will not be able to overturn binding decisions such as the moratorium or the Southern Ocean Whale Sanctuary. Such actions require a three-quarter majority under the current IWC procedure. However, it would allow whaling countries to pursue actions that could hinder conservation measures achieved over the past two decades, for example, a resolution favoring the further expansion of Japan's 'scientific whaling'.

It is difficult to ascertain if the enthusiastic support offered by the developing countries represents genuine concern for their food security or is simply rhetoric used to hide some *quid pro quo* agreement for their support that has nothing to do with whaling.

[7] Participating countries were: Angola, **Cambodia,** Congo, Equatorial Guinea, Eritrea, Ghana, **Laos**, Malawi, Micronesia, **Palau**, Tanzania, and Vanuatu; IWC member **in bold**,

Table 2 Voting list of the St Kitts and Nevis Declaration by year of adherence to the ICRW. LIFDCs in bold. There has been a surge in the membership by LIFDCs, in support of the pro-whaling agenda, in recent years.

Year of Adherence	Countries voted for (total: 33)	Countries voted against (total: 32)
1940s	Norway, Russia	Australia, France, Mexico, South Africa, UK, USA
1950s	Denmark, Japan	
1960s		Argentina
1970s	Rep. Korea	Brazil, Chile, the Netherlands, New Zealand, Spain, Sweden
1980s	Antigua & Barbuda*, St Lucia*, St Vincent & the Grenadines*, **Senegal***	Finland, Germany, **India**, Ireland, Monaco, Oman, Switzerland
1990s	Dominica, Grenada, St Kitts and Nevis, **Solomon Islands**	Austria, Italy
2000-2006	**Benin**, **Cambodia**, **Cameroon**, **Côte d'Ivoire**, Gabon, **the Gambia**, **Guinea**, Iceland, **Kiribati**, **Mali**, Marshall Islands, **Mauritania**, **Mongolia**, **Morocco**, Nauru, **Nicaragua**, Palau, Suriname, **Togo**, **Tuvalu**	Belgium, Belize, Czech Rep., Hungary, Israel, Luxembourg, Panama, Portugal, San Marino, Slovak Rep.

Abstention: **China** (1980);
Absence: Costa Rica (1981), Guatemala (2006), **Kenya** (1981), Peru (1979);
Adherence since the 2006 Meeting: Croatia (2007), Cyprus (2007), **Ecuador** (2007), Greece (2007), **Guinea-Bissau** (2007), **Laos** (2007), Slovenia (2006), Uruguay (2007);
*Countries that had voted in favour of the moratorium on commercial whaling in 1982.

Concerns about Japan's use of development and fisheries aid as a means to obtain the support of aid-recipient countries in the IWC have been expressed for many years. Certainly, the decision of some developing countries to join the IWC, rather than international organizations, e.g., the International Commission for the Conservation of Atlantic Tuna (ICCAT), more directly associated with the management of their fisheries resources (and have lower membership fees) is puzzling (Holt 2007).

If the claim of these countries to ensure their food security is in fact mere rhetoric, then the solution required is political and beyond the scope of this report. However, if their concerns are genuine, but based on misleading science, then a concerted effort by all concerned parties needs to be undertaken to identify the major drivers for the decline of fisheries resources in their waters. This report may be viewed as a contribution to such effort.

Globalization of Fisheries: A Real Threat to Regional Food Security

Though the multi-faceted nature of globalization makes it difficult to define in universally agreed terms, it can be summarized as "the growth or more precisely, the accelerated growth, of economic activity that spans politically defined national and international boundaries." (Oman 1999). This definition clearly articulates the current trends in the world's fisheries where sophisticated networks of international markets together with large distant water fleets operating beyond the maritime boundaries of its home states denote that over 70 percent of global fisheries landings are estimated to be consumed in countries outside the boundaries of the waters where

the catches were made (Pauly *et al.* 2003). As we will discuss below, this disconnect between the regions of fish supply and consumption results in the gravitation of fish into the markets of the affluent developed countries, or more bluntly put, from "the more needy to the less needy" (Kent 1983). Such flow further exacerbates the already skewed distribution of fish, intensifying the current food insecurity crisis resulting from the reduction in the supply (Alder & Watson 2007).

Competition at the sea

Large numbers of industrial fishing vessels from developed countries are fishing in the waters of developing countries. The emergence of the United Nations Convention on the Law of the Sea (UNCLOS), in the late 1970s, enabled coastal countries to claim exclusive rights to waters reaching 200 miles into the open sea, including essentially all coastal shelves and their fisheries resources. Under this new regime, developed countries with established distant water fleets, could not dismantle them without significant economic and social consequences. They began, therefore, to engage in 'cash-for-access' arrangements whereby they secured fishing opportunities in the waters of developing countries in exchange for financial compensation.

In some countries, fishing by foreign fleets far exceeds fishing by the host (Bonfil *et al.* 1999; Gianni & Simpson 2005). While access agreements provide a valuable option for developing countries to extract economic benefit from their fisheries resource, there are concerns about the equity of these arrangements and their impact on local artisanal fishers and the development of domestic fisheries (see e.g., Kaczynski and Fluharty 2002). Moreover, in countries with limited resources for surveillance and management, there are also concerns about the impact of distant water fleets on the environment and sustainability. Regional and distant water fishing by vessels from developing countries is also expanding and fishing fleets of 'flag of convenience' states are reportedly increasingly involved in illegal distant-water fishing (Gianni & Simpson 2005).

Some countries are now critically dependent upon financial compensation payments. Under such conditions, these countries may see it as being in their best interest to support the 'whales-eat-our-fish' argument both to protect the economic benefits they derive from access agreements, however meager, and to obfuscate the fact that they have failed to develop for their people the resources of their EEZ.

For developing countries with distant water fleets operating in their EEZ, negotiating a fair compensation level is extremely difficult because the detailed operational cost of the fleets is not available. In general, there seems to be little relationship between the value of the catch by the distant water fleets and the fee level that they pay (Kaczynski and Fluharty 2002; Peterson 2003), indicative of poor negotiating positions by the host countries, or possible corruption on both sides. Moreover, most of the hosts lack the capacity to monitor the catches of foreign fleets, making it difficult for host countries to assess the quantities and value of the fish caught by the distant water fleets. This further contributes to developing countries being underpaid and overfished by the foreign fleets.

In the 1990s, for example, fishing access agreements signed between the EU and developing countries generated annually, on average, value added of EUR 694 million in the EU member states through processing and marketing of fish caught in the waters of developing countries by

EU vessels. That amount represented three times more than the benefits accruing to host countries through the signing of fisheries agreements with the EU (Gorez, 2005).

Moreover, distant water fleets generally benefit from a variety of subsidies, including the payment of access agreement compensation by their home governments. With these subsidies, distant water fleets have been able to continue to operate even when the stocks were too depleted to make it economically profitable (Munro & Sumaila 2002). This also results in unfair competition between industrialized distant water fleets and the local fleet for the access to resources and markets, especially for the artisanal fishers of developing countries.

Competition in the market

International trade in fish products, like other kinds of trade, is sometimes assumed to benefit all who are involved. However, with the large amounts of fish entering into international markets, there are concerns that the exported fish species will no longer be available for domestic consumption, thus compromising the food security of the exporting countries, particularly in LIFDCs.

Fish is one of the most widely traded commodities in the world with nearly 40 percent of world fish production entering the international market—significantly more than for other food staples such as wheat (20 percent) and rice (5 percent) (FAO 2006). The trends toward globalization of business, banking, and telecommunications, as well as the policies of trade liberalization and expansion of global fishing fleets over the past 50 years have greatly contributed to this increase in fish trade. The total volume and value of fish trade have steadily increased from 8 million tonnes worth USD 8 billion in 1976 to 53 million tonnes worth USD 71.3 billion in 2004 (volume in live weight equivalent, FAO 2006).

The fish trade flows can be summarized as follow (FAO 2006):

- Developing countries accounted for 57 percent and 48 percent of exports in quantity and value respectively. LIFDCs accounted for 20 percent of the total export value in 2004;
- A total of 97 countries, mostly in Latin America, the Caribbean, Africa and developing Asia and Oceania, were net exporters of fish and fisheries products. Europe, Japan and North America were characterized by a fish trade deficit;
- 9 of the top 40 fish-exporting countries were LIFDCs; and
- 85 percent of the value of developed country exports was destined for other developed countries; meanwhile, only 15 percent of the value of fishery exports of developing countries was for other developing countries.

It is evident from these statistics that there is a net flow of fish in the international market from developing to developed nations. Whether or not this should be viewed as problematic remains a matter of debate. But it is our contention that the volume and growth of this trade poses a much greater risk to food security than the small amounts of fish taken by whales. And, unlike the specious argument promoted by the ‘whales-eat-our-fish’ advocates, there is scientific and economic data to validate our claim.

Proponents of free markets would point out that a large share of traded fish products is comprised of high value products, such as shrimp and tuna that are of little interest to consumers in the poorer nations. Therefore, they would also argue that the substantial amount of foreign exchange earned from the export of these luxury fish products can be used to import much larger volumes of low cost foods, with a large net nutritional gain. But while increasing international trade in fish and fishery products undoubtedly provides social and economic benefits for developing countries, there is a need for caution.

Although the fisheries sector may present opportunities for developing countries to earn foreign exchange, the demand from international markets exerts huge pressures on fisheries resources. Thus, meeting demand may encourage intensive, destructive and illegal fishing to the detriment of sustainability. There are also concerns that promoting international trade in fisheries products could have negative consequences for local food security. Impacts may include reduced physical and economic access to fish by channelling fish away from local markets to international markets and perhaps of even great consequence, a large increase the local price of fish (Kurien 2004).

In practice, much of the foreign exchange earned from the export of fish is not devoted to purchasing low cost, nutritious foods for the undernourished population, but is diverted to the purchase of luxury products in demand by local elites or to serve the needs of visitors (van Mulekom *et al.* 2006). Thus, participation in international fish trade may result in a net gain of benefits to the nation as a whole, but a net loss to the poor majority.

New market opportunities for fishmeal, supported by the growth of aquaculture could also lead to local artisanal fisheries exporting small pelagic species that had traditionally been consumed locally – similar to the situation which occurred for demersal fish in West Africa with the artisanal fishery supplying the export market rather than local markets (Neiland 2006).

Moreover, many fisheries operations in developing nations are owned by people from developed nations, thus contributing less to the local economies than it would seem. Participants in a joint fisheries venture often have contradictory objectives with regard to what they hope to achieve through the arrangement, which is a major obstacle in attaining a successful partnership (Gréboval 1979). For the local partner and the government of the host country, the primary concern is the long-term development of fisheries and the creation of associated social and economic benefits. They therefore assume that the joint venture arrangement will provide employment and training opportunities for the local population while providing a low cost food supply for the local market. On the other hand, foreign partners, e.g., Japanese investors, are more concerned with short-term security of fishing access and the attainment of the maximum return on their investment. In some extreme cases, the joint venture is seen as merely a means of securing fishing access for the parent companies of the foreign partners, and not as a profit-generating system, and their objective is simply to minimize costs, as documented in an older, but extremely thoughtful analysis of a Japanese joint venture in the Salomon Islands (Meltzoff & LiPuma 1983).

Moreover, heavy utilization of fishmeal and oil as livestock and aquaculture feed further contributes to the ‘invisible’ export of fish for many developing countries, when finished products, i.e., chicken, pork and salmon, are exported (Kent 2003).

Globalization of 'fishprint'

As previously stated, the major consequence of the expansion of distant water fleets and the development of an international fish market is that consumers in the developed world are now increasingly purchasing fish products originating from outside the EEZ of their countries. In other words, countries can now consume fish at a level that exceeds the productivity of their domestic water, i.e., have its ecological footprint (Wackernagel & Rees 1996) – or "fishprint," as it were – far exceeding the total area of their EEZ, so long as they have the economic means to do so (Talbot et al. 2006).

Figure 4 illustrates the spatial expansion of Japanese distant water fleets and fish trade from 1950 to 2000 by documenting the absolute and relative amounts of seafood that are extracted for Japanese consumers from the global ocean. As might be seen, the reach of Japanese consumer extends to the globe. Similar maps could be drawn for the EU, Russia, the United States and increasingly China. Jointly, they would contribute to maps of relative consumption that are red throughout, i.e., almost all catch from all oceans are going to few countries, and developing countries consuming only fish caught in their own EEZs.

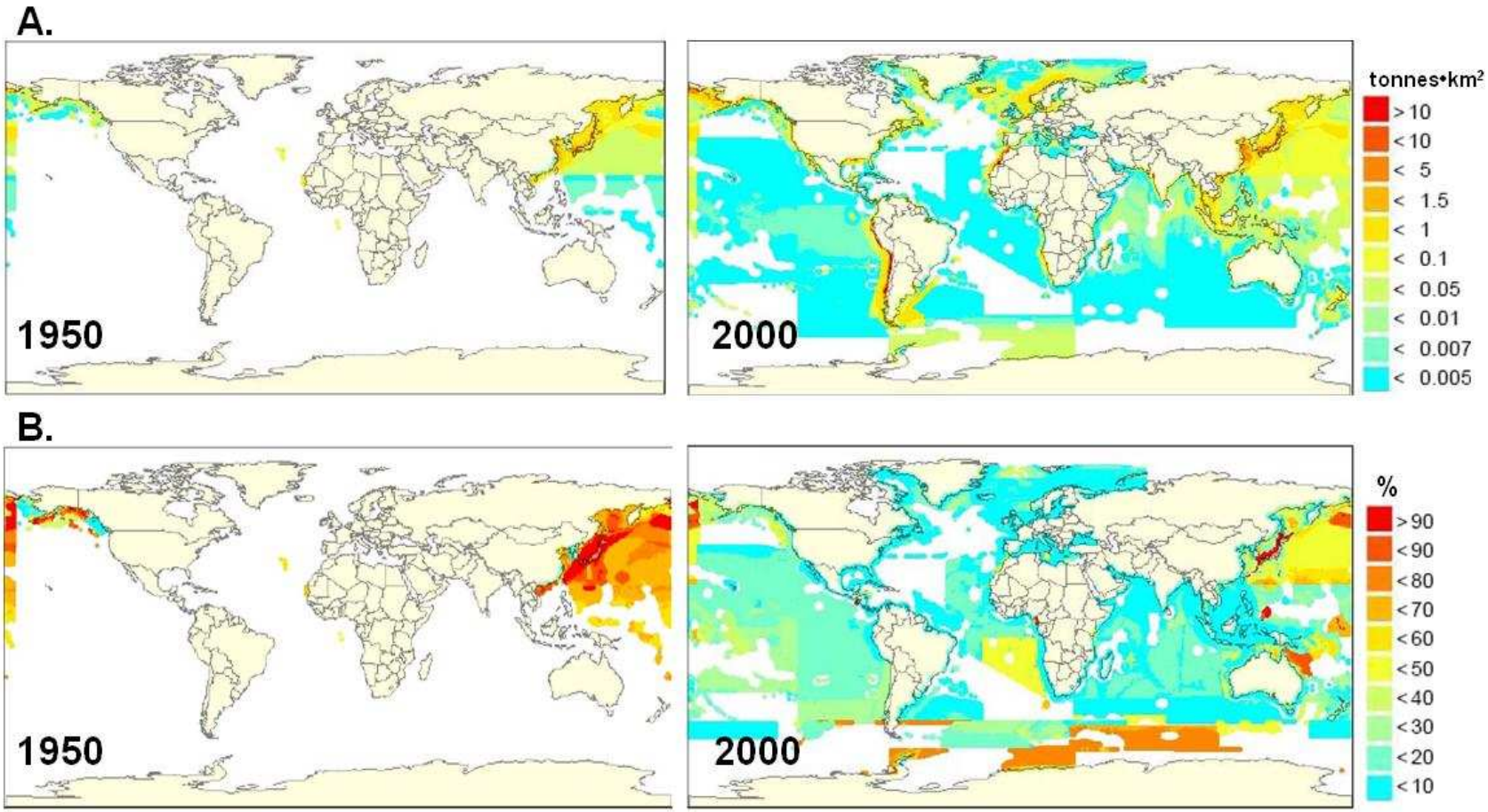


Figure 4 The origin of fish consumed by Japan in 1950 and in 2000, expressed in tonnes/km^2 (A) and as percentage of global consumption (B). In (B), blue regions represent areas where consumption by Japan accounts for a small fraction of the global consumption, while red regions represent areas where consumption by Japan accounts for a large fraction of the total. Regional landing bases of distant water fleets (e.g. El Salvador and Equatorial Guinea in the 2000 figure) are identified as red 'hot spots' (Swartz 2004). Similar maps could be drawn for the EU, the United States, Russia and China, and they would, jointly, color the entire world ocean red

Regional Examination of the Fish Resource Competition

In this section, we will summarize the fish resource competition between domestic and selected foreign markets by examining the level of distant water catch and fish export from EEZs of coastal countries (see Box 3 for a summary of the methodology). Our analysis will focus on the three regions where the 'whales-eat-our-fish' lobby has been most successful and where the IWC recruitment drive by the whaling advocates are likely to focus in future. The results are summarized in Figure 6. It should be noted that in none of the regions examined, domestic markets accounted for more than 50% of the regional catch, compared with the high retention of catch observed in Japan (Figure 5, represented by the high level of red in its domestic waters).

South Pacific[8]

Although countries and dependent territories of the South Pacific have very small populations, their EEZs represent a huge area of the Pacific Ocean. Not surprisingly, the issue of fisheries are of vital food security and economic interest for the countries in the region, especially for those with limited land-based resources. In 2000, the EEZs of the South Pacific island states yielded 426,000 tonnes of fish, over 200,000 tonnes of which were skipjacks destined for non-domestic consumption. Our analysis shows that the domestic market accounts for less than 5% of fish caught in the region. Japan, with its renowned taste for sashimi-grade tuna, consumed 30% of the catch from the region while EU accounted for 4%. It should be noted, however, that the large portion of the catch destined for 'other' markets is based on catches by distant water fleets from Taiwan and South Korea, as well as exports of tuna for canning to regional processing bases, for example in Thailand, and is most likely destined for markets in Japan, EU and North America (Figure 5). Indeed, the region and its surrounding high seas provide about 50 to 70 percent of the world's tuna for canning.

In terms of volume and value, the fisheries in the South Pacific are dominated by the industrial tuna fisheries, even if taking account of the fact that small scale fisheries catches are strongly underestimated in official catch statistics (Zeller et al. 2007a, 2007b). However, the vast majority of fish caught in the region are by distant water vessels from Asia and the United States, with countries hosting these fleets receiving only a fraction of the benefits from the fisheries found in their waters as fishing access fees account for 3 to 4 percent of the landed value (Peterson 2005). Moreover, there are concerns that the large tuna catches by the distant water fisheries may adversely impact those of the small-scale fishers (Gillett *et al.*). Indeed, a recent report indicates that local fishers (e.g. Solomon Islands) are claiming that it is harder to catch tuna now than it was in the past, and that they have to go further from shore and fish for longer to get the same catch, with the commercial tuna fisheries often blamed for this decline in catch (Barclay & Cartwright 2007).

The domestic share of catches from its EEZs may be even smaller if illegal catches are to be included. The region has minimal patrolling and enforcement capabilities (Kiribati for example has only one small patrol boat to monitor its vast EEZ covering an area of over 3.4 million km^2).

[8] Countries included: American Samoa, Cook Islands, Fiji, French Polynesia, **Kiribati**, **Marshall Islands**, Micronesia, Northern Marianas, **Nauru**, New Caledonia, Niue, **Palau**, Papua New Guinea, Samoa, **Solomon Islands**, Tokelau, Tonga, Tuvalu, **Vanuatu** and Wallis and Futuna Islands. Current IWC members in bold.

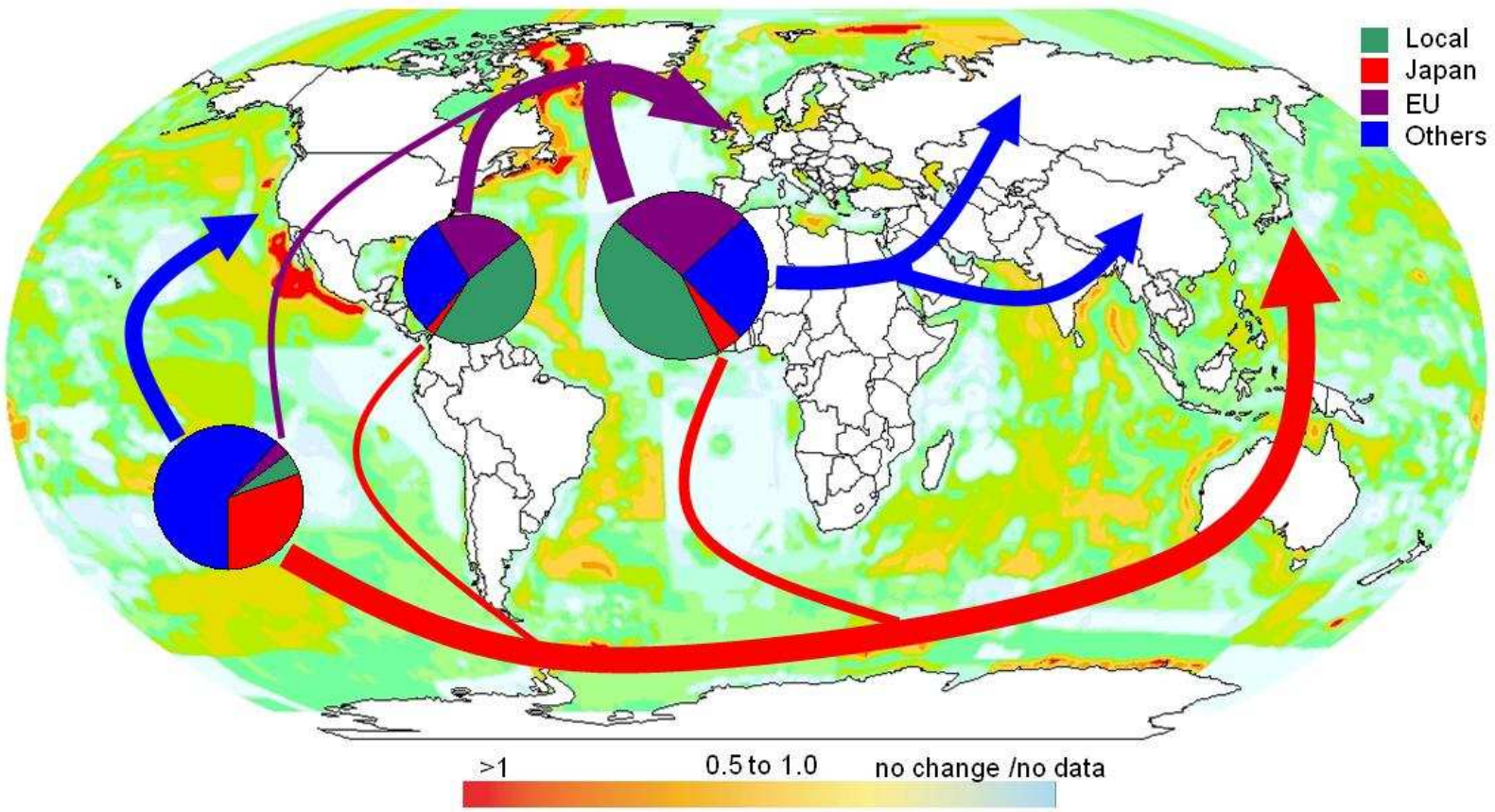


Figure 5 Final destinations of the marine food resources caught in the EEZs of the countries in South Pacific, Caribbean and West Africa, based on 2000 landings data (www.seaaroundus.org) and UN Comtrade trade statistics (comtrade.un.org). Note that in all three regions, local population consume less than 50% of the catch. The background map represents the mean trophic level change from 1950 to 2000 (Pauly & Watson 2005). The map demonstrates that the global fisheries are undergoing considerable 'fishing down,' i.e., large predatory fishes are first to be depleted when fisheries develop. This mode of 'predation' is the converse of the predation by marine mammals, which, to the extent that they prey on fishes, tend to target the small ones (Etnier & Fowler 2005).

Thus, illegal fishing, including illegal activities by distant water vessels, is believed to be widespread in the region (Greenpeace 2007).

The region has also seen the development of export-oriented fisheries exploiting the coastal resources such as sea cucumber, lobsters and (live) reef fishes fuelled by the demand to markets in large Asian cities, notably Hong Kong (Ref. 'WHILE STOCKS LAST'). The local impact of these fisheries is substantial, as they are usually characterized by intense exploitation that rapid reduce the abundance of the targeted species. There have been numerous problems with the use of cyanide and the unsustainable targeting of spawning aggregation. Indeed, these fisheries often jeopardize the long-term commercial viability of the other fisheries, and food security of coastal communities.

In Kiribati, for example, overall nutritional standards have been steadily declining. Urbanization, together with investment in export-oriented crops and fisheries, has contributed to a decline in production of traditional food products and thus, to a less balanced diet for the population. Dependence on nutritionally inferior food imports, purchased via export of high-valued food item such as tuna, has also resulted in a decline in health standards, with a steady increase in the number of reported hypertension and diabetes cases in the 1990s (Thomas 2002).

West Africa[9]

In the past 50 years, marine fish landings from West Africa have increased from 600,000 tonnes to over 4 million tonnes (4.1 million tonnes of fish caught within the EEZs of coastal countries in the region), supplying markets in Europe, Russia (and other members of the former Soviet Bloc), Japan and, more recently, China. The EU, for example, consumes over a quarter of the catch from the region. Our analysis, based on the reported catch and trade, likely underestimates the size of European consumption, with the European Commission estimating more than 1.1 billion Euros in illegal fish entering Europe each year (Rosenthal 2007).

With agriculture and other natural resource sectors stagnant or in decline, coastal and offshore fisheries resources are often perceived as the only source of cheap protein for many countries of west Africa, particularly in areas experiencing high population growth. Yet, despite foreign fishing fleets prospering in the region under fishing access arrangements (Figure 7; see also Alder & Sumaila 2004), few western African countries have realized the potential benefits of sustainably managed fisheries (Kaczynski & Fluharty 2002). While some improvements in fishing access negotiations have been made in recent years (Walmsley *et al.* 2007), it is often the case that countries with limited or exhausted fisheries resources are failing to meet their domestic demand for fish and local fishers are been made to compete with distant water fleets for access to their local resources. As the consequences of the growth in distant water fleets operating in the region, many western African countries, with significant fisheries resources, such as Senegal, Morocco, Guinea have experienced depletion of their fish stocks and increasingly supplementing their declining catches with higher price, lower quality, or less desirable imported fish (Atta-Mills *et al.* 2004).

[99] Countries included: Angola, **Benin**, **Cameroon**, Cape Verde, Dem Rep of Congo, Rep of Congo, **Côte d'Ivoire**, Equatorial Guinea, **Gabon**, **Gambia**, Ghana, **Guinea**, **Guinea Bissau**, Liberia, **Mauritania**, **Morocco**, Namibia, Nigeria, Sao Tome and Principe, **Senegal**, Sierra Leone, **Togo** and Western Sahara. Current IWC members in bold.

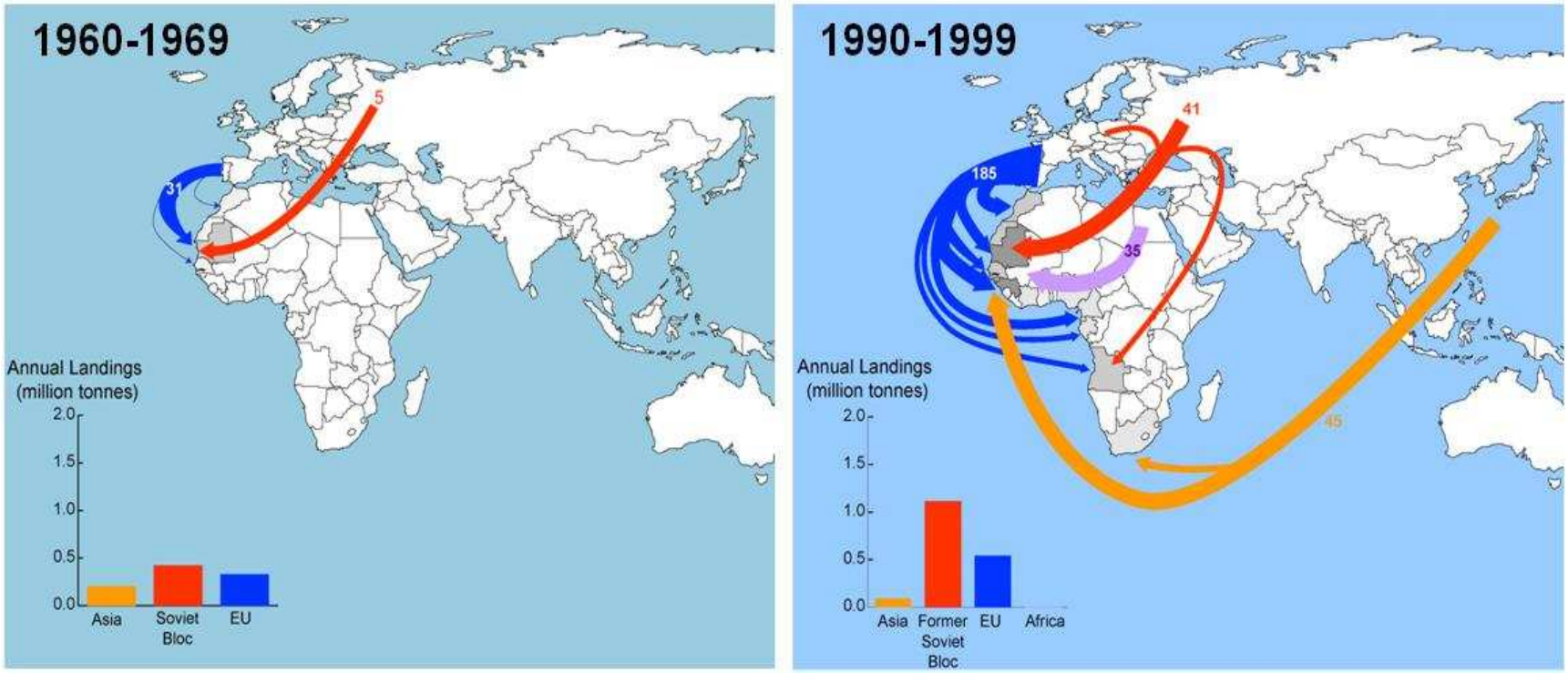


Figure 6 Trends of fishing access to West Africa for Western Europe, Russia, i.e., the major piece of the former Soviet Bloc, and Asia by decade. The numbers in the arrows represents 'agreement years,' calculated by adding total years foreign countries had agreed to access the EEZs of West African countries in a given decade (from Alder & Sumaila 2004).

Caribbean[10]

Although the Caribbean is not a major international source for fish, with its annual catch making up less than 0.2% of the world marine catch, the fisheries sector is nonetheless important to the economies of the island countries of the region for food, employment and foreign currency earnings. In most countries, especially in the Eastern Caribbean, large pelagic stocks have supported important small-scale fisheries. Of the 113,000 tonnes caught within the EEZs of the Caribbean island countries, 45 percent was consumed domestically, with 23 percent destined for the EU and another 30 percent to other foreign markets, mostly in North America. It should also be noted that the region is a net importer of fish products (in live weight), importing processed small pelagic species.

While reports of bilateral fishing access arrangements between the Caribbean countries and distant water nations are scarce, American fishing companies do operate in the region under private agreements with local fishing authorities (Mwikya 2006). Moreover, it is believed that considerable flagging of distant water vessels by the Caribbean countries does occur in the region (REF). Catches by such vessels would be reported as Caribbean catch, if reported at all, and are certainly destined for the markets of the owner countries.

Conclusion

The world of fisheries is fraught with uncertainty. Catches are never reported precisely, neither are deployments of fleets and, hence, their effects on fisheries resources cannot ever be fully understood.

This is even worse when assessing the role of marine mammal predation on fish stocks. Though the population numbers for some species are well known, for most, the available numbers are very approximate, particularly for species that are rarely hunted, or that have been hunted to a small fraction of their former population sizes. Further, the composition of the diet and the feeding habits for such species are generally not known, although we do know, in the aggregate, what most species of marine cetaceans are specialized to feed on. This lack of knowledge, however, cannot and should not be used to blame whales for the tremendous decline in fisheries experienced in the last decades. It is specious reasoning and ethically unconscionable.

What is becoming abundantly clear, through efforts of countless fisheries biologists and economists, is that the world's fish stocks are being decimated by the subsidies-guzzling industrial fleets of developed countries, aided by huge numbers of small scale fishers, particularly in developing countries, where fishing is, for many, the only possible mean of livelihood.

This is the policy challenge that must be addressed. The science to do so exists, and the solutions proposed range from addressing the subsidy issues at the level of the World Trade Organization

[10] Countries included: Anguilla, **Antigua and Barbuda**, Aruba, Bahamas, Barbados, Bermuda, British Virgin Islands, Cayman Islands, Cuba, **Dominica**, Dominican Rep, **Grenada**, Haiti, Jamaica, Montserrat, Netherlands Antilles, Puerto Rico, **Saint Kitts and Nevis**, **Saint Lucia**, **Saint Vincent and the Grenadines**, Trinidad and Tobago, Turks and Caicos, and US Virgin Islands. Current IWC members in bold.

to creating marine protected areas facilitating some resource recovery in local settings, as demonstrated e.g., in the Caribbean, and training people for jobs outside of the fisheries sector.

The challenge posed by declining fisheries resources, particularly in developing countries, cannot be addressed, however, by identifying and addressing imaginary threats.

The Canadian Government (i.e., its Department of Fisheries and Ocean), following the collapse of the cod stock off the Province of Newfoundland and Labrador in the early 1990s, refused to acknowledge the role of excessive fishing, especially trawling, in the collapse of a previously abundant resources, which had been exploited for centuries. Instead, it blamed cold water intrusions, and seals. Such deliberate misrepresentation, in the face of overwhelming scientific evidence to the contrary, has an enormous price. Perhaps Canada, a rich country, can afford such folly. Developing countries can not.

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Box 1 Worrying about Whales Instead of Managing Fisheries: A Personal Account of a Meeting in Senegal

On May 8 and 9 2008, I had the opportunity to attend, in Dakar, Senegal, a workshop organized by WWF and the Lenfest Ocean Program (LOP), devoted to the interaction between the great whale and fisheries of northwest Africa, and titled Whales & Fish Interactions: Are Great Whale a Threat to Fisheries? The workshop was attended by officials from the fishery ministries of half a dozen countries in the region, from Mauritania to Guinea, WWF and LOP staff, a few scientists, and, most interestingly, by parliamentarians from the host country.

Most of the great whales in that region of the world come to reproduce, and feed overwhelmingly at higher latitudes, which is in line with what is known on great whales elsewhere in the tropics. Baleen whales, when the feed, rely mostly on krill and other small plankton organisms, and thus they would not (and neither would the few resident whales; see e.g., Van Waerebeek et al. 1999), in any case, interact with the demersal and tuna fisheries prevailing off northwest Africa. So why a workshop on this outlandish topic? Why not Fisheries vs. the Martians?

The reason for the workshop was not only the fact that the countries in the Northwest African region increasingly vote with Japan at meetings of the International Whaling Commission. Rather, it is the fact that their delegates justify such votes on the grounds that their fisheries are negatively impacted by baleen whales. Indeed, they argue that the whole ecosystem is “out of balance”, a balance that can be re-established only by killing whales - which flies in the face of everything known about the fisheries of the region, whale biology, and common sense. And it does not get better when it is tailored for local consumption.

This was a very awkward situation for me to be in. I have worked for years on West African fisheries, with colleagues from the region, and supported their countries’ interest vis-à-vis people justifying the activity of EU-based or other distant-water fleets operating in West Africa on the basis of questionable ‘agreements’, which the coastal countries were blackmailed into signing, and through which their fisheries resources a made available at less than bargain prices (see Kaczynski and Fluharty 2002). These distant water fleets, jointly with the local, totally unmanaged and overgrown ‘small-scale’ fisheries have reduced the fisheries resources off West Africa to shadows of their former selves, which makes the management of these fisheries, and especially a reduction of their aggregate effort, a priority. This, in fact, was the main result of the EU-funded international research project called ‘Système d’Information et d’Analyse des Pêches de l’Afrique du Nord-Ouest’ (SIAP). This project provided to West African scientists and others to collaborate on the analysis of over half a century worth of catch time series and other data, with the results presented at an international conference held in Dakar in 2002 (see Chavance et al. 2004), amidst a furry of articles in the local press.

This was not the first time, obviously, that such findings were reported. In fact, the SIAP project was largely based on gathering and analyzing the vast literature, spanning several decades, which tracked the declining trajectory of the fisheries off West Africa. This literature, and the syntheses which resulted from the SIAP project, are available to inform local policy makers interested in reforming fisheries policies.

The most crucial reform would be moving from a situation where West African waters are seen as larder from which an endless supply of fish can be extracted to supply foreign markets (Alder and Sumaila 2004) to one where West African countries could build on export and processing of fish to strengthen their own economy, and benefit their own people.

The government positions that I heard at this meeting suggest, however, that such reforms are not being contemplated. Instead, the top fisheries officials of West African countries appear to have thrown their lot

with their Japanese advisers, and their 'whales-eat-our-fish' mantra, for reasons that are either obscure, or too obvious to mention.

The excellent scientific presentations at the workshop, by Drs Kristin Kaschner and Lyne Morissette, dealt with the identity of the great whales off West Africa, their behaviour, their incorporation in (Ecopath) trophic models, and the result of some preliminary simulations (with Ecosim), which suggested that killing all the whales off West Africa – even if it could be done - would have little effect on the fishery resources and catches.

At every step, their finding and assumptions were questioned by one or the other government officials, using concepts (such as 'ecosystem balance') and arguments ('you have not studied the stomachs of newborn calves off West Africa, so you don't really know that they don't eat our fish') originating in the Tokyo-based Cetacean Research Institute. The only evidence they presented was evidence of bad faith, the whole line of arguments being based on absent data. These purely negative arguments, indeed, are of the same kind as those that advocates of the so-called 'intelligent design' use to criticize evolution by natural selection, but who (for good reasons) never offer a positive argument for the case they attempt to make.

There was a ray of hope, though. The participating Senegalese parliamentarians, both from the Senate and the Lower House, were united in their questioning of their government's position, and mentioning their surprise at a government policy that has never been publicly debated and which is actually alien to the culture of their constituents. Indeed, this very point was emphasized by a parliamentarian and mayor of a fishing town, who mentioned that her constituents, far from considering them to be their competitors, consider whales their guardians, and want to see them protected. This view was echoed by participants from other West African countries.

Still, I left Dakar with a heavy heart. To see that such a great country as Japan has twisted its entire development aid, and corrupted fisheries officials of an entire region for the sake of its tiny, heavily subsidized whaling industry, is sad. It will probably last years before the countries targeted by these delusional policies will see through these manoeuvres, and free themselves from the officials which mislead them. Also, the real potential of whale eco-tourism is not being explored, although it has become a serious source of foreign currency in various other countries, e.g., in Argentina.

Foremost, however, the countries successfully targeted by the whale-eat-our fish delusion fail to concentrate on the real problem they have. This was brutally recalled by the senior parliamentarian at the workshop, who put the issue of the mismanagement of fisheries in the general context of food production in Senegal. He recalled that only a few years ago, his country allowed its own rice production to be destroyed by cheap imports from Taiwan, only to be hit a few years later with massive price increases, which have put the now imported staple out of the reach of most of his compatriots. And he warned that the whale-eat-our-fish issue could have similar effect, by diverting attention from the task of putting Senegalese fisheries on a sustainable basis.

Daniel Pauly

Box 2 St Kitts and Nevis Declaration (Resolution 2006-1)

EMPHASISING that the use of cetaceans in many parts of the world including the Caribbean, contributes to sustainable coastal communities, sustainable livelihoods, food security and poverty reduction and that placing the use of whales outside the context of the globally accepted norm of science-based management and rule-making for emotional reasons would set a bad precedent that risks our use of fisheries and other renewable resources;

FURTHER EMPHASING that the use of marine resources as an integral part of development options is critically important at this time for a number of countries experiencing the need to diversify their agriculture;

UNDERSTANDING that the purpose of the 1946 International Convention for the Regulation of Whaling (ICRW) is to 'provide for the proper conservation of whale stocks and thus make possible the orderly development of the whaling industry' (quoted from the Preamble to the Convention) and that the International Whaling Commission (IWC) is therefore about managing whaling to ensure whale stocks are not over-harvested rather than protecting all whales irrespective of their abundance;

NOTING that in 1982, the IWC adopted a moratorium on commercial whaling (paragraph 10 e of the Schedule to the ICRW) without advice from the Commission's Scientific Committee that such measure was required for conservation purposes;

FURTHER NOTING that the moratorium which was clearly intended as a temporary measure is no longer necessary, that the Commission adopted a robust and risk-averse procedure (RMP) for calculating quotas for abundant stocks of baleen whales in 1994 and that the IWC's own Scientific Committee has agreed that many species and stocks of whales are abundant and sustainable whaling is possible;

CONCERNED that after 14 years of discussion and negotiation, the IWC has failed to complete and implement a management regime to regulate commercial whaling.

ACCEPTING that scientific research has shown that whales consume huge quantities of fish making the issue a matter of food security for coastal nations and requiring that the issue of management of whale stocks must be considered in a broader context of ecosystem management since eco-system management has now become an international standard.

REJECTING as unacceptable that a number of international NGOs with self-interest campaigns should use threats in an attempt to direct government policy on matters of sovereign rights related to the use of resources for food security and national development;

NOTING that the position of some members that are opposed to the resumption of commercial whaling on a sustainable basis irrespective of the status of whale stocks is contrary to the object and purpose of the International Convention for the Regulation of Whaling;

UNDERSTANDING that the IWC can be saved from collapse only by implementing conservation and management measures which will allow controlled and sustainable whaling which would not mean a return to historic over-harvesting and that continuing failure to do so serves neither the interests of whale conservation nor management;

NOW THEREFORE:

COMMISSIONERS express their concern that the IWC has failed to meet its obligations under the terms of the ICRW and,

DECLARE our commitment to normalising the functions of the IWC based on the terms of the ICRW and other relevant international law, respect for cultural diversity and traditions of coastal peoples and the fundamental principles of sustainable use of resources, and the need for science-based policy and rulemaking that are accepted as the world standard for the management of marine resources

Box 3 Finding who's eating who's fish: modelling and mapping global fisheries catches and tracking them through the international market

Until recently, the exact origin of fisheries catches of the world was mostly unknown. The reasons were many and where fisheries landing statistics exist; these statistics usually suffer from a number of deficiencies. Ignoring typical problems of missing/incomplete data and inconsistent units of measure, one of their most common weaknesses is that they are often quite vague, particularly about the identity of the harvested taxa as well as the exact location where they were caught. To overcome this problem, over the past eight years the *Sea Around Us* Project has developed a spatial allocation process that relies on what might be called the application of common sense (in conjunction with very large amounts of related data stored in supporting databases) to assign the coarse-scale reported landings from large statistical areas into the most probable distribution within a global grid system with 0.5° latitude by 0.5° longitude cell dimensions (approximately 180,000 ocean cells). The basic assumptions are that catches of a particular fish species (or other harvested taxa) by a specific country cannot occur where the reported species does not occur and that they cannot stem from areas where the country in question is not allowed to fish (Watson *et al.* 2004). Information about species distributions and fishing access agreements under which distant water fleets can legally gain entry into non-domestic EEZs and other reports of fishing activities can therefore serve as constraints to limit the available area where reported catches can be made within the large statistical area.

We developed and used a global database of species distributions based on published maps of occurrence (where available) or by using other sources of information to help restrict the range of exploited taxa, notably water depth (for non-pelagic species), latitudinal limits, statistical areas, proximity to critical habitats (such as seamounts, mangroves or coral reefs), ice coverage and historical records. In addition, we compiled large amounts of information describing the access agreements between fishing nations to the fisheries resources of other coastal countries based on formal bilateral agreements, existing joint ventures between governments and private companies and/or associations, the documented history of fishing prior to the declaration of exclusive economic zones by various countries and other observations. The intersection of these databases with reported catches by countries from large statistical fishing areas allows the allocation of fine-scale fisheries catches to individual spatial cells (Watson *et al.* 2004). Predicted catch and biomass distributions of taxa exploited by fisheries of the world can be viewed online at www.seaaroundus.org.

With the origin and taxa of fisheries catch identified, the next task is to link the catch with the global trade data. The *Sea Around Us* Project is currently in process of developing a comprehensive global database of international fish trade that enable fish to be traced from their origin, i.e., the section of the world ocean where the catch was made (in the aforementioned global grid system) to their final destination, i.e. the market where they was consumed. By interconnecting the catch with trade, this new approach will greatly improve our understanding of the role international markets play on the exploitation of marine fisheries and will allow for a full assessment of the impact countries have on the world's oceans, beyond what they harvest at sea, in other words, the full scale of their ecological 'fishprint' (Talbot *et al.* 2006). The Japanese consumption maps presented here (Figure 4) are one such representation of the 'fishprint'.

(adopted from Kaschner & Pauly 2004)