

CHAPTER 1

THE NATURE AND MAGNITUDE OF GLOBAL NON-FUEL FISHERIES SUBSIDIES¹

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ABSTRACT

Fishery subsidies greatly impact the sustainability of fishery resources. Subsidies that reduce the cost of fisheries operations and those that enhance revenues make fishing enterprises more profitable than they would be otherwise. Such subsidies result in fishery resources being overexploited, as they contribute directly or indirectly to the build-up of excessive fishing capacity, thereby undermining the sustainability of marine living resources and the livelihoods that depend on them.

In this contribution, fishery subsidies are identified and categorized, taking into consideration the policy relevance of fishery subsidies worldwide, subsidy program descriptions, sources of funding, scope and coverage, annual total amounts, administering authority, and the recipients of the subsidy. Using this taxonomy, a database of subsidy programs reported in marine capture fisheries for 144 coastal countries was compiled spanning 1995 to 2005. From this, an annual estimate of subsidies paid to the fishing sector by governments globally is computed for 2000. This static estimate accounts explicitly for data gaps.

Total global fishery subsidies were estimated at about US\$26 billion for the eleven subsidy types identified in this study (excluding fuel subsidies). About 60% of this amount was provided by 38 developed countries and the remaining 40% by 103 developing countries. The proportion of estimated subsidies that contributed towards an increase in fishing capacity globally amounted to about US\$15 billion, while subsidies that contributed to fisheries management and conservation programs were approximately US\$7 billion. The remaining US\$4 billion are defined as ugly subsidies, i.e., they may lead either to fisheries conservation or to overcapacity depending on the context. Japan and the EU were the highest subsidizers of their fisheries, with about US\$4.2 billion and US\$3.0 billion, respectively.

The results from this study have policy implications for fisheries subsidy reforms at the on-going WTO negotiations on rules to eliminate subsidies that cause overcapacity, and in achieving sustainable fisheries management. In conclusion, three major areas are highlighted for future research, the impact of subsidies on: (i) resource exploitation, (ii) industrial profits, and (iii) food sufficiency and livelihoods.

INTRODUCTION

Fishery subsidies are financial payments from public entities to the fishing sector, which help the sector make more profit than it otherwise would. Subsidies have gained worldwide attention because of their complex relation to trade, ecological sustainability and socioeconomic development. It is widely acknowledged that global fisheries are overcapitalized, resulting in the depletion of fishery resources. Although many reasons have been ascribed for the decline of fishery resources, the role of subsidies in the issue of overcapacity and overfishing cannot be sufficiently emphasized. These issues were reiterated at the WSSD (2002) in Johannesburg, the Doha 2001 Ministerial Conference (Doha Conference, 2001), by the FAO (1995) Code of Conduct and Responsible Fisheries, and in the Millennium Ecosystem Report (2005), and have thus prompted significant research interests.

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Subsidies provided by governments have been identified as a driving factor for the build-up of excessive fishing capacity, thereby undermining the sustainability of marine resources and the livelihoods that depend on them (WWF, 2001). Subsidies that enhance revenue and those that reduce cost lead to a marginal increase in profit, thereby increasing participation and fishing effort (Sumaila, 2003). Subsidies that promote fishery resource conservation and management are however, regarded as good and necessary (Milazzo, 1998).

This contribution aims to contribute to our understanding of the present nature of fishery subsidies and to estimate the size and extent of subsidies worldwide. It is divided into five parts: Part I provides background information on the status of fish stocks, and presents the issues of concerns and lays out a set of research questions. Part II presents an overview of fishery subsidies and provides a set of criteria for identifying and categorizing fishery subsidies. Part III describes the methods and steps in computing fisheries subsidies globally. Part IV gives the results of the global magnitude of non-fuel fisheries subsidies, and delves into a discussion of the results by subsidy categories and geographic regions. Part V, finally, concludes with a summary of major findings, policy implications and suggestions for further research.

Appendix 1 presents the results of the subsidy estimates by geographic regions, and Appendix 2 presents an inventory of the subsidy programs for each maritime country worldwide.

BACKGROUND INFORMATION

Context: Status of global fish stocks

It is widely acknowledged that many global fish stocks are in decline (Watson and Pauly, 2001; Jackson *et al.* 2001; Worm and Myers, 2003). An analysis of the Food and Agriculture Organization (FAO) of the United Nation's global fisheries catch statistics by Froese and Pauly (2003), which involved more than 900 species, demonstrated a gradual decline of the status of oceanic fishery resources. Their study illustrates that compared to the 1950s, when most of the catches were taken from undeveloped fisheries (Figure 1); the 1990s showed that most of the catches (about 75%) were from fully exploited or overfished fisheries and over 10% from collapsed fisheries.

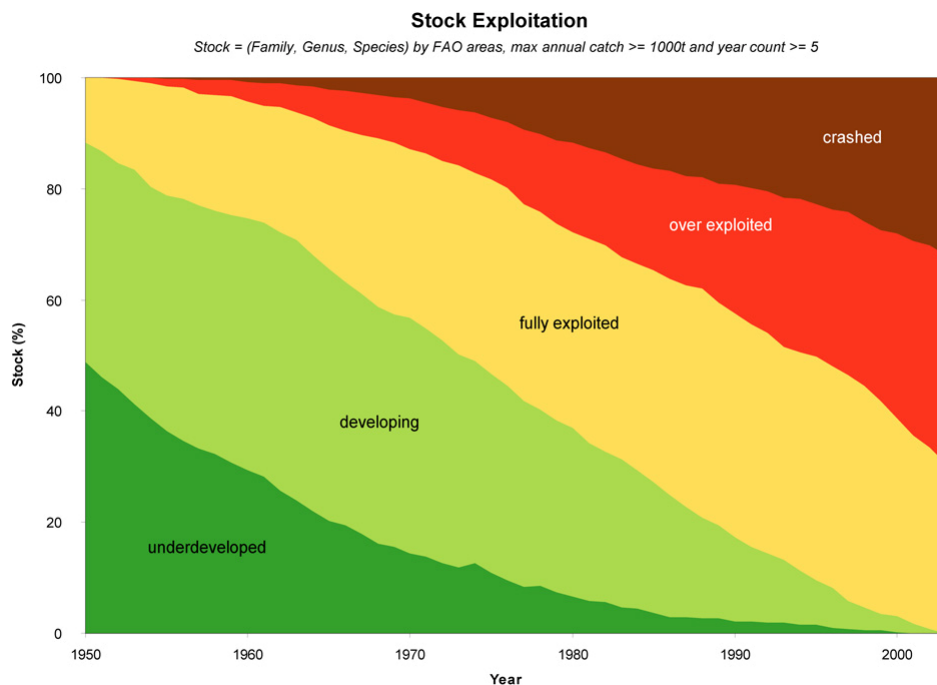


Figure 1. Global trend in the status of marine fisheries resources. Based on FAO statistics to 2003 and the methods and definitions in Froese and Pauly (2003).

The dire situation of many commercially important species, such as Southern Bluefin tuna (*Thunnus maccoyii*) and Northern cod (*Gadus morhua*), led the World Conservation Union (IUCN) to add these to its 'Red List' of critically endangered and vulnerable species, respectively (IUCN, 2003). The number of threatened fish species for both the endangered and vulnerable categories increased from 144 to 238 and from 452 to 682, respectively, for the years 2000 to 2006 (IUCN, 2006). Furthermore, fishing effort increasingly targets species lower down the marine food web, such as sardines, herring and anchovies (Pauly *et al.* 1998). Such 'fishing down of marine food webs' greatly disrupts the structure of marine ecosystems, simplifying their food webs and consequently lowering the resilience of ecosystems to environmental variations, and further increasing the risk of collapse.

Despite the collapse of major world fisheries within the past couple of decades, the global expansion of fishing effort has continued unabated and trade in fish products has intensified to the extent that they have become one of the most globalized commodities (Sumaila, 2002). Fisheries today are an important source of food, contributing about 19% of animal protein for human consumption, a valuable source of foreign exchange; with more than 60% of global fish production from developing countries (FAO, 2002). The fishery industry is now global in scope, employing close to 200 million people worldwide, with international trade of fisheries products reaching over US\$ 50 billion per year (Vannuccini, 2003). Commercial fisheries are driven by global markets with capital flows being largely unregulated and tied to multinational investments (NOAA, 1999). The result is that "over 75% of the world catch is sold and consumed in other countries, rather than the countries in whose EEZ the fish were landed" (Hempel and Pauly, 2002). However, global landings are in decline from a peak of 80 million tonnes since the late 1980s (Watson and Pauly, 2001).

It has been suggested that this crisis is the result of unspecified environmental changes (Sinclair *et al.* 1997). However, an examination of the history of fisheries reveals that overfishing by humans is one of the fundamental causes of the decline of marine species (Jackson *et al.* 2001; Pauly *et al.* 2002). Factors that drive this overfishing include the increasing demand for fish, international global fish trade, poor management and ineffective monitoring of open access fisheries, illegal, unreported and unregulated (IUU) fishing, technological innovations, short term economic and social pressures, subsidies and overcapacity (Sumaila, 2002).

The contention that the depletion of fishery resources should lead to rising prices and consequent reduction in consumption has not been well supported (Sadovy and Vincent, 2002). This is partly due to the prevalence of subsidies, which distort market price. Global negotiations on trade issues in fisheries have led to the identification of subsidies and non-tariff barriers as areas of concern. Political considerations, however, make global wholesale change in 'perverse' subsidies unlikely (Stone, 1997). At present, plans and calls to action for the use of sustainable fishery techniques, the reduction of harmful subsidies, and the minimization of by-catch and discards are meeting a strong opposition (Butcher, 2002).

Given this bleak state of the marine fisheries worldwide, there is a growing recognition that the management of fisheries must be put in an ecosystem context (Pauly *et al.* 2002; Pikitch *et al.* 2004), which includes creation of marine protected areas. Other solutions to the global fishery crisis includes right-based fishery management, eco-labeling of fishery products, reduction of fishing capacity and the abolition of fishery subsidies which contributes directly to the overcapacity problem (Pauly, 2005a).

Issues: Overcapacity, overfishing and fisheries subsidies

One of the most severe impediments to responsible fishing is that on a global scale, there are too many vessels chasing too few fish (Porter, 1998; Cunningham and Gréboval, 2001). The FAO (2003a) International Plan of Action for the Management of Fishing Capacity (IPOA-Capacity) calls on states to achieve an efficient, equitable and transparent management of fishing capacity to reduce, and eventually eliminate, all factors, including subsidies, which contribute, directly or indirectly, to the build-up of excessive fishing capacity (FAO, 1998). According to Milazzo (1998), capacity refers essentially to vessels, gears and labor and how all of these are put to use. Excess capacity (*i.e.*, overcapacity) can be defined as the difference between current fishing capacity and target capacity (FAO, 1998). Fishery subsidies contribute to overcapacity and overfishing in two major ways:

- i. Subsidies that reduce the cost of fisheries operation both in terms of capital and operational cost provides an incentive for fishers to increase their catch and profit, with an aggregate impact to further stimulate effort and compound resource overexploitation problems (Milazzo, 1998);
- ii. Revenue enhancing subsidies makes fishing enterprises far more profitable even when the fishery resources are in decline (Pauly *et al.* 2002).

The consistent conclusion from a number of studies and reports (FAO, 1992; Milazzo, 1998; OECD, 2000; FAO, 2000; WWF, 2001; Munro and Sumaila, 2002) is that overcapacity exists worldwide, with government subsidies contributing to the problem. Government assistance takes all forms, including state-owned enterprises and parastatals, direct capital infusion, financing assistance and preferential tax treatment, market promotion, government management and research, and negotiating access agreements for distant water fishing operations (NOAA, 1999).

Fishing gear and vessel technology has achieved the capacity to radically impact the marine ecosystems with fishing fleets becoming so powerful as to overexploit essentially all stocks in the world (Sumaila, 2002). Global fishing fleets were estimated to be more than twice what the oceans can sustainably support (Porter, 1998), with some current estimates even higher (Pauly, 2005a).

Within the recently hit tsunami regions of South East Asia, there were concerns about the potential harmful build-up of excessive fishing capacity as some of the region's coastal fisheries were already overcapitalized prior to the disaster (Pauly, 2005b). The European Union (EU) Fisheries Council in July 2004 voted for the promotion of European investments and the transfer of technology and vessels to developing countries, which would be detrimental to sustainable fisheries management (CFFA, 2005). In the Gulf of Guinea, it has also been demonstrated that providing subsidized fishing access by the European Union to fishing fleets in countries with poor control measures may lead to stock depletion². With the recently concluded New Partnership for African Development (NEPAD) Fish for All Summit in Abuja (August, 2005) and the World Bank 'profish' Partnership, the issue of fisheries subsidies have gained new momentum.

The overcapitalization of the fishing industry is in turn the result of a number of factors, including the classic tragedy of the commons (Hardin, 1968), a self-defeating race to grab dwindling fish stocks. The massive payments made by a number of governments to support their national fishing industries are, however the main cause, with high levels of fishery subsidies worldwide significantly contributing to the present poor status of fishery resources (WWF, 2001). Recommendations from a coalition of NGOs concerned with marine conservation called the Green Group during the 2005 Hong Kong World Trade Organization (WTO) Ministerial Meeting included:

- Strong disciplines under the WTO Agreement on Subsidies and Countervailing Measures (ASCM) on the prohibition of harmful subsidies that lead to overcapacity, overfishing and IUU fishing;
- Significant improvements in transparency and accountability in subsidy reporting and effective WTO notification requirements;
- Appropriate treatment of the special concerns of developing countries and small-scale fishers;
- Recognition of subsidies that improve fisheries management by reducing fishing capacity and effort, minimizing by-catch and promoting important policy goals.

Research Questions

The specific research questions for this study include:

- i. What are the types and categories of fishery subsidies provided worldwide?
- ii. What is the present amount and extent of each subsidy type (with the exception of fuel) nationally, regionally and globally?
- iii. What proportion of the estimated subsidies contributes toward the increase in fishing capacity?

² <http://www.seararoundus.org/Dakar?ScientificDocs.html> last accessed 01/12/04

Justification

Fishery subsidies are topical because of the concern that they contribute directly or indirectly to overcapacity and overfishing. Previous global estimates of fishery subsidies have ranged from US\$ 14-20 billion (Milazzo, 1998) to US\$ 54 billion (FAO, 1992). Reports by two respected intergovernmental bodies—the Organization for Economic Cooperation and Development (OECD) and the Asia-Pacific Economic Cooperation (APEC)—have produced significant new data (WWF, 2001). Regional estimates have also been provided for the Asia Pacific Rim of about US\$ 12 billion (APEC, 2000) and for the North Atlantic at about US\$ 2.5 billion (Munro and Sumaila, 2002). A better and more robust estimate that is composed of various subsidies, in both the industrial and small-scale sectors is needed, so that policy makers can target reducing specific harmful subsidies.

Currently, within the OECD, fishery subsidy data are published annually as part of the review of fisheries and country statistic bulletin (OECD, 2004; 2005). In other regions, such as the Pacific Island States and the Caribbean Islands, subsidies are reported in the grey literature and usually not quantitatively (Haughton, 2002). Studies and reports done on fishery subsidies and other related issues in the Gulf of Guinea, including those by Mabawonku (1990), Everett (1994), Kaczynski and Fluharty (2002), Alder and Sumaila (2004) and United Nations Environment Program-UNEP (2004a) are either limited in scope or qualitative in nature. Two research areas remain little explored: (i) subsidies provided by donors to developing countries under international aid / bilateral agreements, and (ii) domestic subsidies provided within both the small-scale and industrial fisheries sector in developing countries.

There is also a need for a comprehensive inventory of fishery subsidies both regionally and globally, as well as a current estimation of the magnitude considering all coastal countries for marine capture fisheries. The results of this research is an improvement on existing global subsidy estimates, which will provide a basis for further studies on subsidies and fisheries sustainability.

THE NATURE OF FISHERY SUBSIDIES

Antecedents

Fishery subsidies provided by governments in the early 1930s and 1940s were originally intended towards investment in the fishing sector – the “infant industry” argument (Schrank, 2003). With rapid technological advancement in boat building, gear design and preservation methods in the early 1940s to the 1970s, and the inclusion of 200 nautical miles under national jurisdiction (FAO, 1992), fishery subsidies acted as catalysts for the ‘race to fish’ phenomenon.

The global subsidy debate was prompted by the FAO in the early 1990s in preparation for the May 1992 Conference on Responsible Fishing in Mexico (Milazzo, 1998). The FAO (1992) made an argument that subsidies are a major causal factor in the creation and perpetuation of excess fishing capacity, with a gross estimate of global fisheries subsidies of about US\$ 54 billion. A further review of a wide range of direct and implicit assistance programs that encourage and promote the building, repair, modernization, and operations of the world’s fishing fleets was done by Milazzo (1998) with an estimate of about US\$ 14-20 billion accounting for about 20-25 % of landed value. Regional fisheries subsidy estimates by APEC (2000), and Munro and Sumaila (2002), have to shed more light on these issues.

Attempts were earlier made in the OECD and the WTO to fashion rules that could be applied to fisheries subsidies (Milazzo, 1998). In the OECD, the context was shipbuilding negotiations; in the WTO, it was the Uruguay round agreement on agriculture. In both instances, the fisheries sector was explicitly excluded. This led to New Zealand’s submission³ to the WTO highlighting the implication of fishing subsidies for fishers, vessel builders and vessel owners, and the enhancement and expansion of fishing fleet capacity. A submission by the United States⁴ also raised the issue of overcapitalization and overfishing and raised concerns about ecological impact and the need for conservation measures.

³ WT/CTE/W/52 Committee on Trade and the Environment - Item 6: The Fisheries Sector - Submission by New Zealand. http://docsonline.wto.org/gen_home.asp?language=1and =1, last accessed 10/08/06.

⁴ WT/CTE/W/51 Committee on Trade and the Environment - Item 6: Environmental and Trade Benefits of Removing Subsidies in the Fisheries Sector - Submission by the United States. http://docsonline.wto.org/gen_home.asp?language=1and =1, last accessed 10/08/06.

During the WTO Uruguay round of negotiations, fisheries were discussed in the negotiating group as natural resource based products, based on the recommendations from a working party report (Milazzo, 1998). Fishery issues were moved to the market access group along with other negotiating subjects. As a result of the Uruguay round, fisheries subsidies were therefore included under the remit of the WTO agreement on subsidies and countervailing measures, which covers all goods except for agriculture (Porter, 2004).

Further impetus for the inclusion of fisheries subsidies in trade negotiations developed from the emergence of a broader international coalition in support of subsidy reforms in the fisheries sector, because of the overcapacity problem. Following this, 'The Friends of Fish', a group of states including Australia, Iceland, New Zealand, Norway, Peru, Chile, the Philippines and the United States, was formed to work on the inclusion of fisheries subsidies in the multilateral trade round⁵. Also, fishing interests in developing countries centered on the implication of heavily subsidized fishing fleets from wealthier nations out competing with local fishers in developing countries in meeting food security needs (Sumaila, 2003; Stokkes and Coffey, 2003).

The WTO agreement on subsidies and countervailing measures represents a significant improvement in the rules and disciplines governing both the use of subsidies and countervailing measures to offset their effects. This agreement constitutes the existing international legal regime governing subsidies in the fisheries sector; and applies to more than 140 WTO member countries. The creation of the WTO Committee on Trade and Environment reflected an effort by the WTO to be more sensitive to trade implications of environmental policy measures, which has allowed discussions on the potential environmental advantages of eliminating harmful subsidies.

Among subsidies that are to be reported to the WTO, only that contingent on export performance or which favor domestic over imported goods are prohibited. Other subsidies can be actionable under the ASCM, if they can be shown to have adverse effects on the interests of another party (WTO, 1994). According to WWF (2001), notifications to the WTO of fishery subsidies have been very limited in terms of the amount of subsidies reported, the range of subsidies covered, and the quality of information provided. Stone (1997) further pointed out that several key concepts in the ASCM are defined in ways which make it difficult to determine whether many of the most prolific government expenditures and other interventions in the fisheries sector fall within the domain of the agreement. A central challenge for WTO subsidy reform is to clarify which part of a large grey area should be placed definitely in the class of government financial transfers (GFT), which should be disciplined under WTO rules (Stokke and Coffey, 2003).

Fishery subsidy issues are now widely addressed worldwide by national agencies; inter governmental organizations including the Organization for Economic Corporation and Development (OECD, 2000) and the Asian Pacific Economic Community (APEC, 2000); and regional organizations including New Partnership for African Development (NEPAD), the Caribbean Community (CARICOM), Associations of Southeast Asian Nations (ASEAN) and the South Pacific island nations. The roles played by the International Centre for Trade and Sustainable Development (ICTSD) and of a coalition of NGOs such as the World Wildlife Fund for Nature, BirdLife International, Greenpeace, The Fisheries Secretariat and Oceana, on public outreach and advocacy on these issues cannot be emphasized.

The issue of subsidies that leads to IUU fishing and fishing overcapacity was addressed by the UN General Assembly in its resolution 59/25 of 17 November 2004 and, more recently, at the sixth meeting of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea⁶. The Millennium Ecosystem Assessment (2005) also highlighted the need to eliminate subsidies that promote excessive use of ecosystem services and, where possible, to transfer those subsidies to payments for non-marketed ecosystem services.

The work of the UN agencies, notably the FAO and the UNEP has probably been salient in bringing understanding and dialogue on fisheries policy reforms. This has culminated in a multi-stakeholder workshop⁷, reports by UNEP (2002; 2003; 2004b), and expert consultations in partnership with international agencies by FAO (2000; 2001; 2003b). These efforts have also brought particular attention

⁵ An opposition bloc, the 'friends of fishers' have formed in Europe, with Spain and France as leading members.

⁶ http://www.un.org/Depts/los/consultative_process/consultative_process.htm, last accessed 10/08/06.

⁷ <http://www.unep.ch/etb/events/FishMeeting2004.php>, last accessed 20/06/06.

to the impacts of fisheries subsidies on developing countries, notably in relation to fishing agreements and food sufficiency issues. Subsidies towards fishing access agreements and their impact in developing countries have been examined by Porter (1997), Acheampong (1997), Grynberg (1993), IFREMER (1999), Kaczynski and Fluharty (2002) and Mwikya (2006). Policy research conducted in collaboration with the Support Unit for International Fishery and Aquatic Research (SIFAR) has improved our understanding of the implication of subsidies and trade liberalization for four countries including: Guinea, India, Bangladesh and Vietnam (Bostock, *et al.* 2004).

The workshop on overcapacity, overcapitalization and subsidies in European fisheries in Portsmouth - UK in 1998 (see Hatcher and Robinson, 1999), concluded with an assessment of subsidies to the fishery sector and their effect on trade, and resource sustainability. In addition, the international workshop on fishing vessel and license buyback programs in La Jolla, California in 2004, concluded with numerous case studies on the benefits of decommissioning schemes in general. The workshop also stressed on the need for better design and implementation of such programs for effectiveness fisheries management.

Attempts to provide empirical results on the impact of subsidies on fishery resources have been limited both in scope or time. Anderson (1986) showed the impact of subsidies on the cost and revenue structure in open access fisheries using the Gordon-Schaefer equilibrium model. The underlying theory still holds on the effect of subsidies even though most fisheries are not open access. Arnason (1999) proposed a model for fishery subsidies impact using a change in profits approach, considered far more effective than the government cost approach. This involves modelling resource and effort dynamics to understand the impact on fish biomass and profits. Chuang and Zhang (1999) reviewed subsidy schemes in Taiwan, and how they relate to fish stock sustainability and trade. Seijo (1999) further suggested exploring the potential effect of subsidies for technological development and gear selectivity and recruitment enhancement technologies, which are all relevant to sustainable fisheries management. The UNEP (2004b) provided a matrix approach of analysing the impact of subsidies on fishery resources using two main parameters, i.e., the degree of exploitation and the management system.

However, the data needed in analyzing the impact of subsidies on fishery sustainability requires amongst others, an understanding of the nature and extent of fishery subsidies in different regions. This comprehensive study will contribute significantly to an understanding of the current nature of fishery subsidies, and will provide an estimate of the present magnitude of fishery subsidies worldwide. The results of such an estimate, for each maritime fishing country, in major geographical regions, will be useful for policy reforms toward the reduction of overcapacity in marine fisheries worldwide and for long term socioeconomic development.

What are fisheries subsidies?

The FAO (2001) expert consultation on the economic incentives and responsible fisheries failed to come to an agreement on the definition of a fishery subsidy, partly because of conceptual issues relating to policy relevance and effects of subsidies (Steenblik, 1999; Schrank, 2003). Despite conceptual disagreements, the forms of government financial transfers (GFT) or subsidies that were prioritized were compatible with the conventional definition of subsidies espoused by the WTO: capital expansion such as vessel purchase or modernization grants, tax waivers and deferrals, and fish price support programs.

According to the Marine Resources Assessment Group-MRAG (2002), fishery subsidies may be given for different reasons depending on the government's policy objectives. Broadly speaking, fishery subsidies are provided for the following reasons:

- i. To support and develop local fishing industry;
- ii. To protect employment and to improve income distribution in fishing communities;
- iii. To manage the marine environment (Cox and Schmidt, 2003).

Fisheries subsidy issues have been of interest to policymakers because of the potential impact of subsidies on trade, fishery sector development, social issues and the environment. What to include and exclude, therefore, in terms of the analysis of subsidy programs may change according to the reason for such an analysis (Cox and Schmidt, 2003). This also helps to explain the wide range of aggregated subsidy data that has been put forward by various organizations (Porter, 2002).

In economic terms, subsidies may be defined as “a payment by government to consumers or producers which makes the factor cost received by producers greater than the market price charged by producers” (Black, 1997). Schrank and Keithly (1999) defined a subsidy in terms of profits to industry as “any government program that potentially permits the firm to increase its profit through time beyond what they would have been in the absence of the government program”. According to MRAG (2000), producer subsidies may benefit richer groups such as industrialized fishing companies in developed countries at the expense of poorer fishing communities in developing countries.

The Organization for Economic Cooperation and Development (OECD) defines subsidies (GFTs) as the monetary value of government interventions associated with fisheries policies. Here, eight program classifications are recognized: (i) management, research, enforcement and enhancement; (ii) fisheries infrastructure; (iii) investment and modernization of vessels and gear; (iv) tax exemptions; (v) decommissioning of vessels and license retirements; (vi) expenditures to obtain access to other countries EEZs; (vii) income support and unemployment insurance, and (viii) other government financial transfers (OECD, 2000).

The Asian Pacific Economic Cooperation (APEC) describe subsidies as a combination of GFTs and support programs that fall within the auspices of the Pacific Economic Cooperation Council, with six generic modalities or types: (i) direct assistance to fishers and fisheries workers; (ii) lending support programs; (iii) tax preferences and insurance support programs; (iv) capital and infrastructure support programs; (v) marketing and price support programs; and (vi) fisheries management and conservation programs (APEC, 2000).

Milazzo (1998) categorized subsidies into budgeted and unbudgeted and further added cross-sectoral subsidies, conservation and resource pricing subsidies to his categories in obtaining a global estimate of US\$ 15-20 billion (see Table 1).

Table 1: Estimates of global fisheries subsidy by major categories (Milazzo, 1998).

Subsidy categories	Major types	Amount (US\$ billion)
Budgeted Subsidies	<ul style="list-style-type: none"> • Development grants • State investment • Market promotion • Price support • Foreign access payments 	3.5-4.5
<ul style="list-style-type: none"> • Domestic • Foreign access 	<ul style="list-style-type: none"> • Subsidized loans • Loan guarantees • Loan restructuring • Fuel tax exemptions • Income tax deferral • Accelerated depreciation 	6.0-7.0
Unbudgeted subsidies	<ul style="list-style-type: none"> • Vessel/permit buybacks • Aid to shipbuilders • Targeted infrastructure 	1.5-2.0
Conservation subsidies	<ul style="list-style-type: none"> • User fees 	3.0-7.0
Cross sectoral subsidies		
Resource rent subsidies		
Total (US\$ billion)	All types	14.0-20.5

Mabawonku (1990) in his analysis of subsidies in West Central Africa considers subsidies as a means by which certain economic objectives can be achieved in a cost-effective manner. The major types of subsidies identified were: (i) rebate on fishing inputs, (ii) provision of infrastructure, and (iii) fuel subsidies (see Sumaila, *et al.* 2006a). He argued that in many cases, subsidies and other economic instruments are used in various combinations to achieve specific economic objectives.

WTO (1994) define subsidies are direct or potentially direct transfers of funds from governments to firms or individuals (e.g. grants, loans, loan guarantees, equity infusions), government revenue foregone (e.g. tax waivers or deferrals), government provision of goods and services other than infrastructure at less than market prices, and government support of prices and incomes. To be a subsidy the action must confer a benefit on the firm or individual and must be specific to an industry or a group of industries. This

definition, however, serves the purpose of setting a standard for fair international trade. There are two schools of thought on the impacts of subsidies which concern economists. One is the ‘injury-only’ school, which addresses the concerns from subsidized trade, and the other is the ‘antidistortion’ school, which focuses on the inefficient consequences of government interventions (Hufbauer and Erb, 1984).

According to the WWF (2001), determining the definition of ‘fishing subsidy’ is not a policy-neutral exercise, especially in the context of growing debate over calls for subsidy reforms. Broadly defined in environmental terms, subsidies include all government support to the fishing industry that may play a significant role in encouraging overfishing. However, the most comprehensive and widely accepted definition with a legal standing is that given by the WTO (GATT, 1994).

Subsidies identified and classified

There is no single criterion for classifying fishery subsidies; the various categories (Milazzo, 1998; OECD, 2000; APEC, 2000) mostly overlap depending on the nature of the subsidy and the purpose of classification. The complexity of this issue is based on the fact that there is no single agreement on what a subsidy is or how its effect can be measured. Subsidies, support programs, financial support, economic assistance, and government financial transfers are just five of the most commonly used names for payments that governments provide to the fisheries sector.

The following guidelines were useful in identifying and assessing fisheries subsidies: (i) policy objective of the subsidy; (ii) the subsidy program descriptions; (iii) scope, coverage and duration; (iv) annual US\$ amounts; (v) sources of funding; (vi) administering authority; (vii) subsidy recipients, and (viii) the mechanisms of transfer (FAO, 2003b; Westlund, 2004).

The objective criterion for the classification of a subsidy in this study lies in the potential impact on the sustainability of the fishery resource. The effect of a subsidy, however, depends on the status of the fishery and the management system in place. According to Munro and Sumaila (2002), economists have now come to regard fishery resources, like all other natural resources, as natural capital. A set of fishery resources in a particular region can be viewed as a portfolio of natural capital assets capable of yielding a stream of economic benefits (both market and non-market) to society through time. If natural capital is renewable then one can within limits engage in ‘investment’ in the natural capital assets, such as refraining from harvesting and allowing the resource to rebuild to a biological optimum. Similarly, one can also engage in ‘disinvestment’ in the natural resource, for example, through activities such as biological and economic overfishing that take the fishery resource away from its optimal use. Based on this theory three categories of subsidies can be identified: (i) ‘good’ subsidies, (ii) ‘bad’ subsidies, and (iii) ‘ugly’ subsidies.

Good subsidies

‘Good subsidies’ are programs that lead to investment in natural capital assets to a social optimum, which is defined here as the maximum allocation of natural resources to society as a whole, i.e., by maximizing economic rent. Good subsidies enhance the growth of fish stocks through conservation, and the monitoring of catch rates through control and surveillance measures to achieve a biological optimal use. Good subsidies are made up of the following two types:

- i. *Fisheries management programs and services*: These are subsidy programs to ensure that publicly-owned fisheries resources are appropriately managed and that regulations are enforced (OECD, 2005a). Sub categories include: (a) monitoring, control and surveillance programs, (b) stock assessment and resource surveys, (c) fishery habitat enhancement programs, (d) implementation and maintenance of MPAs, and (e) stock enhancement programs.
- ii. *Fishery research and development (R&D)*: These are subsidy programs geared towards improving methods for fish catching and processing, and other strategies that enhance the fishery resource base through scientific and technological breakthroughs. Sub categories include: (a) fishery frame surveys, (b) oceanographic studies, (c) fishery socio-economic studies, (d) fishery planning and implementation, (e) setting fishery information systems, (f) creating database and statistical bulletin supportive of fishery management plans, and (f) setting up marine protected areas (MPA) and reserves.

Fisheries management programs and services have been questioned on the basis that the services mostly benefits the private sector, and not the public, i.e., the rightful owners of marine resources (WWF, 2001). However, most countries have justified it as their sovereign right to manage and conserve their marine resources within their EEZs as espoused under the United Nations Convention on the Law of the Sea (UNCLOS, 1980).

Bad subsidies

'Bad subsidies' are defined as subsidy programs that lead to disinvestments in natural capital assets once the fishing capacity develops to a point where resource exploitation exceeds the Maximum Economic Yield (MEY). This is equal to the maximum rent obtainable from the fishery, computed as the largest positive difference of total cost and total revenues. As such, MEY corresponds to an effort level lower than the maximum sustainable yield (MSY). Excessive disinvestment can lead in some cases to outright destruction of the natural resources (Bjorndal and Munro, 1998).

Fishery economics theory holds that, in an open access fisheries, in which fishing cost is assumed to be proportional to fishing effort, effort will continue to increase even though revenues per unit of effort are declining, and that ultimately revenues will decline until they equal costs (Gordon, 1954). The point at which total revenue equals total cost is commonly regarded as the bionomic equilibrium (BE), where both industry profits and resource rents have been completely dissipated (Figure 2). With subsidies, the fishing effort can actually exceed E_3 (Sumaila, 2002).

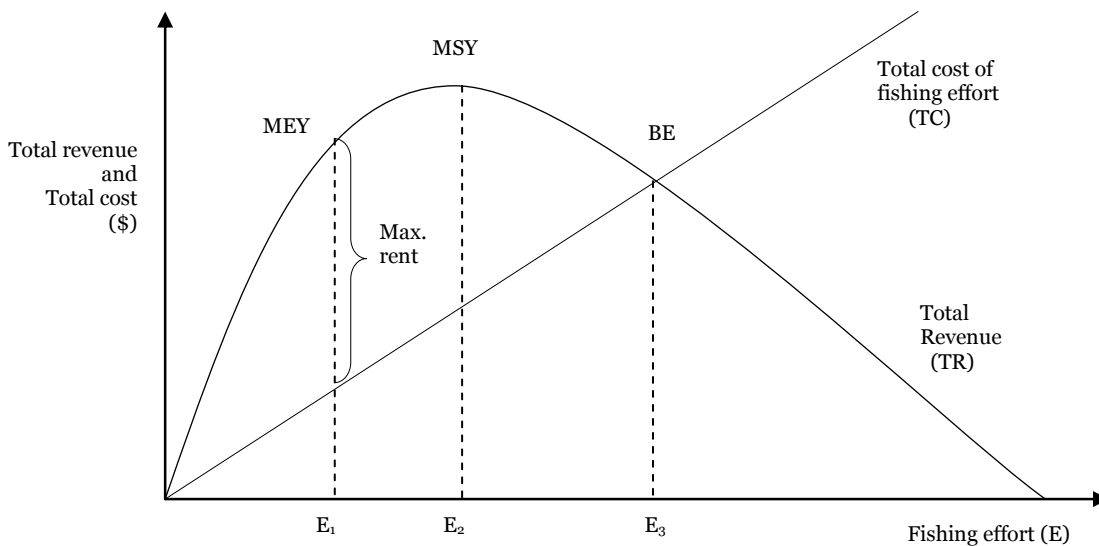


Figure 2: Gordon Schaefer bioeconomic model (Gordon, 1954).

Figure 3 demonstrates that subsidies that lower cost from TC_1 to TC_2 , will also lower the bionomic equilibrium from BE_1 to BE_2 , thus encouraging the growth of fishing effort from E_3 to E_4 .

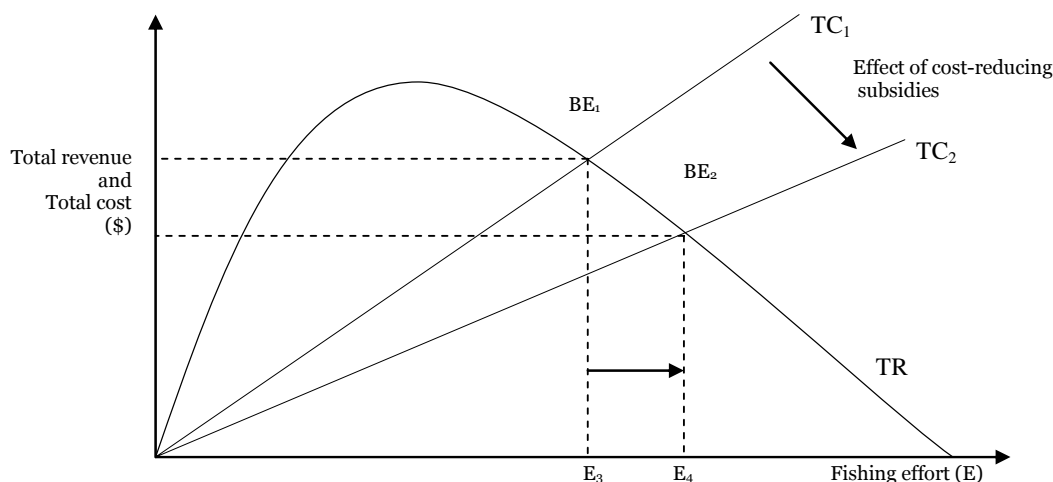


Figure 3: Schematic representation of how subsidies induce overfishing (see text).

Bad subsidies include all forms of capital inputs and infrastructure investments from public sources that reduce cost or enhance revenue and include the following types:

- i. **Boat construction, renewal and modernization programs:** These support programs include lending programs below market rate and geared toward fishing vessel construction, renewal and modernization such as loan guarantees, restructuring and other lending programs. This subsidy type also involves support programs to enhance fishing technology from public funds for fishing enterprises, parastatals and firms;
- ii. **Fishing port construction and renovation programs:** These support programs include public funds toward the provision of fish landing site infrastructures, port improvements for fishing fleets (APEC, 2000), harbor maintenance, jetty and landing facilities and low or free moorage for fishing fleets;
- iii. **Marketing support, processing and storage infrastructure programs:** These are support programs towards market interventions such as export promotion, value addition and price support. They also include infrastructure investment programs from public funds toward processing and storage of fishery products and fish auction facilities;
- iv. **Fishery development projects and support services:** These are support programs towards fishery enterprises development. It also includes support programs such as the provision of institutional support and services, the provision of baits, and search and rescue programs. The nature and sources for such support programs are diverse and includes development grants and concession credit either from national sources or through bilateral and multilateral assistance programs;
- v. **Tax exemptions:** These are subsidy programs for investment in the fisheries sector that have a direct impact on profits such as rebates and other government-funded insurance support programs including: (a) income tax deferral for fishers; (b) crew insurance (OECD, 2004); (c) duty free imports of fishing inputs; (d) vessel insurance programs, and (e) other economic incentive programs;
- vi. **Foreign access agreements:** This program entails a combination of one of the following: (a) explicit monetary transfer; (b) the transfer of fishing technology, and (c) the provision of market access in another fishing country (OECD, 2005a). Out of these varied combinations, three types of access agreements can be identified worldwide: (i) reciprocal access; (ii) access for trade agreements, and (iii) access fees for third country agreements (Milazzo, 1998).

The aggregate impact of subsidies that enhance overcapacity and overfishing through increased revenues or profits is to further stimulate effort and compound resource overexploitation problems (Milazzo, 1998). Certain types of subsidies therefore create incentives for overfishing under certain management conditions (Munro and Sumaila, 2002).

Ugly subsidies

'Ugly subsidies' are defined as programs that have the potential to lead to either investment or disinvestment in the fishery resource. These subsidy programs can lead to positive impacts such as resource enhancement programs or to negative impacts such as resource overexploitation. Subsidies in this category include controversial ones such as fisher assistance programs, vessel buyback programs and rural fisher community development programs:

- i. *Fisher assistance programs*: These are payments to fishers to stop fishing temporarily or to ensure income during bad times. These subsidies can also be given due to a lack of alternative employment opportunities in regions where fishing is the main activity (OECD, 2005b). This subsidy type could be revenue enhancing from government budgets and increase community dependence on government funds; or may reduce fishing pressure through retraining programs into other economic sectors. They include the following types: (a) income support programs; (b) unemployment insurance; (c) worker adjustment programs, and (d) fisher retraining, and other direct payments to fishers;
- ii. *Vessel buybacks programs*: These are fishing capacity reduction programs including two types: (a) permit buybacks, and (b) license retirements. These subsidies reduce fishing pressure and foster resource management goals; however their effectiveness has been seriously questioned (Holland *et al.* 1999; Munro and Sumaila, 2002; Clark *et al.* 2005);
- iii. *Rural fishers' community development programs*: These consist of programs that are geared towards rural fisher development with an overall objective of poverty alleviation and food sufficiency. These programs include multiple stakeholder participation within local communities involving cooperatives, with assistance from donor agencies and NGOs for integrated livelihood development policy objectives. Despite such development policy objectives, a number of fisheries development donor consultations⁸ have concluded that projects concentrated on enhancing productive capacity in developing countries are contributing to overcapacity, and with poor rate of management success (SIFR, 1992).

In summary, three categories of subsidies with eleven program types are identified globally in this study:

- A. 'Good subsidies'
 - Fisheries management programs and services;
 - Fishery research and development.
- B. 'Bad subsidies'
 - Tax exemption programs;
 - Foreign access agreements;
 - Boat construction renewal and modernization programs;
 - Fishing port construction and renovation programs;
 - Fishery development projects and support services;
 - Marketing support, processing and storage infrastructure programs.
- C. 'Ugly subsidies'
 - Fisher assistance programs;
 - Vessel buyback programs; and
 - Rural fishers' community development programs.

Although fuel tax rebates can be classified as a sub category of tax exemption, this study does not consider subsidies towards vessel fuel usage, which have recently been estimated at about US\$ 6.5 billion by Sumaila *et al.* (this volume).

⁸ <http://www.onefish.org/global/archive/sifar/onefish.htm>, last accessed 12/08/06.

METHODOLOGY FOR COMPUTING SUBSIDY ESTIMATES

Data collection and compilation

Information was recorded on 144 coastal countries for the eleven fishery subsidy types identified in this study. Overseas territories of European countries, whatever their legal status, are not included in this study⁹. Within a matrix framework, quantitative data was collected and recorded in each cell for any given country and subsidy type, and summed to provide subsidy category totals.

The coastal countries were grouped (using the UNDP Human Development Index-HDI) into two categories: developed (Group I) and developing (Group II) countries. The HDI¹⁰ is a composite index that measures country's development by taking into account three basic components of human development: (i) longevity; (ii) level of education; and (iii) standard of living. Longevity is a measure of life expectancy, level of education is measured by a combination of adult literacy (two-thirds weight) and mean years of schooling (one-third weight), and standard of living is measured by real GDP per capita at purchasing power parity.

Countries with HDI scores ranging from 0.80-1.00 were classified as Group I, and those with HDI scores from 0.00-0.79 were classified as Group II. Some adjustments were made to this general rule, i.e., Russia, China and Taiwan with HDI of less than 0.80 were nonetheless assigned to the Group I category. This is due to their highly developed industrial fishery sectors and high public expenditures in this sector. This step lessened problems of outliers in statistical estimations for the two country groupings. Similarly, countries such as Trinidad and Tobago, Cuba, and Uruguay with HDI scores greater than 0.80 but with less developed fishery sectors were placed in Group II. Out of the 144 coastal countries, 38 countries were categorized in Group I (developed) and the remaining 106 countries were categorized in Group II (developing). Sumaila *et al.* (this volume) used the same categorization, and hence their fuel subsidy estimates can be added to those presented here by categories.

Fishery subsidy data were compiled mainly from secondary sources in the primary and grey literature, including newspaper articles. Internet web resources and search tools were also widely utilized. The study targeted information on the major fishing nations around the world in all six FAO fishery regions (Africa, Asia, Europe, North America, Oceania, South and Central America plus Caribbean). They were obtained mainly through the publications of intergovernmental organizations and multilateral agencies.

The first step was targeted at developed countries' fisheries subsidy statistics available from intergovernmental agencies. The next effort was targeted at developing countries statistics through publications of multilateral agencies such as the FAO and UNEP, intergovernmental organizations such as CARICOM, and at individual country levels.

Data were obtained from the following major sources: (a) Organization for Economic Cooperation and Development (OECD, 2000; 2004; 2005); (b) Asian Pacific Economic Cooperation (APEC, 2000); (c) European Commission (www.europa.eu); (d) Food and Agricultural Organization of the United Nations (FAO), web resources on sections that dealt with 'aid' and 'international cooperation' under specific country profiles and 'investment' or 'subsidies' under the fisheries management information link for any given country (www.fao.org); (e) national fisheries department web links, financial and budgetary reports, and fishery reports and documents; (f) the web resources of the Support for International Fisheries and Aquatic Research, now known as the 'onefish' community directory program (www.onefish.org); (g) United Nations Environment Program reports (UNEP, 2002; 2003; 2004b); (h) regional financial institution portfolios such as the African Development Bank; (i) overseas development project reports on fishery issues such as the UK's Department for International Development (DFID); (j) World Trade Organization (WTO) trade notifications; and (ix) NGO reports on marine issues, such as WWF (2001).

⁹ The reason is that the landings are summed up under the major countries within 'territorial EEZs' in the *Sea Around Us* Project database, from which landed values were obtained. For example, landings from the Azores and the Madeira Islands are grouped under Portugal. For each coastal country, four types of landings were considered (i) from their own EEZs (ii) from their territories' EEZs (iii) landings from other countries' EEZs (iv) from the high seas.

¹⁰ http://hdr.undp.org/reports/global/2003/pdf/hdro3_HDI.pdf Last accessed 12/06/06.

According to Insull and Orzeszko (1991), international assistance in fisheries is provided in the form of capital aid or technical assistance from bilateral cooperation, multilateral donors and regional financial development banks. Thus, for developing countries, fisheries subsidies were identified from both domestic and international sources, and data was collected from both the subsidy providers and the recipients.

Analysis of collected data

A database of ten subsidy types identified for 144 coastal countries engaged in fishing activity in the year 2000 was created, spanning 1995 to 2005. Even though this is a static analysis for the year 2000, for countries for which year 2000 data was not available, the closest available data within the period 1995 to 2005 was used. The data from years prior or after 2000 were normalized to constant 2000 US dollars by applying the consumer price index (CPI), extracted from the International Financial Statistics website¹¹. The estimate for the magnitude of fishery subsidies is therefore a static estimate, with the eleven year information used explicitly for data gaps.

For each data cell entry within the matrix, comments were provided on the year or duration of the subsidy program, the source(s) of information, the nature of the subsidy program, and the subsidy recipients. For each country where a subsidy was provided with information on the amount and duration, the absolute annual amounts in United States dollars (US\$) were recorded in the database. This information is referred to as 'known subsidy amounts'. In the OECD (2004) report, from which subsidy amounts were obtained, the government financial transfer (GFT) categories were reclassified under the eleven types of subsidies identified in the study. The values of the GFT from this report were converted from OECD member countries' local currency to US\$. This study focuses on marine capture fisheries only, and subsidies within other fishery sectors such as aquaculture and inland capture fisheries were not considered.

Several steps were taken to normalize the available data: (a) subsidy programs towards capital cost such as infrastructure were annualized by considering depreciation costs (if available), or by using World Bank statistics; (b) subsidy programs towards fishery projects were assumed to last five years if the project cycle was not provided; (c) subsidy programs in the form of concession loans were calculated on the basis of forgone interest rate. For instance, the African Development Fund of the African Development Bank provides interest-free loans for artisanal fishery rural development projects, fisheries harbor complexes and fish markets. The real subsidy benefit were calculated as the market cost of the loan less the total cost of subsidized loan which is estimated at 4%-5% of the principal loan amount. This estimate however, depends on available information on subsidized lending such as: (i) the subsidization rate; (ii) the amount of reduced interest rate; (iii) the time of maturities associated with government-guaranteed loans; and (iv) the amount of forgiven loans. According to Milazzo (1998), in the absence of such information, 10% of the principal amount is a better measure of benefits for all subsidized lending. The 10% rule by Milazzo (1998) is applied when information on subsidized loans was not available.

Three types of data cell entries can be found in the matrix worksheets: (i) cell entries with annual subsidy figures, i.e., known amounts; (ii) cell entries where subsidies are known to exist but without absolute figures; and (iii) cell entries where information was not available.

Out of the 144 countries under investigation, subsidy information (both qualitative and quantitative) was collected for 141 countries ranging from one to all ten subsidy types identified above. Croatia, Lebanon and the Democratic Republic of Congo had no information on fishery subsidies, and they were assumed not to provide any.

The total available subsidy amounts for the ten identified subsidy types (excluding fishing access agreements), was US\$ 11.0 billion. Data were mostly obtained from developed countries, amounting to about 85% of the collected information. Developed countries also contributed about 60% of global total landed values in year 2000. The bulk of the information from developing countries was qualitative, (i.e., with unknown amounts), for which estimates are provided below (see section 3.3).

Payments for fishing access are provided by only a few countries, mostly the EU, USA and some Asian countries, including Japan, China, Taiwan and South Korea. The most significant is the European Union – African, Caribbean and Pacific Countries (EU-ACP) fishing agreement, which involves lump sum

¹¹ <http://pacific.commerce.ubc.ca/ifs/>, last accessed 28/06/04.

payments from the EU to the African, Caribbean and Pacific countries. Other kinds of payments from the US and Japan included access fees for tuna fishing fleets to the Pacific Island States. MRAG (2000) reported that the EU devotes one third of its budget to these agreements, resulting in a subsidy of some US\$ 400 million in total. These foreign agreements are funded mainly for the benefit of Spanish, French and Portuguese fleets (see Milazzo, 1998). Spain has been particularly successful with EU assistance subsidies for joint ventures, with over 250 vessels in 22 countries with catches reaching 190,000 tons (MRAG, 2000). The EU lump sum payments to its member countries are prorated by LV with about 60% of the amount to Spain, France and Portugal and the remaining 40% to the rest of the EU membership. The known subsidy amounts for fishing access payments are about three quarter billion (Milazzo, 1998), which was scaled up to about a billion considering other payments from Russia, China, USA, Taiwan and South Korea (Milazzo, 1998; MRAG, 2000; Mwikya, 2006).

Filling the data gaps

Out of the 1152 cell entries¹² within the global subsidy matrix worksheets, 22% are known subsidy data entries (252 cells), and 34% of the data cell entries were qualitative with unknown quantities (396 cells). The remaining 44% were cell entries where subsidy information was not available (504 cells). Given this absence of information, the 504 data cells were assigned zero amounts, i.e., the assumption was made that subsidies were not provided. Estimates were computed for the 396 data cell entries where subsidies were reported, but with unknown amounts (Figure 4).

For each country with annual subsidy amount, a ratio of the known subsidy amount to the country's total landed value (LV) was obtained. The expressed ratio of subsidy amount per LV was then averaged for each group of countries, i.e., developed (Group I) and developing countries (Group II) to obtain a group mean. The group mean for each subsidy type was noted, and used for the data cells where subsidies were reported, but with unknown amounts. Here, subsidies were estimated as the group mean multiplied by the 2000 LV for the country in question. The LV for the year 2000 is obtained from the *Sea Around Us* Project database¹³. The LV data is computed as the ex-vessel price multiplied by the country landings (see Sumaila *et al.* 2006b).

The magnitude of global fishery subsidies is the sum of the data cell entries for both the known subsidy amounts and the estimates for the unknown amounts.

¹² Data entries for fisher assistance programs and vessel buybacks are limited to Group I countries and rural community fishery development program entries was limited to Group II countries; thereby excluding 288 data cell entries with no information.

¹³ <http://www.seaaroundus.org/eez/eez.aspx> Last accessed July 13th, 2006.

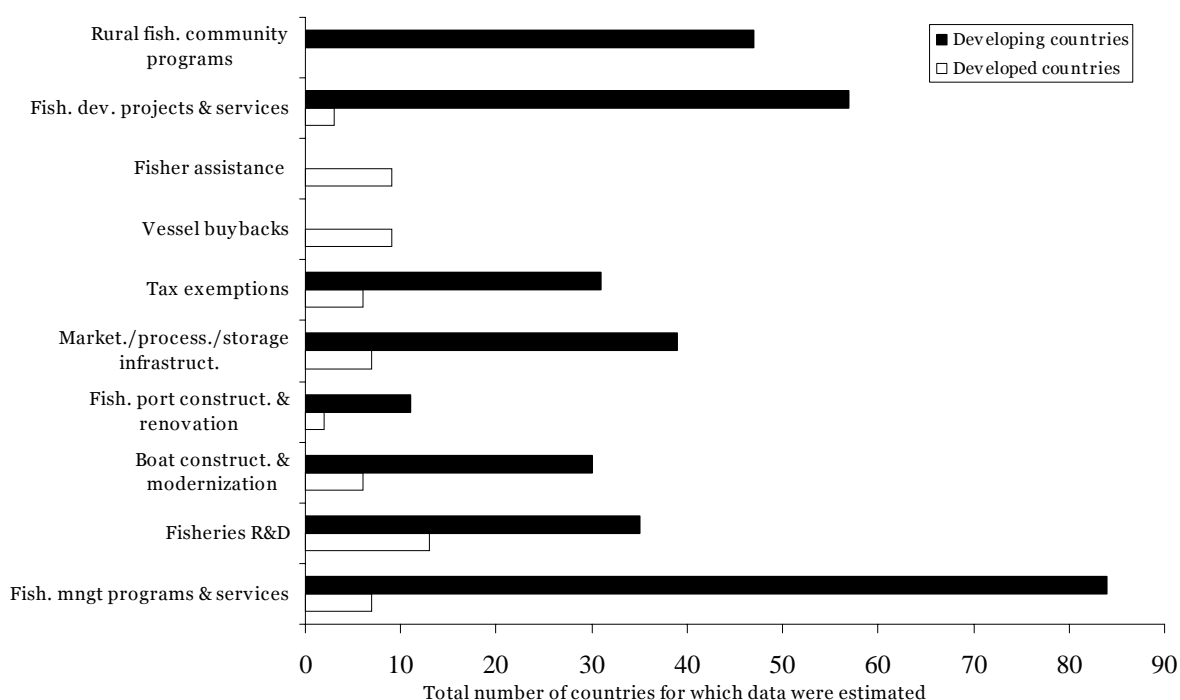


Figure 2: Number of data cells for which subsidy estimates were computed.

RESULTS AND DISCUSSION

Global total estimate of fisheries subsidies

The total magnitude of fishery subsidies in marine capture fisheries was estimated at US\$ 25.7 billion for the eleven types of subsidies identified, excluding fuel subsidies. Table 2 shows that more than half of the total estimated subsidies were provided by developed countries (US\$ 13.4 billion), with the rest being provided by developing countries (US\$ 12.3 billion). The zeroes in brackets in Table 2 are subsidies for which data were not available, and which were assumed to be zero.

Table 2 also shows that, subsidies towards vessel buyback programs, fishing access agreements and fisher assistance programs were provided by developed countries only. Likewise, rural fishers' community development programs are provided in developing countries only. Developed countries contributed about 80% to the estimated amount for fisheries management programs and services (US\$ 5 billion). Boat construction, renovation and modernization programs in developed countries contributed about 60% of the program total amounting to US\$ 1.2 billion.

The results further shows that developing countries provided appreciable amounts towards fishing port construction and renovation programs, about 86% of the program totals of about US\$ 4.6 billion. Fishery development projects and support services from developing countries contributed significantly as well, about 85% to the global total of US\$ 2.6 billion (US\$ 2.2 billion). This result is well supported by Insull and Orzeszko (1991), who reported earlier on management type aid to the fishery sector in developing countries. This included capital aid projects and technical assistance provided and coordinated by multilateral agencies, international development agencies and regional development banks. At present, these wide ranging donor funded fishery development program activities can be located at a number of web resources including the OECD¹⁴, the DFID¹⁵ and the 'onefish' web portal¹⁶.

¹⁴ <http://www.oecd.org/dataoecd/50/17/5037721.htm>, last accessed 25/08/09.

¹⁵ <http://www.fmsp.org.uk/fmsp/faces/Logout.jsp>, last accessed 25/08/09.

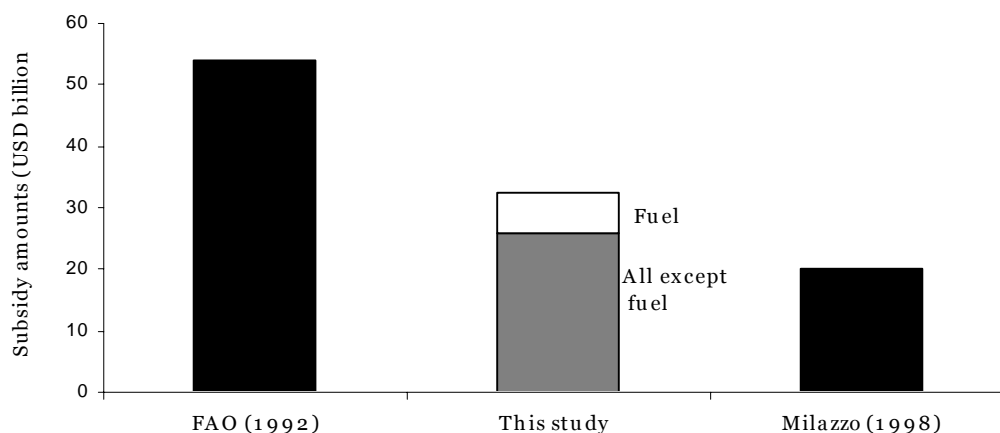
¹⁶ <http://www.onefish.org/global/index.jsp>, last accessed 25/08/06.

Table 2: Global fisheries subsidy estimates per year in billion US\$.

Subsidy program types	Developing countries (US\$b)	Developed countries (US\$b)	Global total (US\$b)
Fisheries management programs and services	1.2	5.0	6.2
Fisheries research and development	0.4	0.5	0.9
Boat construction, renewal and modernization programs	0.8	1.2	2.0
Fishing port construction and renovation programs	4.6	0.7	5.3
Marketing support, processing and storage infrastructure programs	1.5	1.0	2.5
Tax exemption programs	0.6	0.5	1.2
Fishing access agreements	(0)	1.0	1.0
Vessel buyback programs	(0)	0.9	0.9
Fisher assistance programs	(0)	2.1	2.1
Fishery development projects and support services	2.2	0.4	2.6
Rural fishers community development programs	0.9	(0)	0.9
Total (US\$b)	12.3	13.4	25.7

The results from this study also confirms that capital aid programs usually involve loans or direct financial inputs for vessel and equipments, fishery infrastructure including ports and processing facilities, and support programs towards fishery development enterprises. Technical assistance includes diverse support programs such as grants towards fishery development projects and production enhancing technologies, institutional infrastructure, technical resources and capacity building geared towards fisheries research and development, and technical advice for fisheries management.

As illustrated in Figure 5, the US\$ 26 billion subsidy estimate in this study, complemented by the US\$ 6.5 billion fuel estimates by Sumaila *et al.* (2006b), is nicely bracketed by earlier global estimates. Milazzo's (1998) estimate of US\$ 14-20 billion was probably on the low side, and the FAO's (1992) estimate of US\$ 54 billion was generally assumed to be too high by most fisheries practitioners.

**Figure 3:** A comparison of global fishery subsidy estimates.

Fisheries subsidy estimates by categories

The result of the subsidy estimates by categories is illustrated by Figure 6. Subsidies in the 'bad' category are the highest, amounting to US\$ 15 billion, with 65% of the global total provided in developing countries. 'Good' subsidies are the next highest in total amount (US\$ 7 billion), mostly given in developed countries. 'Ugly' subsidies are by far the least (US\$ 4 billion), with 75% also provided in developed countries.

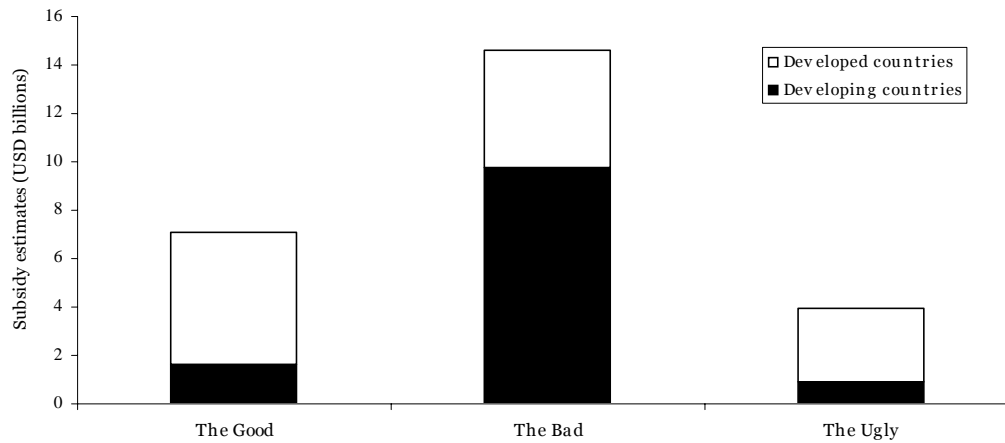


Figure 4: Fishery subsidy estimates by categories.

Appendix 1 details country estimates of good, bad and ugly subsidies by regions, with country subsidy intensity provided, i.e. subsidy as a percentage of landed value (LV).

Good subsidies

The total amount of good subsidies was estimated at US\$ 7.1 billion, as the sum of two subsidies types: fisheries management and services, and fisheries research and development. The results for the good subsidies amounts reflects on the fact that in most developing countries with limited budgets, subsidies are obtained for fisheries management (including enforcement) and research and development mostly through international assistance programs. This is demonstrated by numerous international fishery research and management programs, such as the R/V *Dr Fridtjof Nansen* Resource Surveys. This program jointly funded by NORAD and FAO have conducted regional fish stock assessments spanning three decades in several developing countries in Asia, Africa, Latin America and the Caribbean (Saetersdal *et al.* 1999).

This study has established that a very large number of countries (about 95% worldwide) provided some form of management subsidies to their fishing sectors (see appendix 2, subsidy program compendium). With major commercial fish stocks in decline (FAO, 2004) and an increase in international trade of fishery products (Vannuccini, 2003), there is an increasing and concerted effort towards fisheries management and conservation programs, research and development globally (Hempel and Pauly, 2002). The notion that public management of fisheries can be a subsidy has generated significant debate among economists and policy makers, due to the role of the public sector in managing fishery resources as a public good, and transferring management cost to the private sector (WWF, 2001).

It is widely believed that subsidizing an open access fishery resource by reducing operational cost leads to overexploitation of the resource, but with negligible resource consequences in a privatized fishery (Sumaila, 2003). The argument for and against subsidies under privatized fishery has been widely debated (see Clark *et al.* 2005). Nonetheless, Milazzo (1998) commended user fees on fishery resources as a form of good subsidy, i.e., resource rent subsidies, since natural resources are typically under priced and overexploited. This is justified on the basis that user groups should meet the recovery cost of resource use and collateral environmental impacts. In some countries such as New Zealand and Iceland, user fees are instrumental in recovering government's expense in managing the fishery. In Australia, about 2.5% of landed value is levied on domestic fishers operating in marine fisheries, whilst in Canada; the rate is about 5% of landed value for fisheries managed with individual quotas. Furthermore, Clark *et al.* (2006) suggested the use of right-based schemes in conjunction with taxes for effective fisheries management. The challenge however, lies in developing broad rules by which management cost can be recovered from resource users.

Bad subsidies

The total amount estimated for the six subsidy types under the bad subsidy category was US\$ 15 billion, with fishing port construction and renovation programs contributing up to 36% (US\$ 5.3 billion), next to fishery development projects and support services amounting to 18% (US\$ 2.6 billion) as shown in Table 3.

The fisheries subsidy debate has been topical because of the concern that some subsidies aggravate the management of fishery resources by increasing fishing capacity to an unsustainable level (Milazzo, 1998; Munro and Sumaila, 2002). A build up of excess fleet capacity generally results in economic waste and undermines the capacity of resource managers to manage fish resources sustainably (Sumaila, 2003).

Table 3: Estimate of bad subsidy types.

Bad Subsidy types	Amounts (US\$b) (%)
Boat construction, renewal and modernization programs	2 (14)
Fishing port construction and renovation programs	5 (36)
Marketing, processing and storage infrastructure programs	3 (17)
Tax exemption programs	1 (8)
Fishing access agreements	1 (7)
Fishery development projects and services	3 (18)
Total	15 (100)

FAO (2001) further illustrates the effect of subsidies on fishery profits using case studies in specific fisheries from both developing and developed countries. The findings showed that within the European Union and India, almost all types of vessels which received subsidies would also have been profitable without subsidies. The subsidies played a role, however, in significantly increasing their earnings and profitability, thus encouraging participation. In South Korea, the situation was ambivalent, while in Thailand, vessels that received tax exemptions on fuel required that exemption in order to make profits.

The now largely abandoned 2004 European Commission ban on subsidies for more powerful engines was a significant move towards sustainable management of fishery resources. The reform sought to restrict modernization or investment to the whole vessel except for the sole purpose of safety on decks. Gear replacement or renovations programs were to be funded within the context of recovery plans only, or in improving gear selectivity and in meeting sustainable environmental criteria. However, these reforms are undergoing a wave of disapproval because of two new developments: (i) enlargement of the EU membership and the needs of new members in securing EU benefits in the areas of fisheries subsidies, and (ii) a worsening economic situation due to increasing fuel prices, eroding the viability of an industry already weakened by overcapacity and depleted stocks (Coffey, 2006). Most of the disapproval comes from a pro-subsidy coalition including France, Spain, Italy, Greece, Portugal, and two new members Poland and Estonia. This new group also known as the 'friends of fishers' have successfully requested aid to support engine replacements and general modernization. Moreover, a new proposal by some member states to outright reverse the 2002 EU subsidy reform that prohibits public aid to joint ventures and the exports of vessels to third countries is far more troubling; as this has been a turning point in phasing out damaging subsidies within both the WSSD and the WTO contexts (Coffey, 2006).

Certain types of subsidies such as vessel construction, renovation and modernization are contingent on countries that have a long history of industrial development (Milazzo, 1998). It is predominantly governments in the North that can afford to subsidize fisheries (Sumaila, 2003), both locally within their EEZs and internationally as distant water fleets (Hempel and Pauly, 2002). According to WTO notification, six countries provided over US\$ 8.4 billion in aid to the shipbuilding sector in 1996, and in 1997 eight countries reported almost US\$ 4.5 billion as shown in Table 4 (WWF, 2001).

There are three impacts of subsidies from the North on fish and fishers in the South: (i) they tend to distort prices and/or costs of fishing in favor of fishers in the North, with a consequent uncompetitive market; (ii) decommissioned vessels in the North posed a threat of vessel transfer to the South with fear of resource overexploitation and a threatened fisher livelihood; and (iii) the purchase of access rights by governments in the North is a subsidy that has negative consequences on the resource biomass and food security of people in the South (Sumaila, 2003).

The results from this study shows that fishing access payments for distant water fleets (DWF) are provided by only a handful of countries but with a significant share of world catches, including the EU, Japan, Russia, Korea, Taiwan, China and the USA, amounting to about a billion US\$ (see Table 5). The access payments are in the form of (i) bilateral access such as the EU-ACP agreement, which involved financial compensation for a defined quantity of a specified fishery species. The EU also administers several joint ventures programs, and 'trade for access' arrangements to developing countries for preferential access to markets for various fishery products. In addition to these, Argentina signed a second generation agreement with the EU, which allows quota access to EU vessels in Argentinean EEZ (Mwikya, 2006); (ii) the US has negotiated the only multilateral tuna fisheries access agreements with seventeen pacific island countries. In 2003, the annual fee was US\$ 21 million for approximately 16 purse seiners. About 86% of this amount is disbursed from the State Department and the 14% comes from the American Tuna Association (Mwikya, 2006); (iii) The Japanese and other far eastern distant water fleets from Korea, China and Taiwan usually fish under private access agreements with payments from the private sector organizations, as joint ventures or payments made in the form of aid from the governments. These payments are based on the amount of catch reported at specific ports, and the payments are often not disclosed. Milazzo (1998) reported payments from Japan towards DWF and securing fishing rights in developing countries to the tune of about US\$ 200 million. China also continues its DWF and high seas fisheries policy with payments in the North pacific, Indian Oceans, off Western Africa and recently in the Caribbean (Milazzo, 1998; Bonfil *et al.* 1998).

Fishing access subsidies are not only subsidies under the terms of the WTO agreement, but also effectively contribute to the transfer of excessive fishing capacity from Northern to Southern waters, and thereby undermine the economic and conservation interests of coastal developing countries. Fishing access agreements pretend to reconcile trade and aid, but have barely contributed to the developments to the local fishing industries of the coastal states (Milazzo, 1998). These arrangements can be of mutual long-term benefit only if it is effectively enforced and measures are in place to ensure compliance (Atta-Mills *et al.* 2004). Most of the EU agreements signed with West African states, nonetheless, do not contain catch quotas for EU vessels and this usually results in resource overexploitation (Kaczynski and Fluharty, 2002). Between 1992 and 2000 EU companies signed 152 joint ventures involving 241 boats, representing about 88,319 GRT; these deals were highly subsidized by the EU. Half of these companies were Spanish, and the rest were Portuguese, Italian, Greek, French and Danish. As of 2000, these vessels were fishing in the waters of 28 countries; 77% of them in Africa, 22% in South and Central America and 1% in Europe (COFREPECHE, 2000). Bonfil *et al.* (1998) using Senegal and Mauritania to exemplify the problem of transfer of protein and wealth from developing countries to relatively rich DWF nations; they estimated that over 80% of the catch was taken by DWF nations from 1950 to 1994.

Fishery subsidies provided in developing countries are going through a transition from 'capture component', i.e., poorly managed, state controlled semi- industrial fisheries, to 'export stimulating mechanisms' (UNEP, 2002). According to Milazzo (1998), in developing countries, where government agencies responsible for fisheries generally have modest budgets, it appears that the bulk of subsidies are provided in the form of subsidized loans and tax breaks. Lately, in the 1990s, the emphasis has been on management aid and technical assistance programs in value adding and quality control, as shown by the results of this study and confirmed by other reports (see FAO, 2003c). This could also justify the huge

Table 4: World Trade Organization ship building notifications 1996-1997 in US\$ million (WWF, 2001).

Country	1996	1997
Australia	19	17
Belgium	-	2
Germany	500	99
Italy	-	676
Japan	6,893	3,553
Norway	191	92
Portugal	-	13
Spain	503	-
United Kingdom	302	8
Total (US\$m)	8,408	4,460

Table 5: Fishing access subsidy payments for 18 fishing nations.

Country	Access subsidies amounts (US\$'000) (%)
Japan	200,000 (20)
China	193,418 (19)
Spain	124,910 (12)
France	100,090 (10)
Russia	70,878 (7)
Denmark	48,736 (5)
Portugal	45,000 (5)
Korea	43,606 (4)
United Kingdom	36,112 (4)
Iceland	25,523 (3)
Italy	22,937 (2)
Taiwan	21,098 (2)
US	21,000 (2)
Netherlands	14,953 (1)
Ireland	10,723 (1)
Greece	7,041 (1)
Germany	6,274 (1)
Sweden	4,679 (~0)
Belgium	1,726 (~0)
Finland	1,297 (~0)
Total (US\$'000)	1,000,000 (100)

investments in capital infrastructure and marketing programs, from both domestic and international sources (see Appendix 2).

Ugly subsidies

The total estimate of ugly subsidies worldwide is about US\$ 4.0 billion, with fisher assistance programs in developed countries contributing more than 50%. Fisher assistance programs, though applauded for their social welfare objectives in many instances, have also been criticized for their role in creating a subsidy-dependent community.

The argument against fisher assistance programs is that it encourages fishers to stay in the fishing industry rather than leave it and diversify into other economic activities (Schrank, 2003). The impact of such subsidies is basically to artificially raise the price of harvested fish or reduce the cost of fishing (Munro and Sumaila, 2002). Subsidy policies that are directed either implicitly and/or explicitly at social objectives need to be analyzed to ensure that they do not hamper the effective management of fish stocks (OECD, 2005a). The policies should at least be coherent and mutually supportive for sustainable resource management.

With the decline of fisheries within the North Atlantic (Pauly and Mclean, 2003) and grossly overcapitalized global fleets (Gréboval, 1999), vessel buyback programs are generally regarded as good subsidies due to their capacity reduction goals (Milazzo, 1998). Buyback programs were estimated close to a billion US\$ and provided only by developed countries. These programs though with good intent in reducing fishing capacity, have been criticized for their ineffectiveness as the fishing capacity usually seeps back into the fishery over time (Cunningham and Gréboval, 2001; Holland *et al.* 1999; Clark *et al.* 2005). Munro and Sumaila (2002) also pointed out that buybacks can be good when not anticipated by fishers, but bad when anticipated because fishers will accumulate effort in anticipation, thereby neutralizing the expected benefits. Furthermore, there is the general fear of a 'spillover effect' of vessels from one fishery to another either in the high seas or as distant water fleets into other EEZs (Munro, 1998). It has been reported that vessels decommissioned from the Canadian cod fishery, for e.g., were transferred to Argentinean waters (UNEP, 2003).

The EU for instance has developed sets of criteria and sustainability reference points for sustainable vessel buyback programs including: (i) an entry/exit ratio for the introduction of new vessels of 1 to 1; (ii) vessel buybacks supported by public aid non-replaceable; and (iii) for any new vessels over 100 GRT built with public aid, the entry/exit ratio should be 1 to 1.35 to counter technological advancement¹⁷. However, EU common fishing policy rules are often poorly enforced and monitored, resulting in breaches and infringements¹⁸ and the export of fishing capacity to other countries (Milazzo, 1998). According to COFREPECHE (2000), from 1992 to 2000, Kenya, Guinea Conakry and Angola had about 110%, 96% and 85% increase in GRT respectively, due to vessels imported as a result of EU joint venture agreements. An earlier common fisheries policy (CFP) Regulation (2371/2002) sought to strengthen the link between fleet management and public aid but without any success. This was because monitoring and control was ineffective, and aid was conditional upon compliance with reference points. With recent developments in the CFP such as vessel modernization, it appears that the EU may be stepping from some of the key subsidy reforms committed to a few years ago (Coffey, 2006).

Case study analysis in West Central Africa by Mabawonku (1990) demonstrated that fishery subsidies can achieve specific economic objectives, such as increasing income through the reduction of input prices (mainly for food) and the provision of infrastructure and services, such as extension and training. It is important from a sustainability perspective, to assess subsidies in small scale fisheries that would be directly 'capacity-enhancing' and to distinguish it from other subsidy types without such effects (Schorr, 2005).

Rural fisher community development programs in developing countries are synonymous to fisher assistance programs in developed countries; however, the major difference is that the former has livelihood program activities integrated within coastal communities. In several developing countries,

¹⁷ <http://www.fao.org/fi/fcp/en/GBR/body.htm>, last accessed 18/06/06.

¹⁸ <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/06/992&format=HTML&aged=0&language=EN&guiLanguage=en>, last accessed 12/08/06.

excess capacity in the form of human capital or labor is likely to be more significant than capital in the form of fleets, particularly where barriers to labor mobility are commonplace (Clark *et al.* 2005). This is further exacerbated by intergenerational shift into fishing activities from other sectors (Tietze *et al.* 2000), and the lack of access to alternative income generating activities in several coastal communities. Subsidy support programs in such circumstances are regarded as unsustainable if they promote indiscriminate gear use by coastal fishers (Pauly *et al.* 1989; CECAF, 2000), and/or promote large excess of rural labor that may lead to Malthusian overfishing as shown in Figure 7 (Pauly, 1993; 1997; Teh and Sumaila, 2006). This can have negative impact in sustaining fishery resources and the very livelihoods they aim to support. To remedy such situation, Teh and Sumaila (2006) recommended the integration of food sufficiency program goals within a sustainable coastal management framework.

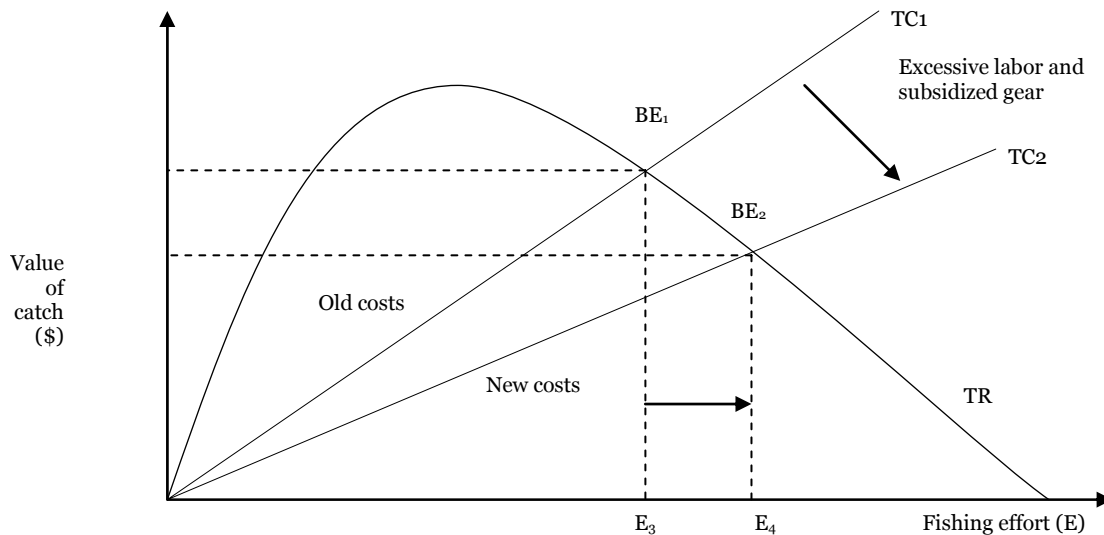


Figure 5: Subsidies and Malthusian overfishing (adapted from Pauly, 1997).

Also, the effect of subsidies and development assistance in most developing countries does not seem to meet the expected outcome of the intended policy goals (SIFR, 1992). For instance, most external assistance programs on research in developing countries tend to target high value species such as tuna for export rather than species that could be harvested by the local fishermen to supply domestic markets (Milazzo, 1998). Moreover, there are indications to show that some of the subsidy programs geared towards small scale fisheries development in general are intended to enhance fishing capacity to target commercial fish species for export (FAO, 1996; Khan, 1998) with a consequent shortage of protein to the local population (UNEP, 2002).

Fisheries subsidy estimates by region

With seven geographical regions of the world identified (Sub Saharan Africa, Asia, North Africa and the Mediterranean, Europe, North America, Oceania, Latin America and the Caribbean), information is provided on the size and extent to which subsidies contribute to fisheries conservation programs and the increase in fishing pressure. Figure 8 illustrates that Asia provided the largest amount of subsidies, about US\$ 11.6 billion, representing about 16% of total LV, and with more than 50% in the bad subsidies category. The next highest subsidizing region is Europe, with more than 50% in the bad subsidies category as well, representing about 22% of the total LV (see Figure 9 for regional subsidy intensity).

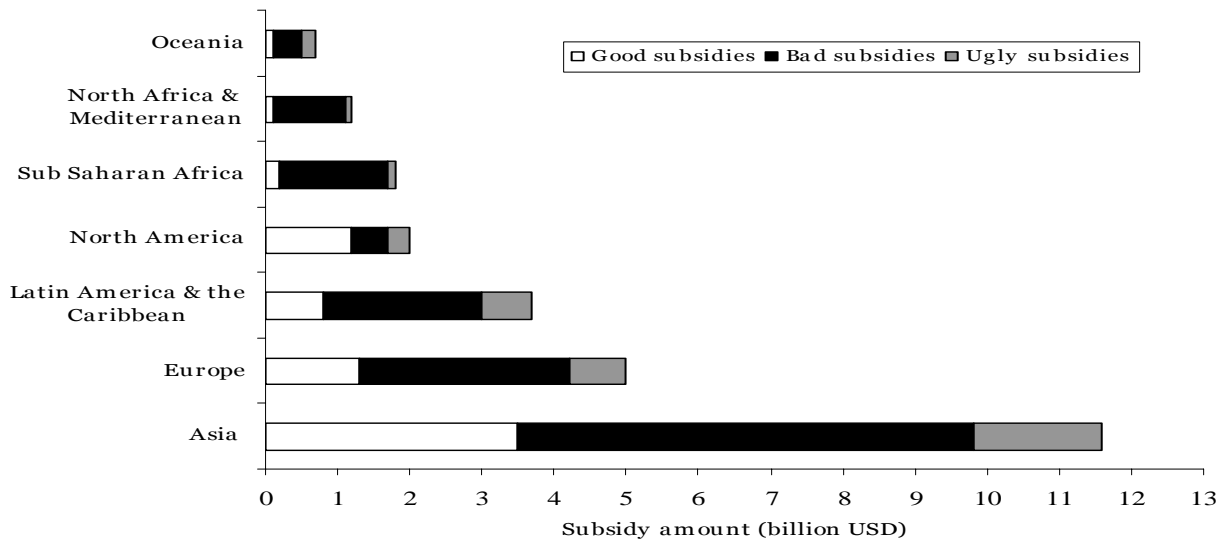


Figure 6: Subsidy amounts, by major geographic regions.

Oceania provided the least amount of subsidies to its fishery, about US\$ 755 million, with two of its regional members (Australia and New Zealand) being proponents for the ban of subsidies with the Friends of Fish Alliance.

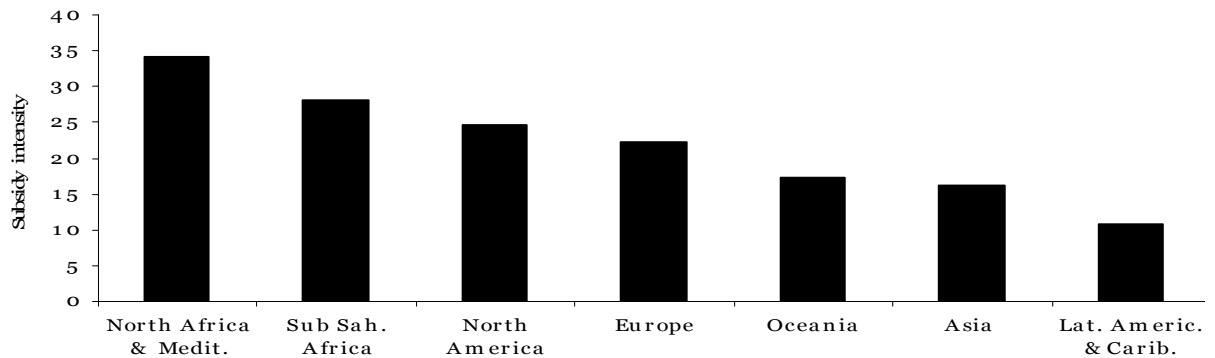


Figure 7: Subsidy as a percentage of total landed value for major geographic regions.

In contrast to developed countries, industrial fisheries of many developing countries in Asia, Oceania, Africa etc., deal with the high capital investment and operating costs by one or more of the following: (i) national inputs: import or export duty waivers and concessions; (ii) bilateral or overseas development assistance: technical assistance in the form of infrastructure support; (iii) multilateral assistance such as marketing supports programs, and (vi) joint venture arrangements (UNEP, 2003).

A breakdown of the results of this study by subsidy categories provided by major fishing nations is illustrated in Figure 10, with Japan being the highest subsidizer (US\$ 4.2 billion), representing 19% of its LV. Next are the EU, Russia, China, Peru and the USA in decreasing order; with subsidy intensity ranging from 4% in Peru to 23% in the USA (see Appendix 1 for a list of countries' subsidy intensities).

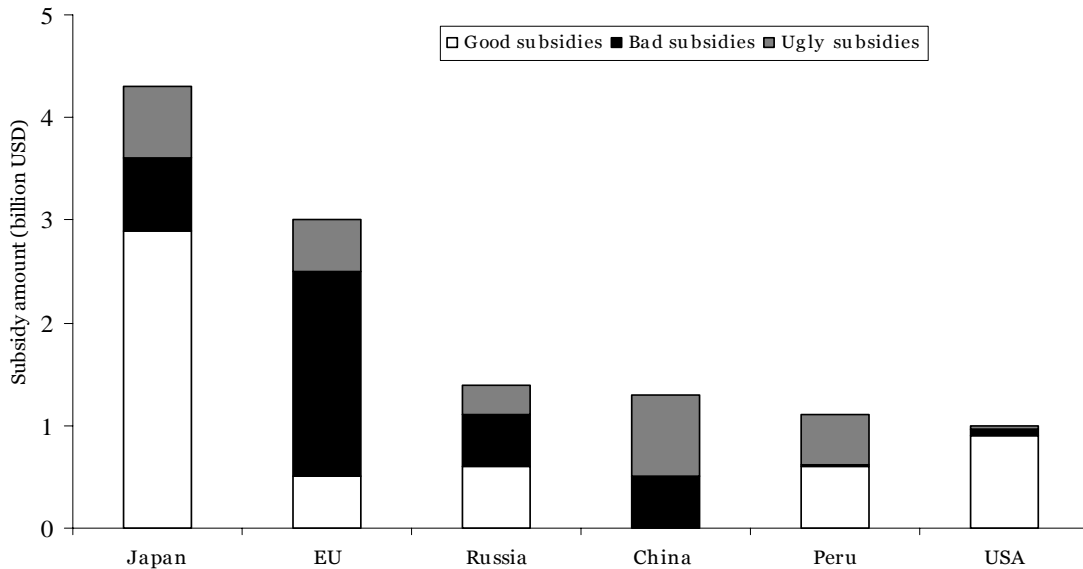


Figure 8: Subsidy estimates for major fishing nations.

The Japanese fishing industry is one of the largest and highly diverse, with the Fisheries Agency of Japan's budget amounting to about US\$ 4.0 billion, a quarter of total revenues in the marine capture fisheries (Milazzo, 1998). Japan's per capita fish consumption has consistently ranked among the highest in the world, about 69.1 kg/year, far exceeding the world average of 16.0 kg/year (FAO 2002). Japan's fish consumption patterns have also accounted for being one of the world's largest markets for fishery products, both in weight and value¹⁹. Japan obtains much of its catch from the coastal waters of developing countries (Swartz, 2004). As of 2000, Japan ranked third in marine landings, behind China and Peru (FAO 2002), with most of the catch based on joint venture agreements (Nakai, 1995) and distant water fleets (Iwasaki, 1997) subsidized by the Japanese governments in the form of aid packages and development grants (Bergin and Haward, 1995).

The EU has the third largest fleet in the world with around 100,000 boats taking 10% of the world's catch, with an increase in fleet size by about 6% with the entry of 10 new members into the Union²⁰. The newly approved EU subsidy budget of about US\$ 4.8 billion, have both fisheries management and cost reduction components and includes: (i) installing more efficient engines for crafts less than 12 meters long; (ii) providing aid towards rising fuel cost; (iii) contributing towards environmental friendly fishing techniques; (iv) assisting with processing and marketing programs, and (v) providing fisher assistance support²¹. The new European Fisheries Fund (EFF) is to replace the Financial Instrument on Fisheries Guidance (FIFG), and is responsible for the provision of financial support to the fisheries sector from 2007-2013. However, controversy still looms over the terms of agreement of the fund; since Britain, Germany, Sweden, the Netherlands and Belgium object to the expansion of existing fishing fleets, because this will undermine current WTO subsidy negotiations and fisheries sustainability. The demand came mainly from 'friends of fishers' who have requested for grants for new engines in boats under 12 meters long, which account for 80% of Europe's fleet²².

Russia's current subsidy programs are low (estimated at US\$ 1.4 billion) compared to the mid seventies and early eighties when they were the most dominant player in high sea fisheries with distant water trawler and factory 'mother ships' (Milazzo, 1998). Pashkova (2001) reported that current government subsidies to the industry are in the order of US\$ 5 billion, taking into consideration distant water fleet investments and local infrastructure support needs. Current post-Soviet subsidy programs are to boost about 50 fishery factories, for enhanced processing and marketing of fishery products particularly around

¹⁹ <http://faostat.fao.org/site/506/DesktopDefault.aspx?PageID=506>, last accessed 17/08/06.

²⁰ http://oceansa.org/uploads/media/UNEP_workshop_on_fisheries_subsidies_and_sustainable_fisheries_management.pdf, last accessed 16/08/06.

²¹ www.intrafish.com Published 20/06/06, last accessed 22/06/06.

²² NewScientist.com Published 20/05/06, last accessed 25/05/06.

the Murmansk region, one of the biggest fish processing complexes in the world (Euro Arctic news, March 11th 2006)²³. The estimates for Russian subsidies may be on the conservative side.

Most of the subsidies provided by the USA as illustrated in Figure 10 are good subsidies, aimed at management and conservation purposes.

Research Limitations

The accuracy of the estimation techniques used in this study are determined by a number of factors: (a) the availability of information provided by most countries to multilateral and intergovernmental organizations, such as the FAO, OECD and APEC; (b) the type of normalization and standardization applied to the available data sets; (c) the appropriateness of grouping countries into developed and developing country categories based on economic indicators²⁵; (d) the reliability in the secondary information collated without cross checking or validation; (e) the use of weighted averages based on countries landed value for interpolation purposes; (f) the criteria for excluding certain information from the estimates (e.g. subsidies towards aquaculture); (g) the taxonomy of subsidies used in the study; and (h) the nature of the data sources.

Despite the attempt in obtaining detailed information on all countries and on all types of subsidies, there have been several challenges and drawbacks. These include the following:

- i. The WTO notifications on actionable subsidies submitted to the negotiation group mostly lacked information on specific amounts of the various subsidies reported. Table 5 shows that from 1995 to 2001, about 191 submissions were made (Cox and Schmidt, 2002);
- ii. Information from WTO records does not reflect the true nature of the subsidies provided, nor is the values corroborated and updated. According to WWF (2001), the twelve countries with the largest total fishing subsidies officially reported by OECD (2000) and the APEC (2000) showed considerable discrepancies in their figures reported to the various intergovernmental organizations as shown in Table 5;
- iii. Some under-reporting has also been noted and include the following:

Table 6: WTO fisheries subsidy notifications from 1995-2001.

Country ²⁴	Capture sector	Ship building	Processing	Others	Total No. by country
Canada	4	NA	NA	NA	4
Japan	6	NA	NA	1	7
S. Korea	6	2	2	1	11
Norway	16	1	1	4	22
Philippines	1	NA	NA	NA	1
Poland	3	NA	NA	NA	3
Senegal	1	NA	NA	NA	1
Slovakia	1	NA	NA	NA	1
USA	5	NA	NA	NA	5
EU countries	75	9	9	34	127
Iceland	1	NA	1	3	5
Tunisia	NA	NA	NA	1	1
Singapore	1	NA	NA	NA	1
Turkey	1	NA	NA	NA	1
Thailand	NA	NA	NA	1	1
Total	121	12	13	45	191

Table 7: Some discrepancies in fisheries subsidies reported from 1996 to 1997 (WWF, 2001).

Country/ States	Officially reported government subsidies to the OECD and APEC (US\$b)		Amount of government subsidies reported to the WTO (US\$b)	
	1996	1997	1996	1997
Japan	8.2	3.0	5.0	0
EU	0.9-1.0	0.8-1.0	0.6	0.7
Canada	0.8	0.7-0.8	0.6	0.7
Korea	0.4	0.3-0.4	0.04	0.05
Taiwan	0.1	0.2	NA	NA
Norway	0.2	0.2	0.01	0.02
Spain	0.1	0.2	0.07	0.07
Italy	0.08	0.07	0	0
China	0.06	0.05	NA	NA

²³ <http://www.sr.se/cgi-bin/euroarctic/amnessida.asp?programID=2460andNyheter=oandgrupp=2604andartikel=813284>, last accessed 22/06/06.

²⁴ NA: Not Available.

²⁵ <http://earthtrends.wri.org>, last accessed 10/06/06.

- The USA provided subsidies under the capital construction fund (APEC, 2000), with known costs of administration, but without the actual subsidy figures enjoyed by the fishing industry (WWF, 2001);
- China provided rough estimates of about US\$ 700–800 million in annual subsidies to the fish-harvesting sector (Milazzo, 1998), yet only US\$ 50 million was officially reported to APEC (2000);
- Japan reported US\$ 5 billion subsidies to the WTO in 1996 for tax preference programs, that was not included in either the OECD or APEC studies (WWF, 2001).

Detailed information and clarity on the amount and nature of the subsidies provided by countries worldwide will set the stage for better negotiation rules on setting sustainable fishing criteria and also measuring the impact of these subsidies on fishery resources.

In order to encourage transparency, the data used for this exercise, given in Appendix 2, will be made available, by country, via the website of the *Sea Around Us* Project (www.seaaroundus.org). We hope this will lead to feedback and correction/amplification of the database.

SUMMARY AND CONCLUSION

Summary of major findings

Major findings of this research are:

- The magnitude of global fishery subsidies was estimated at US\$ 26 billion for marine capture fisheries for eleven subsidy types identified (excluding fuel subsidies). The eleven subsidy types were (i) fisheries management programs and services; (ii) fishery research and development; (iii) tax exemption programs; (iv) foreign access agreements; (v) boat construction renewal and modernization programs; (vi) fishing port construction and renovation programs; (vii) fishery development projects and support services; (viii) marketing support, processing and storage infrastructure programs; (ix) fisher assistance programs; (x) vessel buyback programs; and (xi) rural fishers' community development programs;
- Fisheries subsidies can be classified into three categories based on their potential impact on fish stocks as: the 'Good', the 'Bad' and the 'Ugly'. For these three subsidy categories, bad subsidies were the highest, estimated at US\$ 15 billion. Next were the good subsidies at about US\$ 7 billion; and the ugly subsidies being the least provided at about US\$ 4 billion;
- A total of 1152 entries were made within the subsidy matrix in computing for the magnitude of fishery subsidies. This information was obtained for 141 countries where subsidies were provided and documented;
- Out of the eleven subsidy types identified, fishery management programs and services amounted to the highest provided, almost a quarter of the global totals (US\$ 6.2 billion), provided by 138 coastal countries;
- Vessel buyback programs, fishing access agreement and fisher assistance programs were common to developed countries only, with estimates of US\$ 1 billion, US\$ 1 billion and US\$ 2 billion, respectively;
- Rural fisher community development programs are only provided in developing countries and estimated at US\$ 1.0 billion;
- Subsidies for fishery access agreement payments were estimated at US\$ 1 billion, and they are given by a handful of nations with a huge share of global catch including the EU, Japan, China, USA, Russia, Taiwan and Korea;
- About 52% of the total global fisheries subsidy estimate is provided by 38 developed countries (US\$ 13.4 billion) and the remaining 48% from 103 developing countries (US\$ 12.3 billion);
- By geographical regions, Asia (East, South and West) provided the largest share of the global fishery subsidies about US\$ 11.6 billion, next to Europe with US\$ 5 billion, with subsidy intensity of 16% and 22% respectively;

- Amongst the major fishing nations, Japan provided the highest subsidy amount about US\$ 4.2 billion, next to the EU with about US\$ 3 billion, followed by Russia, China, Peru and the USA with US\$ 1.4 billion, US\$ 1.3 billion, US\$ 1.1 billion and US\$ 1.0 billion respectively.

Policy implications

The debate on fisheries subsidies no longer deals exclusively, or even largely with trade injury, but increasingly with fishery resource conservation issues (Milazzo, 1997) and economic waste (Munro, 1998). Other concerns have been socio-economic regarding rural development, coastal employment and food security issues (Fluharty and Kaczynski, 2002; Sumaila, 2003; Alder and Sumaila, 2004).

Most policy reforms on fishery subsidies have been within multilateral trade talks by the negotiation group on subsidy rules at the World Trade Organization (WTO) in collaboration with the United Nations agencies such as the Food and Agricultural Organization (FAO), the United Nations Environment Program (UNEP), intergovernmental organizations and a coalition of Non Governmental Organizations (NGOs). The emphasis has been to eliminate subsidies that distort trade and also those that lead to overcapacity and overfishing based on the Doha rounds of trade talks and the Johannesburg Summit on Sustainable Development.

At the moment, out of the numerous position papers and proposals to the WTO negotiation group, two submissions for policy reforms are noteworthy. One approach is to have a top-down broad-based prohibition of all fishery subsidies, and the other is a bottom-up approach that prohibit subsidies that are explicitly listed as trade distorting or that lead to overcapacity. The difference between the two approaches, i.e., top-down and bottom-up is simply about what is at stake. The argument for the bottom-up approach led by Japan, the EU, Korea and Taiwan is that, by addressing overcapacity through reduction in vessel construction, modernization and overseas transfers, would inevitably curtail problems of overfishing. Also, the bottom-up proponents are arguing that ineffective fisheries management is also a contributing factor as much as subsidies to the present status of global fish stocks.

Alternatively, the 'Friends of Fish' countries and several other countries including Iceland, New Zealand, Pakistan, Australia, Brazil, Chile and India, are advocating for a total ban of all subsidies, but with exemptions, such as considering the needs of developing countries under a special and differential (S&D) provision. The benefits of this blanket prohibition are that it is simple, leads to transparency, and still allow for some exceptions. However, the top-down prohibition imposes stronger disciplines and notification requirements, which are neither within the Doha mandate nor within the ASCM and may have impact on other non fishing sectors. There are several challenges to this proposal as well, such as compliance to rules, and the cost of notification and enforcement. Some countries including the US and a coalition of NGOs have been advocating for subsidies that support conservation efforts, and disaster relief programs.

The contention with the S&D provision is that, since some developing countries have large catches, extending such a rule will undermine the effectiveness of any new fisheries rules. Further proposal on the negotiations of rules on the S&D provision are on-going, but the needs of small and vulnerable coastal states have emphasized with particular reference to the exemption of access payments, research related fisheries management programs and certain social insurance programs for fisher communities and disaster relief programs. Beneficiaries of such *de minimis*, i.e., developing country subsidies prohibition package will then need to meet certain other eligibility criteria. One suggestion has been to give exceptions to fisheries in developing economies with a gross national income per capita of less than a thousand US\$²⁶. Another proposal is to provide a basis for itemizing small scale fishing boats by size, length or volume of catch landed, and to set a limit to which rules should apply in identifying which fisheries are artisanal and small scales. Another issue has been the ambiguous definition of small scale or artisanal fisheries, which requires the provision of guidelines or sets of criteria to measure the effect of subsidies that enhance overcapacity (Schorr, 2005). To this effect, the best proposals is to apply S&D only to those

²⁶ TN/RL/GEN/57/REV.2 Paper submitted to the WTO negotiation group on rules.
http://docsonline.wto.org/gen_home.asp?language=1and =1, last accessed 10/08/06.

countries that fall below a certain threshold based on weight in terms of world market share of traded fish²⁷.

According to Schorr (2005), because subsidies to artisanal fisheries appear to take on a wide variety of forms, their effect is always hard to measure. Subsidies are most likely to be associated with the following: (i) vessel/gear modernization including motorization and the use of efficient gear such as purse seines; (ii) landing and processing infrastructure including fishing port facilities, refrigeration, roads and transport infrastructure; (iii) export including value adding and quality control; (iv) fuel subsidies; (v) other inputs such as ice; (vi) training programs and capacity building, and (vii) capital for investment. However, the outcomes of some of these policies on fishery sustainability in small scale fisheries have not been well studied, and needs further investigation.

A turning point in the WTO negotiations has been the suggestion by Brazil²⁸ and other developing countries to include regional fisheries management organizations (RFMO) in the subsidies discussion, since they have regional management responsibilities (see Abdallah and Sumaila, this volume, for more on Brazil). Sumaila and Keith (2006) further emphasized on the positive role of RFMOs in stimulating discussion amongst regional members and the sharing of information towards the WTO negotiation on rules. The suggestion to include fishery subsidy talks within multilateral environmental agreements with the collaboration of the UN agencies, and ways to improve on the reporting and clarification of subsidy information is highly relevant to policy development.

However, the challenges to these contributions are many, ranging from non-membership role within RFMOs, the legal procedures for international environmental agreements and the cost of monitoring and compliance. How to address these issues within the WTO requires more negotiations and proposals on better reporting of subsidies and understanding the impact on subsidies on resource sustainability. Defining working guidelines and sustainability criteria for specific fishery sectors, using both ecological and economic indicators is highly desirable, and needed for the following goals:

- To monitor subsidies aimed at reducing fishing capacity, but results in seepages and spill over effects;
- To assess certain subsidies in developing countries that are effort-enhancing such as access agreements, using the criteria 'patently at risk' in terms of fish stocks and 'effective fishery management' in terms of monitoring and control should be considered;
- To examine subsidies that may lead to Malthusian overfishing in rural coastal communities and to develop coherent policies for rural communities;
- To investigate subsidy programs that promote food sufficiency and poverty alleviation and to distinguish them from subsidies that promote fish exports;
- To develop national fisheries subsidy report cards, with rules on transparent reporting, and compliance on notifications. Such a report card can be used for S&D provisions, RFMO management programs and for negotiation rules on subsidy reforms within the WTO.

SUGGESTIONS FOR FURTHER RESEARCH

Three major areas have been less investigated in the analysis of impacts of subsidies. Future research should therefore focus on the following three areas, both for policy reforms in sustaining fishery resources and for sustainable fishery livelihoods:

- To assess the impact of subsidies on resource exploitation and sustainability in different fishery sectors, i.e., artisanal and industrial fishing sector;
- To examine the impact of subsidies on industrial profits;

²⁷ <http://www.ictsd.org/weekly/06-06-21/story4.htm>, last accessed 20/08/06.

²⁸ TN/RL/GEN/79/REV.1 Paper submitted to the WTO negotiation group on rules. http://docsonline.wto.org/gen_home.asp?language=1and _=1, last accessed 10/08/06.

- To investigate the impact of subsidies on exports, food sufficiency and livelihoods in artisanal fisheries;
- To corroborate subsidy data in Appendix 2 (and available online at www.seaaroundus.org) with reporting agencies to account for biases and uncertainties in the computation of fishery subsidy estimates.

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