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# DISCUSSION PAPER 3
# *SLOW FISH* : CREATING NEW METAPHORS FOR SUSTAINABILITY

by

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## SUMMARY

Analogous to the recently emerging 'slow food'movement for the protection of the right to taste (see www.slowfood.com), the concept of 'slow fish'may be used to convey important messages for protection of fisheries and the right to fish. The slow food movement talks about striking the right balance of respect and exchange with nature and the environment, while enhancing eating pleasure. Similar notions also occur in fisheries, when fishers talk about their personal attachment to the sea and how they consider fishing a satisfying and fulfilling lifestyle. The rapid development of fishing technology during the past decades has brought about many undesirable changes in the underlying ecosystems, causing many fisheries to fail. Governments, mired in day-to-day tactical decision-making, have been so far unable to contain the industry, leaving the public at large with increasing doubts about the future of fisheries and fish supply.

We propose here a new metaphor for the general public to think about: sustainability, the concept of 'slow fish', with three components. First, 'slow down fishing'deals with the need to match the rate of fishing with the rates of nature. It involves creating an understanding that long-term benefits of responsible fishing practices outweigh the loss of short-term gains, especially when considering total ecosystem values and future generations. Next, 'scale down fisheries', concerning the need for reduction of fishing capacity, using incentives such as differential taxes, geared preferentially to small-scale, owner-operated vessels. Finally, 'maintain small-scale fishing communities'considers food security and viable livelihood of local fishing communities. Through education and media programmes, this would create awareness for importance of local knowledge, community pride and high-quality fish that are locally caught and consumed (including visiting tourists), thus linking, here as well, with a key tenet of the slow food movement.

## 1. INTRODUCTION: A NEED FOR NEW METAPHORS

Since the mid-1990s, FAO and several prominent scientists have warned against the crisis in fisheries worldwide and provided evidence to support an urgent need for global actions to address the problem (Pauly *et al.*, 1998; Jackson *et al.*, 2001; FAO, 2002; Myers and Worm, 2003). Agenda 21, the Convention for Biological Diversity, the listing of some commercial fish species under CITES, and the FAO Code of Conduct for Responsible Fisheries, are some of

the initiatives intended to address this situation. The FAO Code of Conduct, in particular, aims at setting principles such as ecosystem-based management, participatory decision-making, quality and safety of fishery products, integration of fisheries with coastal management, and international cooperation in management and compliance (FAO, 1995). These principles have been used as a basis for policy setting and implementation at the national level for many countries. For example, the US government adopts ecosystem-based principles and implements these through ecosystem management plans (EPAP, 1999), while Canada's Ocean Strategy considers ecosystem 'health'(DFO, 2002). Environmental organizations endorse similar principles, as expressed in the WWF proposals and guidance (Ward *et al.*, 2002) and the Pew Ocean Commission Report (POC, 2003).

In addition to reporting on the worsening state of the fisheries and marine ecosystem, some studies identify the causes and propose potential solutions. Using historical trends and mapping techniques, Pauly and Maclean (2003) showed that overfishing was the major cause of decline of fish stock and ecosystem degradation in the North Atlantic. Their recommendations to alleviate the problem included reducing fishing effort, transforming the market for fish and transforming the governance of fisheries. Chuenpagdee *et al.* (2003) compared and ranked ten fishing gears used in the US, in terms of their impacts on by-catch and habitats. Their report, *Shifting Gears*, provided a comprehensive account of ecosystem impacts caused by each gear, as well as suggested means to lessen these impacts, such as gear modifications and shifting from high to low impact gears. These recommendations and suggestions, while sensible, are not always well received. Policy makers willing to endorse these measures may fear becoming unpopular with the owners of industrial fishing fleets, whose economic interests usually carry more political weight than those of small-scale commercial and subsistence fishers. Thus, more often than not, problems in fisheries emerge from issues of fair access allocation and equitable distribution of costs and benefits between the different segments of the fisheries sector.

International and national environmental organizations dealing with marine and fisheries issues have launched various education and awareness program about conservation issues. An example of these efforts is the production of a '*Fish List* '(www.thefishlist.org), assembled by Blue Ocean Institute, Environmental Defence, Monterey Bay Aquarium's Seafood Watch Program and Seafood Choices Alliance. The list aims to inform consumers as to what seafood to enjoy and what to avoid, based on the state of the underlying fish stock and impacts caused by various fishing methods, and enhances public awareness about fisheries and ocean issues.

Overall, fisheries problems have been well identified by scientists, acknowledged by governments, and generally understood by the public. Various efforts to reverse the trends which have led to the crisis, such as effective subsidies and fleet reduction program, have been explored, while programs to provide protection to fisheries resources and their ecosystems, such as the designation of marine protected areas, are implemented. Fishers and other stakeholders are increasingly being consulted about fisheries management. Yet, the continuing crisis suggests that more is required, i.e., that it is the very way we think and talk about fisheries and fish that needs to change. It is under this premise that we propose a new metaphor, '*slow fish* ', to promote discussion and awareness about fisheries sustainability among the general public.

'Slow fish'follows the key tenet of the 'slow food'movement (www.slowfood.com) for the protection of the right to taste and striking the balance of respect and exchange with nature and the environment, while enhancing eating pleasure (Honoré, 2004). For fisheries, this translates into three key areas, i.e., slow down fishing, scale down fisheries, and maintain small-scale fishing communities. 'Slow down fishing'concerns the need to match the fast rate of resource exploitation with the slow rate of nature, by slowing down fishing. This would promote an understanding and acknowledgement of long-term societal benefits of responsible fishing practices through an application of valuation methods that account for the total value of

fisheries resource and of ecosystems, for the present and future generations. Next, 'scale down fisheries'deals with the need for reduction of fishing capacity through appropriate incentives, including a differential tax system favouring the operation of small-scale, owner-operated vessels. Finally, 'maintain small-scale fishing communities'recognizes the importance of local fishing communities in their contributions to food security and viable livelihood. Through education and media programmes, it aims to increase public awareness and appreciation for locally caught and consumed fish and seafood products. The rationale for considering these three aspects and policy recommendations on how to achieve 'slow fish'are described in the following sections.

## 2. SLOW DOWN FISHING

Several studies have shown that the growth of fisheries catches worldwide has slowed down since the 1970s, and indeed reversed since the late 1980s (FAO, 2002; Pauly *et al.* 2002). The decline is due to several factors, including overfishing, ecosystem changes due to destructive fishing practices, discarding of by-catch, and to a lesser extent, pollution of coastal waters. A natural response to this should be that we slow down fishing. The reality is, however, quite the opposite. Many nations choose to become competitive in the race for the last fish, through expansion and modernization of fishing fleets that go fishing farther, deeper, and stay longer at sea (Pauly and Maclean, 2003). This is often done despite higher costs, e.g., of fuel (Pauly *et al.*, 2003), and increased environmental damages (Chuenpagdee *et al.*, 2003). This expansion was possible, among other things, because of high levels of subsidies, which contribute to keeping the costs of fishing artificially low.

Swan and Gréboval (2004) identified subsidies and overcapacity as the most important factors for unsustainability. Several examples of government programs promoting fisheries development through subsidies have been reported, e.g., for the trawl fisheries in the Gulf of Thailand (Chuenpagdee and Pauly, 2004a), and the small pelagic fishery in Chile (Zuleta, 2004). It is not surprising, thus, that over-capitalization and over-capacity are currently considered the most pressing problems of the world's fisheries (Kirkley and Squires, 2003), and that debate continues about the effects of subsidies and ways to remove them (Swan and Gréboval, 2004; Holland *et al.*, 1999; Clark *et al.*, 2004). Although some may argue that subsidies help keep the fisheries economically viable, they usually add to the existing marginalization of small-scale fishers, for example, by raising barriers for members of the small-scale sector to participate in management decisions (Delgado *et al.*, 2003).

Another reason for continued overfishing is the undervaluation of fisheries resources. Policy makers, managers, investors, and environmental organizations alike rely on valuation techniques and economic analyses to assist in their decisions about various resource issues, such as allocation, fisheries development project appraisal, and damage compensation (e.g., in cases of oil spills). Similar to the evolution seen in ecological and biological assessment, social and economic assessment of fisheries resources has been modified to account for the complexity, diversity and dynamics of the resource system. Experts, unsurprisingly, differ in their opinion about the most appropriate techniques to capture resource values. While there is no lack of publications on principles, methods and guidelines, different approaches can lead to dissimilar results, as observed in studies by Costanza *et al.* (1997) and Lomborg (2001), suggesting that estimating the actual costs of fishing remains a challenge.

For the most part, valuation methods rely on conventional, implicit or constructed markets, such as changes in productivity, travel cost, and contingent valuation (CV), respectively. Several recent research focus on improving the existing conventional methods, in particular CV, which is most often used to value natural and environmental resources (see for example, McDaniels *et al.*, 2003). Others focus on exploring alternative techniques and different elicitation process to deal with the difficulties in resource valuation (Farber *et al.*, 2002). One

such approach is the ‘damage schedule’method, which relies on the rankings of perceived relative importance of resources (Chuenpagdee *et al.*, 2003). Not only does this offers an alternative ‘metric’for valuation, but it also draws upon choices made by individuals, including experts, managers, resource users and general public, to reflect their value system. Interestingly, in its applications to various resource issues (e.g., fisheries, coastal habitats, marine protected areas) and in diverse cultural settings (e.g., Thailand, Mexico, Belize, US, Canada), rankings obtained generally reflect an underlying consensus amongst stakeholders. These findings are encouraging, as they imply that people might be more in agreement with difficult policy decisions than normally assumed. Thus, ‘slow down fishing' might indeed be possible to implement.

In addition to proper resource valuation, cost-benefit analysis needs to incorporate the real costs of resource extraction, including externalities and subsidies, as well as explicitly considers the interests of future generations (Sumaila, 2001), and accounts for unpredictable future events (Weitzman, 1998), through different uses of discount rates. This new analysis could contribute to efforts to halt overexploitation of fisheries, as it attempts to shift the focus from the present to the future, and illustrates that long-term benefits outweigh the loss of short-term gains.

Why slow down fishing? Given the reality that fisheries exploitation rates do not match the slow rates of nature, i.e., the slow rates of growth, reproduction and biomass accumulation of most species, and the even slower rates of build-up of biogenic structures (coral reefs, deep sea reefs, oyster reefs, etc.), it makes sense to slow fishing down. Considering the irreversibility of change in many natural and social systems, once they are disrupted by over-exploitative and damaging activities, it is reasonable to consider lessening fishing pressure. Moreover, experiences show that programs such as restoration of habitats, rebuilding of fish stocks and the re-establishment of displaced coastal communities have usually not been successful, despite strong effort and high investment. Efforts to restore oysters in the Chesapeake Bay started more than a decade ago, by attempting to construct a large-scale oyster reefs, and later to build a three-dimensional reef structure. Yet, it remains to be seen whether the Chesapeake Bay Program will achieve its goal of a tenfold increase in oysters by 2010 considering challenges such as habitat degradation and the current low population levels of native oysters (CBP, 2000). Another example is the cod fisheries off the North East coast of Canada. It has been many years since the collapse of cod fisheries that caused about 35 000 fishers to become unemployed. Still, there is no sign of recovery of both underlying fish population and fishing communities (Haedrich and Hamilton, 2000).

Slow down fishing closely corresponds with the precautionary principles and the FAO Code of Conduct for Responsible Fisheries (FAO, 1995). It requires that proactive fisheries policies and social programs be implemented to slow the rate of fishing, and to change how people relate to fisheries resources. Policy changes involving institutional reform are often useful in this regard. As seen in Thailand and Indonesia, new ministries have been established with the mandates to manage fisheries as natural resources for sustainability and conservation, instead of as agricultural products to be simply ‘harvested’. The shift from exploitation to conservation reflects the recent considerations for ecosystem health and future generations.

Changing how people relate to fisheries is, in some way, a formidable task, given the looming threat of a supply shortage. As reported in Delgado *et al*. (2003), global fish consumption is on the rise, due to the combined effects of growth in population, income and urbanization. It is now being recognized, however, that the problem is not only about the overall amount of food being consumed. Rather, the concerns are related to the distribution of food and consumption pattern. Presently, fish and fisheries products are not evenly and fairly distributed. For example, most of the fisheries resources in the exclusive economic zones (EEZs) of West African countries are extracted through rather one-sided fishery ‘access agreements’for fishing fleets from the European Union, which supply European markets (Kaczynski and Fluharty,

2002). The United States, Japan and other countries of the North are similarly involved in unbalanced fish trade with developing countries. Overall, consumption patterns in the North may be as responsible for the shortage of fish in countries of the South, even as their populations grow (Curran *et al.*, 2002). Clearly illustrating the importance of these two issues is critical to altering people's perspective on global fish supply.

The strong interest in promoting aquaculture as a solution for seafood shortage is notable. There is sufficient evidence that this 'blue revolution'needs 'greening'in order to be sustainable and not adding to current problems of ecosystem degradation (EJF, 2004; Naylor *et al.*, 2000). The development of shrimp farming (particularly, black tiger prawn, *Penaeusmonodon*) in Thailand and its environmental impacts is but one of numerous examples (Chuenpagdee and Pauly, 2004a). The intensification of shrimp farming has resulted in loss of mangrove forests, degradation of coastal ecosystem and water pollution. Considerations about growing methods, feeds, processing, distribution and regulations are needed before shrimp farming can becomes sustainable (Lebel *et al.*, 2002). A thorough analysis is required to relate aquaculture with concerns of food security, addressing the issue of competition in the utilization of fisheries products e.g., as fishmeal for feeding carnivorous fishes such as salmon, vs. direct human consumption. For many people, the ill-named 'trash fish'are considered 'food fish', or in some cases, 'choice fish', and they can be used as raw materials for various human food products, such as fish sauce and fish balls (Pauly, 1996). In such case, promoting aquaculture of carnivorous species can result in further reduction in food supply for the local poor. Slowing down fishing thus involves long-term considerations on ecosystem, social, and economic effects, from both capture fisheries and the fish farming sector.

## 3. SCALE DOWN FISHERIES

Fisheries, in all countries, operate at several scales, and the definition of small-scale and large-scale operations may differ from country to country. The variation in the definitions is greater, however, for medium to large-scale than within the small-scale sector. In other words, for many countries, the lower and upper limit for what constitutes small-scale fisheries is comparable. For example, based on FAO Country Profiles (http://www.fao.org/fi/fcp/fcp.asp), the smallest unit of small-scale fisheries is fishing with no boat, and the average size of a small-scale boat is between 5–8 m. Boat sizes between 12–15 m are still considered small, but not those greater than 21–24 m. Other characteristics used to determine the size of the fisheries are boat type, GRT, engine size, number of crew, and gear type. The latter is perhaps the least robust as many gears, particularly mobile ones, can be made in a range of size. Thus, when gear type is used to characterize small-scale fisheries, it must be accompanied by other descriptive features.

It is acknowledged that all fisheries, large or small, have ecosystem impacts, and can cause overfishing. Nevertheless, social and economic consequences of the current fisheries situation differ greatly between small and large-scale operators. For many small-scale fishing communities, dependency on fisheries resources is high, as fishing is often the only source of income and livelihood. Thus, their food security is greatly threatened with the degradation of fisheries, and is worsened when faced with a competition from the large-scale fishing sector, especially when it relies on large catch-efficient commercial fishing vessels, such as purse seiners and trawlers (FAO, 2000). The latest report by FAO warns of the overfishing situation in the Asia-Pacific region, causing changes in the trophic level of the fisheries ecosystems, and the increase in the amount of 'trash fish'in the catches (www.fao.org/newsroom/en/news/2004/49367/index.html). For a region with a large number of small-scale fishing communities, which relies on fisheries for much of its food and for various economic reasons, such diagnosis is worrisome.

Despite the recognition of the important role of the small-scale fisheries sector to local

communities, this sector is largely marginalized, geographically, economically and politically (Pauly, 1997). The physical remoteness of most small-scale fishing communities makes it difficult for their members to benefit from government programs, such as port development, roads and infrastructure, processing facilities, and other forms of subsidies, as well as to access fisheries information and to participate in management decisions. Small-scale fisheries are further marginalized in terms of information and research. National fisheries statistics focus largely on the medium and large-scale commercial fishing sectors, and little data is available on the small-scale fishing sector, and even less so for subsistence fisheries. Information about small-scale fisheries is usually descriptive, based on research that emphasizes the anthropological, social and cultural aspects of the fishing communities. While the distinctiveness of each community should be appreciated, failure to provide an overview of the important economic role played by this sector prevents the emergence of cross-country generalization, and limits the possibility of making a comparative assessment of their contributions to their respective societies. As a result, funding and technical supports are not appropriately distributed. For example, more credit loans and subsidies should be given to the small-scale than to large-scale sector, to develop infrastructure and marketing system such that small-scale fishing communities become less dependent on moneylenders, and can obtain good prices for their products. With the new product requirements such as the FAO/Codex Hazard Analysis Critical Control Point (HACCP) system seeking to identify and control hygiene risks of fish and seafood products, the cost of compliance is high and the small-scale fishing sector cannot meet the cost without financial and coordination support from the government.

From an ethical perspective, scaling down fisheries creates fairness. Why do 20 percent of fishers (large-scale) catch 80 percent of the fish (Wilen, 2000)? It is certainly not because they work harder than small-scale fishers or that they are more experienced. The advantage that they have seems to be on the use of modern fishing equipment and technology. Unfortunately, it is the modernization of the fishing industry that is responsible for most of today's overfishing problems. The introduction of trawlers in the Gulf of Thailand, for example, was an unplanned experiment, causing unanticipated results, including displacement of small-scale fishers (Pauly and Chuenpagdee, 2003). Although we acknowledge that some small-scale fishing methods can be very destructive, such as dynamite and cyanide fishing practiced illegally in many developing countries, e.g. of Southeast Asia (Saeger 1993) or Africa (Vakily 1993), small-scale fisheries sector has overall been at a disadvantage. The rights-based system favoured by many fishery management bodies has not been effectively implemented to allocate a fair share of resources to small-scale fishers. Often, they bear the ‘burden of proof’about their traditional and cultural ties to the fisheries resources. An alternative to the individual fishing rights, such as the community right system proposed by Macinko and Bromley (2002), should be considered to create management systems that are fair to small-scale fishers.

For fisheries managementthat is institutionalized such that decisions are taken at the central level, and are based solely on resource biology and short-term economic gains, small-scale fisheries may not look like a viable option. FAO estimates show, however, that of the 36 million people engaged in fishing and fish farming, roughly 15 million fishers are employed aboard decked or undecked fishing vessels operating in marine capture fisheries, and that more than 90 percent of these fishers are working on vessels that are less than 24 m in length (FAO, 2000). Clearly, the small-scale fishing sector occupies an important niche in the employment structure, and the social fabric of many countries.

Scaling the fisheries down might increase some conflicts between static gears. But at least it will be a fair competition between fishers of the same scale, as opposed to the current situation where the small-scale sector constantly competes against, and usually loses, to large-scale operators. Finally, scaling down fisheries might just happen on its own, given the increasing costs of fishing, particularly with the projected rise in global fuel price (Heinberg, 2003). A different type of intervention is needed, however, to discourage the tendency to resort to increase subsidies and offsetting the costs in further investment in the capital-intensive, large-

scale fisheries. A choice has to be made between providing for a small number of large-scale operators or supporting the livelihood of numerous small-scale fishing communities (see below).

## 4. MAINTAIN SMALL-SCALE FISHING COMMUNITIES

With the current trends in global demand for seafood and the potential in export earnings through global markets, nations are inclined to further develop their fishing industry through modernization of fleet and increase in capital investment, further transforming locally-based fishing activities into globalized, industrial fisheries. Small-scale fishing communities in the North and the South alike are faced with such trends, and with the difficulties in maintaining their cultural identity, practicing traditional ways of living, improving quality of life, and participating in the resource management. In other words, they are further marginalized by globalization.

Maintaining communities is certainly not about keeping them poor, deprived and undeveloped. Rather, it means accepting that they should be making their own decisions. The roles of governments are thus to explore possible options with the communities, including alternative livelihood, and to provide support to facilitate their decisions, within constraints emanating from the resources themselves. Evidently, not all communities are able to participate in such process at the same level. As suggested in numerous studies on community participation in resource management, some key attributes for meaningful engagement are local capacity, level of organization, and leadership (Jentoft and McCay 1995, Sen and Nielsen 1996). This implies that, for some communities, local capacity building and empowerment programs are required. Equally important is the willingness of the government to share authority and partner with the communities in resource management. Often, community-based management and decentralization is successful when political will exists, and when principles such as inclusiveness, transparency, and accountability are practiced (Jentoft, 2004).

Several examples demonstrate the growing value of local knowledge and the increasing roles of small-scale fishing communities in promoting resource conservation and fisheries sustainability. In Oceania (Johannes 1982) and Vietnam (Ruddle 1998), communities participate in conservation and traditional management of fisheries resources. The Philippines is the leading country in community-based marine protected areas (White and Vogt, 2000). Local knowledge is well integrated with natural and social science research method in the investigation of white hake (*Urophycis tenuis*) predation on juvenile American lobster (*Homarus americanus*) in Southern Gulf of St. Lawrence, Nova Scotia, Canada (Davis *et al.*, 2004). Small-scale fishing communities in southern Thailand have established marketing cooperative whereby community members control the auction of fish and sale of fisheries products.The initiative has resulted in maintaining the livelihood of the communities, as well as in promoting conservation measures, such as the release of egg-bearing female crabs.

Despite the above, changes in the communities are expected to take place, including the pattern of seafood consumption. When adding the changes in attitudes toward fish that occur in other places, meeting the increasing demand for fish becomes a bigger challenge. A survey of about 9,000 women in Norway showed, for example, that increases in fish and seafood consumption was due to factors such as belief in health benefits, change in consumer pattern for healthy diet, increasing household size, and relatively close distance to coastal areas (Trondsen *et al.*, 2004). In general, fish consumption is high in developed countries where preference for fish has increased, and in developing countries where alternative sources of protein are limited or where fish is part of the traditional diet. Japan, for example, is one of the highest per caput consumption levels in the world (about 70 kg/year), while that for several small island states in the Pacific, in the Indian Ocean and in the Caribbean is over 50 kg/year (Westlund, 1995).

Should we eat more or less fish? In developed countries, people eat increasingly more fish, including salmon and shrimp, which become readily available due to globalization of fish trade, and of the fish meal required for farming these organisms, which increasingly originates in developing countries (Delgado *et al*., 2003). These changes in seafood consumption patterns are among the major threats to maintaining fishing communities and food security in developing countries. The pressure to increase the amount of export to satisfy overseas demand, in exchange for foreign earnings, reduces the quantity of fish available for local consumption. The situation is dire in many locations where fish was a staple food item. Food security is often perceived as the ability to produce for export, with the money thus earned to purchase food on global markets. The alternative suggested here by the 'slow food'movement is local reliance on locally produced food.

Slow food (www.slowfood.com) is an international movement launched by Carlo Petrini in 1986, initially as an objection to the trend toward more and more 'fast food'(Honoré, 2004). The movement has since become a promoter of local products and breeds of artisanal producers and of environmental sustainability. The movement has now about 60 000 members, from 100 countries, half of which are in Italy. Members meet and stage events, debates and other initiatives to create awareness about food and culture, as well as promote other ways to 'slow down', e.g., slow living, forming also part of the 'Slow'movement in general (Honoré, 2004). Applying the 'slow food'philosophy to fisheries would work in favour of maintaining small-scale fishing communities, as it allows them to generate revenue from the local sale of their products, as well as income from tourists who would be attracted to visit the communities and taste high quality fish and seafood. More importantly, the movement brings to surface the cultural ties and personal pride that many small-scale fishers have about the sea and their livelihood.

Another important initiative to promote sustainability and to provide the right incentives for producers and consumers is the eco-labelling, certification and quality insurance of the products. One example is the Marine Stewardship Council (www.msc.org). Another system is the seafood labelling scheme implemented in the US in the fall of 2004, which is to indicate the origin of products (where they are caught), the processing location and the nature of production (wild or farmed). The public seems to be in favour of the food labelling scheme, partly as a way to support American seafood producers and partly due to health concerns, especially since the report on the high level of toxins in farmed salmon (Hites *et al*., 2004). Most of the seafood industry, however, considers it onerous, expensive and unnecessary (Kay, 2004). The concern is legitimate, and a plan should be in place to ensure that the capital investment required to meet the scheme is not too high, particularly for small-scale producers. Consumers, on the other hand, can rely on sustainable seafood guides, such as the previously mentioned 'Fish List', mainly for fish and seafood products in the US, and a comparable list, the 'Good Fish Guide', compiled by the Marine Conservation Society, based in the UK, covers fish from the European side of the Atlantic (www.fishonline.org).

Why maintain small-scale fishing communities? Based on a study by David. Thompson (cited in Pauly, 1997), the small-scale sector contributes to sustainability in at least three aspects. First, almost all small-scale fisheries catches are used for human consumption, as opposed to about half in the case of industrial fishing. Second, fuel efficiency is higher in small-scale fisheries than in industrial sector, with a production of 10–20 tonnes of fish for each tonne of fuel, i.e., four to five times better than that for industrial fishing. Finally, as much as 4 000 people are employed for each US$1 million investment in fishing vessels, a stark difference from 5–30 people in the case of industrial fisheries. Another important consideration in favour of maintaining small-scale fisheries is the fact that income generated from this sector is likely to stay at the local level, and contribute to local well-being (Sen 1999). Studies also show that women and children in small communities participate in fisheries and contribute to food security within their households, not only in the commonly understood roles in fish marketing and fish processing, but also in the fishing activities. Some of the examples are reef gleaning, widespread in Southeast Asia and the Pacific (Chapman 1987), and gathering of estuarine

bivalves and other invertebrates in West and East Africa (Williams 2002) and in El Salvador (Gammage 2004).

The UN definition of food security is not only about ensuring that people have physical and economic access to sufficient, safe, and nutritious food at all time, it is also about the right to food, defined as "*the right to have regular, permanent and unobstructed access, either directly or by means of financial purchases, to quantitatively and qualitatively adequate and sufficient food corresponding to the cultural traditions of the people to whom the consumer belongs and which ensures a physical, mental, individual and collective fulfilling and dignified life free from anxiety* "(UN, 2001). Thus, maintaining small-scale fishing communities is clearly an important path to realize this ambitious global goal.

## 5. TOWARDS 'SLOW FISH'

There is no need to be romantic about 'slow fish'. Pragmatically, it boils down to three basic points, i.e., going slow, staying small and eating less. The fact that it might sound sensible to many people, for their daily activities as much as in their considerations about fisheries, does not make it easy to implement. Innovative schemes and strong political commitment will be required.

On its own, the predictable increases in fuel costs of the coming decades should result in the scaling down of the fishing industry (Pauly *et al.* 2003). We would add to this an additional scheme to reflect the actual, particularly the environmental costs of fishing. Similar to the 'polluter-pay'principle, we propose a differential tax system on fishing, based on the level of impacts (in terms of by-catch and habitat damage), and also on the size of operation. Building from the ranking method developed by Chuenpagdee *et al.* (2003), we incorporate considerations for 'scale of fisheries'to distinguish between ecosystem effects caused by large, medium and small-scale fishing operations. The first five columns in Table 1 are the actual results of the study of ten fishing gears used in US waters, focusing on impacts of these gears on by-catch of five species groups, i.e., shellfish and crabs, finfish, sharks, marine mammals, and seabirds and sea turtles, as well as damages to physical and biological habitats (Chuenpagdee *et al.* 2003). The rankings were obtained using a workshop consultation process and a paired comparison survey with fishers, managers, and the general public (represented by members of environmental organizations). As the proposed cost scheme aims to provide incentives for scaling down the fisheries, we add the size of fishing operation to the consideration (Column 6). The total impact, incorporating the ecosystem impacts and fisheries scale, is then used to determine the differential tax level (Table 1).

This scheme is flexible and can incorporate different gear types and sizes. The by-catch and habitat damages for each gear can be determined on a relative scale to gears with known impacts. The relative scale also implies the consistency in applying the tax level (e.g., higher tax to fisheries with greater overall impacts). The level of taxes can be initially set low and later adjusted to deter investment that would expand the size of the fisheries, or as incentive to stay small. Other information that can be added to Table 1 includes net economic surplus (or loss) for each gear. As reported in FAO (2000), various fisheries in each country can result in either positive or negative net surplus. In general, either very large-scale fisheries (e.g., deep-sea bottom trawl) or very small fisheries (e.g., artisanal gillnetters) tend to operate at a loss. The former is due to excess capacity and over-capitalization, while the latter is not as cost effective as other inshore fisheries such as purse-seine (FAO, 2000).

We have suggested earlier that slowing down fishing involves long-term consideration and looking into the future, through improving resource valuation methods and incorporating true costs of fishing in the trade-off analysis. Additionally, we believe that a proactive conservation curriculum is required for secondary and tertiary educational institutions. Several education

programs exist to create awareness about environment and conservation among general public and school children. Universities around the world offer course and degree programs in fisheries, but with a focus on technology, development, biology, stock assessment, fisheries management, and, to a lesser extent, on social science issues. While it is acknowledged that principles such as sustainability, precaution, ecosystem-based approaches and equity may be part of such courses, the emphasis is still primarily on resource utilization, not conservation. There is certainly a need to include in the offering of colleges and universities of the maritime countries of the world dedicated courses in ocean conservation, to capitalize on the fact that university students will become responsible consumers and a critical mass in support of the 'slow fish'movement. Such courses should be developed and offered through collaboration between universities and academic institutions worldwide.

Education can be informal and fun. A wide range of education tools for sustainability is available, as reported by Milne *et al.* (2003) of those used in the Philippines and Indonesia. The 'slow fish'movement can be promoted at food festival and other sustainability forum, as part of raising awareness about the issues and a media and public communication campaign. Information about the importance of small-scale fisheries and their contributions to ecosystem sustainability, economic viability of small communities, and social well-being needs to be widely disseminated. A database on small-scale fisheries that is currently being developed, as part of the *Sea Around Us* Project (www.seaaroundus.org), based at the Fisheries Centre, University of British Columbia, is part of an initiative to demystify and de-marginalize the small-scale fisheries sector. The database includes number of fishers, number of boats, small-scale fisheries catches, contributions from women and children, and other characteristics (Chuenpagdee and Pauly, 2004b). It is structurally similar to the global (large-scale) fisheries, ecosystem and biodiversity database also assembled by the *Sea Around Us*, to allow for comparative assessment of the two fishing scales, in terms of their socio-economic contributions and ecosystem impacts.

We now turn to our final recommendations on governance perspectives, at local, national and international levels. As suggested by Pauly *et al.* (2003), putting sustainability first implies governments'ratification of and adherence to international fisheries agreements and conventions. Nationally, government needs to devise governance system that allow a movement from solving current problems of tactical management, to considerations for long-term societal trends and needs (Kooiman, 2003). Such governance systems would be concerned mainly with creating opportunity, building governing institutions, and setting principles, e.g., effectiveness, legitimacy, and ethics or moral responsibility. At the local level, government would focus on providing financial and institutional support to local fishing communities in their initiatives to promote conservation and sustainability, in their desire to maintain traditional lifestyle, and in their interest in bottom-up governance of local resources.

Why would fisher go along with 'slow fish'? Charles *et al.* (2003) show that fishers can be in favour of such program, provided that it is carefully developed. The survey indicated that traditional coastal fishers working along the French coast of the English Channel, from Brest to Boulogne, supported the quality enhancement program that aimed to induce improved product marketing. Appropriate incentives that are culturally sensitive are certainly required. In the case of the French fishers, they would agree to fish less simply to obtain a better balance between work and spare time, and thus improve their quality of life.

## 6. CONCLUSIONS

It has been projected that the future global demand for fish will reach 100–120 million tonnes by 2010 (Westlund, 1995). Given the current situation of the world fisheries, it is doubtful that global marine ecosystems will be able to supply that amount. The risk and uncertainty about aquaculture production is still high, particularly in terms of its overall environmental impacts.

‘Slow fish’is a new metaphor encouraging us to think and act consciously about slowing down fishing, scaling down fisheries and maintaining small-scale fishing communities. This requires long-term considerations, comprehensive cost analysis, and the explicit considerations of future generations. It involves promoting small-scale fisheries, to match the scale of extraction with the scale of natural regeneration. Tools such as differential tax system, geared preferentially to small-scale, owner-operated vessels, could be used to generate incentives to scale down. Support should be given to endorse local governance of resources, promote local products caught by sustainable fishing methods, conduct research and collect information on small-scale fisheries, and enhance public and education program on conservation and environmental sustainability. ‘Slow fish’, as in ‘slow food’, means protection of fisheries and the right of local, small-scale fishers, of current and future generations, to fish, for a living and for food.

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