

DIRECTORATE-GENERAL FOR INTERNAL POLICIES

POLICY DEPARTMENT
STRUCTURAL AND COHESION POLICIES **B**



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GLOBAL FISHERIES SUBSIDIES

NOTE





DIRECTORATE-GENERAL FOR INTERNAL POLICIES
POLICY DEPARTMENT B: STRUCTURAL AND COHESION POLICIES

FISHERIES

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Abstract

The aim of this briefing note is to provide an analysis of the current state of fisheries subsidies worldwide. The note reviews previous investigations and discussion of subsidies issues, including the debates at the World Trade Organization, gives a brief overview of the impact of subsidies on key economic, social and environmental aspects of the fisheries sector, and discusses the updated estimates of global fisheries subsidies presented here. The note presents the various types of subsidies proposed in the literature, and how they are likely to affect our ability to manage fisheries sustainability through time.

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LIST OF ABBREVIATIONS

ACP	African-Caribbean-Pacific countries
ADB	African Development Bank
APEC	Asian Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
ASCM	Agreement on Subsidy and Countervailing Measures
BE	Bionomic Equilibrium
CARICOM	Caribbean Community
CFP	Common Fisheries Policy
DFIF	Department for International Development
EAGGF	European Agriculture Guidance and Guarantee Fund
EEZ	Exclusive Economic Zone
EFF	European Fisheries Fund
EMFF	European Maritime and Fisheries Fund
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FIFG	Financial Instrument for Fisheries Guidance
GFT	Government Financial Transfers
ICCAT	International Commission for the Conservation of Atlantic Tuna
HDI	Human Development Index
ICTSD	International Centre for Trade and Sustainable Development
IUU	Illegal, Unregulated and Unreported fishing
MEY	Maximum Economic Yield
MPA	Marine Protected Area
MSY	Maximum Sustainable Yield
MRAG	Marine Resources Assessment Group, London
NEPAD	New Partnership for African Development
NGO	Non-Government Organization
OECD	Organization for Economic Cooperation and Development
R&D	Research and Development
RFMO	Regional Fisheries Management Organization
SVE	Small and Vulnerable Economies
SIFAR	Support Unit for International Fisheries and Aquatic Research
UNEP	United Nations Environment Programme
WTO	World Trade Organization
WWF	World Wildlife Fund for Nature

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EXECUTIVE SUMMARY

Background

Subsidies that reduce the cost of fisheries operations and those that enhance revenues make fishing enterprises more profitable than they would otherwise be. This results directly or indirectly in the build-up of excessive fishing capacity, leading to the overexploitation of fishery resources. In the 1950s and 1960s, the more subsidies you gave, the more fish you got, but things have changed: the resource base is too diminished for all these fishing boats to turn a profit, and the subsidies, far from having the effect they had earlier, now contribute to overfishing, i.e., more fish being caught than should be according to the biology of the fish stock. The realization of this fact and the current reform of the European Union's Common Fisheries Policy and fisheries subsidies have now put the latter in the spotlight in the EU. In fact, fisheries subsidies have been a matter for policy concern since the early 1990s, when the FAO made an argument, based on economic theory, that such government transfers contribute to excess fishing capacity and over-exploitation.

Aim

The objective of this briefing note is to provide an analysis of the current state of fisheries subsidies worldwide, and how they are likely to affect the sustainability of fisheries. More specifically, the note does the following:

- Review previous investigations of global subsidies issues, and give a brief overview of the impact of subsidies on key economic, social and environmental aspects of the fisheries sector;
- Address trade aspect of fisheries subsidies and the negotiations of fisheries subsidies at the World Trade Organization (WTO);
- Present and discuss various types of subsidies proposed in the literature, focusing on how the different types of subsidies are likely to affect the chances of managing fisheries sustainability through time;
- Discuss and present the magnitude of fisheries subsidies worldwide, and analyse the most recent estimates at regional and global scale, by categories of subsidies.
- Present and discuss different trends in addressing the issue in different fishing countries and what can be learned from this experience; and
- Based on this analysis, formulate clear recommendations for restructuring fisheries subsidies under the CFP.

The methodology consists of a survey of existing recent information from academic publications, research project reports, websites, databases, and any other relevant sources, e.g., FAO, OECD, UNEP, World Bank, WTO. We conduct analyses of secondary data collected to address the questions and issues listed above.

We produce a briefing note that contains clear findings and recommendations destined for the Members of the European Parliament. The goal is a note that is comprehensive and comprehensible to non-specialists. We aim to include only data relevant to decision-making, and to exclude non-essential data in order to produce a clear and easily readable note.

The study is global but we will use maps, graphs and pictures of high quality to present results not only at the global level but also at regional and country level as doing so would allow us to address the relevant issues related to subsidies at different scales of analysis.

KEY FINDINGS

Global fisheries subsidies were estimated at about USD 35 billion in 2009 dollars, which is close to the earlier estimate of 2003 subsidies once they are adjusted for inflation;

Capacity-enhancing subsidies constituted the highest categories provided at over USD 20 billion;

For all regions, the amount of capacity-enhancing subsidies is higher than other categories, except both North and South America, which have higher beneficial subsidies;

This shows that fuel subsidies constitute the greatest part of the total subsidy (22% of the total), followed by subsidies for management (20% of the total) and ports and harbours (10% of the total);

Subsidies contributed by developed countries are far greater (65% of the total) than that contributed by developing countries (35% of the total);

Asia is by far the greatest subsidizing region (43 % of total), followed by Europe (25 % of total) and North America (16 % of total).

Japan provides the highest amount of subsidies among developed countries (19.7% of total), followed by China, here considered a developed country (19.6% of total).

1. INTRODUCTION

Government subsidies have become a crucial component of the operation of the fisheries active in the Exclusive Economic Zone (EEZ) of most countries, and in the High Seas, and thus an understanding of the nature and amount of these subsidies is crucial to reform fisheries management and reduce overcapacity.

Various definitions of subsidies have been provided in literature, including by the global or regional organizations, i.e., FAO (2001), WTO (2001), OECD (2000) and APEC (2000), by consultant groups such as MRAG (2000), and by academics such as Schrank and Keithly Jr (1999), and Sumaila and Pauly (2006).

For the purposes of this report, fisheries subsidies are defined as financial payments from public entities to the fishing sector, which help the sector make more profit than it would otherwise. In recent decades, 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 (see e.g., Pauly et al. 2002).

Although many reasons have been identified for the decline of fishery resources, the role of subsidies in generating overcapacity and overfishing is not contested and indeed, cannot be sufficiently emphasized (e.g., Schrank 2003; Clark et al. 2005). The deleterious effect of fisheries subsidies as a contributor to fisheries overcapacity has been raised in many international fora, including the World Summit on Sustainable Development of the United Nations (2002) in Johannesburg, the Ministerial Conference of the WTO (2001) in Doha, and the Millennium Ecosystem Report of the UNEP (2005), at Rio+20 in 2012. As a result, subsidies have led to significant research interests.

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 (Pauly et al. 2002; Clark et al. 2005; Sumaila et al. 2010). Subsidies that enhance revenue and/or reduce cost lead to a marginal increase in profit, thereby increasing incentives for participation and fishing effort (Milazzo 1998). Subsidies that promote fishery resource conservation and management are, however, regarded as beneficial and necessary (Milazzo 1998). Scientist, managers, policy makers and the public are concerned about the former type of fisheries subsidies because they contribute directly or indirectly to overcapacity and overfishing.

Fishery subsidies provided by governments in the early 1930s and late 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 from the late 1940s to the 1970s, and the creation of 200 nautical miles Exclusive Economic Zones (FAO 1992), fishery subsidies acted as drivers 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, based on economic theory, 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, an estimate which appears to have been on the high side (even prior to adjusting for inflation). A further review of a wide range of direct

and implicit assistance programs that encourage and promote the building, maintenance and modernization, as well as the operations of the world's fishing fleets was undertaken by Milazzo (1998), which yielded 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, and did the studies in Sumaila and Pauly (2006), which were the first to employ an explicit methodology including all subsidy types for all maritime countries of the world (see www.seaaroundus.org/sponsor/feru.aspx). The present study, indeed, may be seen as an update to the 2006 study.

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 submission 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 States also raised the issue of overcapitalization and overfishing and raised concerns about ecological impact and the need for conservation measures.

All the efforts expended to date to discipline subsidies have not yet yielded the desired goal of disciplining capacity-enhancing subsidies even though they have increase awareness among policy makers and the public of the harmful effect of this unproductive use of taxpayer money. However, these efforts may have set the stage for influential bodies such as the European Parliament to push the world to stop using public resources to undermine what is probably one of the world's most valuable renewable natural endowments.

2. SUBSIDIES, TRADE AND THE WTO

KEY FINDINGS

- Subsidies distort markets and international trade;
- Since the bulk of subsidies are paid by developed countries where a larger proportion of fisheries are large scale, small-scale fishers are in general disadvantaged relative to large-scale fishers.
- The recent WTO negotiations included disciplining capacity-enhancing subsidies even though it was not successful, at least not yet.

2.1. Fisheries subsidies and international trade in fish

One key reason the WTO became active in the effort to discipline fisheries subsidies is that, like other subsidies, e.g., those to the agricultural sector, economic theory has clearly demonstrated that subsidies distort the market and therefore trade (van Beers and de Moor 2001): Fisheries that receive subsidies get an undue advantage in the market place over those who do not. This is an important concern because generally large fishing companies capture most of the subsidies to the disadvantage of small-scale fishers (Jacquet and Pauly 2008); and by extension, fishers in developing countries are also disadvantaged since their governments do not have the means to compete with those of developed countries (Sumaila 2003).

In recognition of the trade impacts of fisheries subsidies, the WTO Uruguay Round Negotiation moved fisheries issues to the market access group along with other negotiating subjects. Furthermore, fisheries subsidies were included under the remit of the WTO agreement on subsidies and countervailing measures, which covers all goods except agriculture products (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 effect of subsidies on overcapacity. 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 round. Also, fishing interests in developing countries highlighted the implication of heavily subsidized fishing fleets from wealthier countries out-competing local fishers in developing countries, and how this affect their ability to meet their food security needs (Sumaila 2003).

2.2. The WTO and the subsidies negotiations¹

The inclusion of fisheries subsidies in the Doha Round of the World Trade Organization's negotiations marked the first effort by this entity to address the environmental issues in a key natural resource sector using trade related disciplines. This unique environmental aspect of the negotiation mandate was unfamiliar to the WTO and the negotiations have proved to be challenging and complex.

¹ This section is based on Swartz and Sumaila (2013).

The initial difficulties in the WTO negotiation can be attributed to the language of the mandate itself. The Doha Ministerial Declaration (WTO 2001) which launched the Doha Round in 2001 described the negotiation mandate on the fisheries subsidies as follows:

...participants shall also aim to clarify and improve WTO disciplines on fisheries subsidies, taking into account the importance of this sector to developed countries.
(Para 28)

The somewhat ambiguous language of the mandate, particularly the lack of explicit reference to the nature of the required clarifications and improvements of the existing WTO disciplines (i.e. ASCM), has meant that for first few years after Doha, the negotiations were dominated by discussions on the interpretation of the mandate. Some countries, namely the 'Friends of Fish' coalition of countries united in their aspirations for broad prohibition of fisheries subsidies, argued that the mandate covers both disciplining of trade-distorting subsidies and overcapacity/overfishing inducing subsidies, while other member countries such as the EU, Japan, Republic of Korea and Taiwan argued that the mandate for the ASCM should be limited to strengthening the existing agreement on the trade-distorting effects of fisheries subsidies.

By 2004, however, a consensus began to emerge for acceptance of the environmental mandate of the negotiations. Several factors contributed the emergence of consensus. First, the identification of the Doha Round as a "development" Round, emphasizing the need to address developing country issues, has resulted in an increasing number of developing countries getting actively involved in the negotiations on fisheries subsidies, thus broadening the discussion beyond issues promoted by the established coalitions of predominantly developed countries. Moreover, the internal dialogue within the European Union, particularly following the expiration of the existing EU Common Fisheries Policy, spurred the re-examination of EU fisheries policies, including restructuring of its subsidies program, and led to the adjustment of the EU's position with regard to the WTO fisheries subsidies negotiations.

The acceptance of the environmental mandate by the EU, Japan and China, among others, paved the way for more explicit language in the 2005 Hong Kong Declaration (WTO 2005a). The new Declaration stated that the negotiations for strengthening disciplines on fisheries subsidies should include "the prohibition of certain forms of fisheries subsidies that contribute to overcapacity and over-fishing", whilst adopting appropriate and effective special and differential treatments to developing countries taking into account the importance of fisheries to "development priorities, poverty reduction, and livelihood and food security concerns" in these countries.

The Hong Kong mandate fundamentally altered the dynamics of the fisheries subsidies negotiations. The focus of the negotiation shifted from the scope of the negotiation mandate to identifying the types of subsidies to be included in the ensuing prohibition and formulating the nature of the special and differential treatments for developing countries. With regard to the breadth of the prohibition, the discussion revolved around the so-called 'top-down versus bottom-up' debate. The 'Friends of Fish' coalition argued for a comprehensive list of prohibited subsidies which includes most fisheries subsidy programs (i.e. 'top-down'), to be circumscribed by a limited list of exceptions targeting programs aimed at improving fisheries management and surveillance as well as active capacity reduction (WTO 2004). Meanwhile, arguing that only some subsidies programs can be associated with overcapacity and overfishing, a group led by Japan, Korea and Taiwan pushed for a 'bottom-up' approach, limiting the scope of the prohibition to a narrowly defined list of specific programs (WTO 2005b). These countries maintained that fisheries

subsidies are damaging only in poorly managed fisheries and, therefore, the prohibition should be applied only in absence of proper management. Meanwhile the discussion on the nature of the special and differential treatment focused on identifying the types of subsidy programs that can be beneficial in addressing the development needs of the developing countries while instituting a certain set of conditions under which the special and differential treatments are granted, so as to prevent their abuse.

The Hong Kong Declaration also opened a period of negotiations centred on the legal language of the resulting agreement, with many countries proposing various versions of legal texts. While the proposals and negotiations did not yield significant convergences on major issues, by 2007, following a brief suspension of the Doha Round in 2006, the Chair of the Negotiating Group on Rules was requested to prepare a draft of proposed rules for fisheries subsidies.

The Chair's Draft (WTO 2007), which became an important element of the WTO's negotiation consisted of two core elements: a broadly set of prohibited subsidies and a list of general exceptions to these prohibitions with complementary regulations guarding against circumvention; and 'special and differential treatment' giving policy flexibility to developing countries through provisions of additional exceptions based on various combinations of factors such as types and location of fisheries.

Specifically, the draft identified following types of subsidies to be prohibited:

- Vessel acquisition, construction, repair or other modifications;
- Transfer of vessels to a third country (i.e. forms of vessel buyback programs where the excess capacity is exported instead of being scrapped);
- Support on operating costs (e.g. fuel and license fees) of fishing and land-based processing activities;
- Port infrastructure exclusively or predominantly for fisheries activities;
- Income support;
- Price support; and
- Acquisition of fishing access to foreign waters.

In addition, the draft would have prohibited subsidies to any vessels engaged in illegal, unreported or unregulated (IUU) fishing as well as subsidies affecting fishing on "unequivocally overfished stocks." At the same time, it allowed subsidies programs which are aimed at assisting adoptions of vessel safety and sustainable fishing practices as well as capacity-reducing programs such vessel buybacks and fisher re-education, provided these programs do not contribute to a net increase in fishing capacity. Moreover, the Draft addressed the issue of the production-distorting effects of subsidies on jointly exploited stocks by enabling countries to challenge any subsidies that are deemed to be causing adverse effects on any stocks in which disputing countries have an "identifiable" interest under international law.

For developing countries, the Chair's Draft recognized the following exceptions as "special and differential treatment":

- Full exception for least-developed countries;
- Full exception (except for programs affecting overfished stocks) for artisanal fisheries defined as inshore fisheries operating non-mechanical gear with minimal commercial relationships;

- Partial exception (including subsidies for vessel acquisition and modification and on operating costs) for small-scale fisheries with vessels under 10 meters; and
- Exceptions for vessel modification subsidies on domestic fisheries operating within their EEZ provided that prior scientific stock assessments show that the fishing capacity does not exceed a sustainable level.

These exceptions, apart from those provided to least-developed countries, would have required the subsidizing countries to maintain a fisheries management system meeting certain international standards, including possible involvement of the FAO in a peer review process, and notification of all programs to the WTO secretariat.

The responses to the Chair's Draft were mixed. It was applauded by the 'Friends of Fish' countries and strongly endorsed by environmental organizations, including the WWF, which describes it as containing "the necessary elements of success" (WWF 2007). Meanwhile, other countries expressed their disappointment with the approach taken in the Draft, namely in what they perceived as the Chair's attempt to artificially generate convergences despite lack of such convergence. Nonetheless, the text was widely embraced as a basis for continuing negotiations and almost all of the subsequent proposals by members were submitted as amendments to the text.

Spurred by renewed calls for 'deliverables' on the Doha Round by the G20 and APEC leaders in late 2010, the delegations and the WTO Secretariat engaged in a period of intense negotiations in early 2011. The declared target of these discussions (for all components of the Doha Round) was to produce revised legal texts to be submitted for possible confirmation at the next round of Ministerial meetings to be held by the end of the year. The collective enthusiasm for the completion of the Round stimulated a proliferation of proposals in the fisheries subsidies negotiations, with eight new proposals being submitted in the span of three months in addition to the six proposals submitted in 2010. The following are highlights from some of the proposals and discussions on key issues.

The 'Friends of Fish' coalition strongly endorsed the Chair's Draft and proceeded to submit a series of proposals aimed at clarifying some of the ambiguous language of the Draft and at addressing the technical details. The proposal by the United States (WTO 2010a) and by Australia (WTO 2010b), for example, provided some clarifications to the concept of the "unequivocally overfished state" of fisheries resources, the definition of attributable "harm" with regard to jointly exploited stocks, and the necessary components of the fisheries management requirement. These proposals also presented several amendments on the exceptions to the prohibition, in order to eliminate potential "loopholes". Meanwhile Argentina, Chile, Costa Rica, Egypt and Uruguay (WTO 2011a) endeavoured to refine the conditions for exceptions for developing countries under the special and differential treatment by putting forward a proposal that required most exceptions to be applied only if the existing level of fishing capacity should prove to be "substantially lower" than needed to achieve optimal exploitation.

The proposal by Japan (WTO 2011b) reiterated its previously stated position that subsidies do not "a priori contribute to overcapacity or overfishing" and that capacity-enhancing effects of subsidies, if any, can be mitigated by effective fisheries management. Based on this line of argument, Japan proposed to reduce the list of prohibited subsidies, for example, limiting the prohibition of subsidies on operating costs to what it deems as "direct" operating costs and to allow subsidies on vessel construction provided that an increase in fishing capacity resulting from such programs is complemented with withdrawals of existing capacity. The proposal also removed the provision on

“unequivocally overexploited stocks” and introduced, as a general exception, subsidies programs targeting small-scale fisheries for both developing and developed countries.

Like the proposal submitted by Japan, the proposals submitted by the Republic of Korea were centred on the belief that effective fisheries management systems can minimize the negative impacts of fisheries subsidies. As such, Korea’s first proposal with Taiwan stipulated that the prohibition of subsidies should apply only when a subsidizing country fails to maintain sufficient fisheries management systems (WTO 2008a), while its more recent proposal (WTO 2010c) subcategorized prohibited subsidies between those outright prohibited (e.g. vessel construction and modification) and those for which adverse effects of the subsidy programs must be demonstrated to exist before measures to prohibit such programs can be enforced. Korea also submitted a proposal incorporating the concept of de minimis (WTO 2011c), first introduced in the context of fisheries subsidies by Canada (below).

Arguing for a simple and enforceable approach to the discipline on fisheries subsidies, Canada submitted a proposal based on the concept of de minimis general exception (WTO 2011d). This proposal argued for a system where countries would be able to provide subsidies of any type, up to an agreed threshold, with a higher threshold for developing countries, possibly differentiated according to the scale of their fisheries. The simplicity of the proposal has garnered some support, for example, from the European Union (e.g. WTO 2006), which implements a similar program for its members; however, some countries contended that such a system may create loopholes in the discipline and that without knowing the size of the de minimis caps, it is not possible to assess the impact of such proposals.

The European Communities (EC) submitted a number of communications where it expressed its position on issues pertaining to the negotiation. In 2003, the EC made a submission (WTO 2003) to the Negotiating Group on Rules – Fisheries Subsidies. In this submission, the EC highlighted the problem of fisheries subsidies and overcapacity and provided a proposed solution. Then in 2005, it published WTO (2005c), where the focus was on “how any subsidy disciplines which are drawn up by the WTO on fisheries subsidies are actually implemented in practice”. The EC provided a proposal in in this communication on how to enforce any agreed disciplines. Also, WTO (2006) was circulated as a formal document to the WTO, in which the EC supported the sentiment expressed by some WTO Members that new disciplines for fisheries subsidies must be simple, transparent and enforceable.

With the Chair’s Draft setting out the types of exceptions available to the developing countries and conditions under which such exceptions are permitted, several large developing countries presented their positions on the issue via two sets of proposals: one by India, Indonesia and China (WTO 2008b) and another by Brazil, China, India and Mexico (WTO 2010d). The main objection to the Chair’s Draft expressed in these proposals was the restriction of the special and differential treatment provision to those fisheries operating solely within the domestic Exclusive Economic Zones. These countries contended that developing countries, as latecomers to high seas fisheries, need to catch up with the high seas fleets of the developed world and that the cost advantages enjoyed by the fleets of developed countries are too great to overcome without subsidies. According to the report by the Chair (WTO 2011e), this issue of subsidization of high seas fishing became one of the most contentious issues in the latter stage of the negotiation, with opponents of such an exception countering that fishing activities in the high seas are highly industrialized operations and should, therefore, face the same subsidy rules as all other high seas fleets.

Several additional proposals were put forward by the coalition of small and vulnerable economies (SVEs) and Africa, Caribbean and Pacific (ACP) argued that due to the relatively small scale of their fisheries, contributions by these countries to global overcapacity and overfishing are negligible (WTO 2008c, 2010e, 2011f). These proposals, therefore, seek to exempt from the prohibition countries with a total marine fisheries catch below a specified threshold, e.g. less than 0.1% of the global total. In addition, there were proposals submitted by Morocco (WTO 2010f), Kenya (WTO 2011g), and Malaysia (WTO 2011h), the objectives of which were to clarify some of the language used in describing small and artisanal fisheries and subsidies programs available to these fisheries under the special and differential treatment provision.

In addition to the issues highlighted by various proposals described above, the negotiations also attempted to address some of the long-standing concerns over the fisheries subsidies debate. The subject of fuel subsidies, for example, has been the most contentious and several sessions of the negotiations were dedicated exclusively to addressing this issue. Some delegates considered that all fuel subsidies, regardless of their specificity to fisheries, should be disciplined, while others argued for a more tailored approach to regulating their use (e.g., Harper et al. 2012 demonstrate that the position of the US in the debate may have stemmed from their own definition of fuel subsidies). Some delegates, noting the wide range of fuel prices between countries, challenged the various fuel pricing policies, including fuel tax policies. However, many countries were cautious in addressing fuel tax policies, concerned that any regulation of fuel tax may be perceived as intrusion of WTO rules into member countries' domestic taxation system as a whole.

In the end, three months of negotiations in early 2011 saw minimal convergences in key issues with delegates offering little room for compromise. The Negotiating Group Chair concluded that he is not in a position to present a revised legal text on the subject as was mandated and instead produced a report that summarized the state of the negotiations (WTO 2011i). The conclusion from the report was not promising. Noting that delegates must re-examine their short-term approaches to the discussion in order for the negotiations to make progress, he concluded that he does not hold "great prospect for the fisheries subsidies negotiations."

It should also be noted that the WTO negotiations are conducted as a "single undertaking", meaning that results must be achieved in all areas of the negotiations, not only in those regarding fisheries subsidies, and must be applicable to all member countries. Any potential breakthroughs in the negotiations on fisheries subsidies at the WTO must therefore be coupled with similar breakthroughs in the negotiations on the Doha Round as a whole. Like the current situation on the fisheries subsidies negotiations, the outlook for the Doha Round as a whole is bleak.

Despite the significant amount of effort devoted to identifying and measuring fisheries subsidies and to analysing their potential and actual impacts on environmental and economic sustainability over the past decade, there has been little progress made in formulating an international regime for the regulation of fisheries subsidies. The negotiation for the improved discipline on fisheries subsidies at the WTO has stalled in recent years and considerable challenges remain before a meaningful agreement can be attained.

Nonetheless, the negotiations at the WTO have been valuable in recognizing the urgent need to control fisheries subsidies and the 2007 Chair's Draft remains an important document in envisioning what an international agreement on fisheries subsidies should look like. Perhaps the aspiration of achieving a comprehensive agreement in an organization dedicated to international trade was over-ambitious. However, the standstill of the Doha

Round may present opportunities for other international organizations with dedicated interest in sustainable management of marine fisheries. The production-distorting effects of fisheries subsidies are most pronounced in High Seas fisheries and focusing on these fisheries via regional fisheries management organizations (RFMOs) such as the International Commission for the Conservation of Atlantic Tuna (ICCAT) may prove to be a more suitable environment for constructive negotiations (but see Cullis-Suzuki and Pauly 2010a). Alternatively, the future of international fisheries subsidies regulation may be a coordinated effort between the WTO and international fisheries agencies such as the FAO, where the WTO disciplines the trade-distorting effects and the FAO and RFMOs regulate the production-distorting effects.

Currently, the WTO's ASCM 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 reconcile international trade policies with environmental policies, including the issue of the potential environmental advantages in eliminating capacity-enhancing subsidies.

ASCM, as it currently stands, applies only to the market-distorting forms of fisheries subsidies, while other forms of subsidies can be actionable only if they can be shown to have adverse effects on the interests of another party (WTO 1999). 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. Several key concepts in the ASCM are defined in ways that 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).

3. TYPES OF SUBSIDIES AND THEIR IMPACT ON SUSTAINABILITY

KEY FINDINGS

- Subsidies can be beneficial to the sustainability of fisheries, e.g., those for management and research;
- There are also capacity-enhancing subsidies, e.g., fuel subsidies, which lead to overcapacity and overfishing.

3.1. Types of subsidies

There is no single way to classify fishery subsidies, as their various categories mostly overlap depending on the nature of the subsidy and the purpose of classification (Milazzo 1998; APEC 2000; OECD 2000). 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.

However, 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 2003; Westlund 2004).

One objective criterion for the classification of a subsidy in this study lies in the potential impact on the sustainability of the fishery resource (OECD 2006; Cox and Sumaila 2010). The effect of a subsidy, therefore, 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) beneficial subsidies, (ii) capacity-enhancing subsidies, and (iii) ambiguous subsidies.

3.2. Impact of different subsidy types

The three categories of subsidies are farther divided into eleven program types as follows:

- A. Beneficial subsidies:
- Fisheries management programs and services; and
 - Fishery research and development.

- B. Capacity-enhancing 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; and
 - Fuel subsidies.
- C. Ambiguous subsidies
- Fisher assistance programs;
 - Vessel buyback programs; and
 - Rural fishers' community development programs.

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). In the next few sub-sections; we explain how different types of subsidies are expected to affect the sustainability of fish and fisheries.

3.2.1. Beneficial subsidies

Beneficial 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. Beneficial subsidies enhance the growth of fish stocks through conservation, and the monitoring of catch rates through control and surveillance measures to achieve a biological and economic optimal use. Beneficial subsidies are made up of the following two types:

- 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;
- 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.

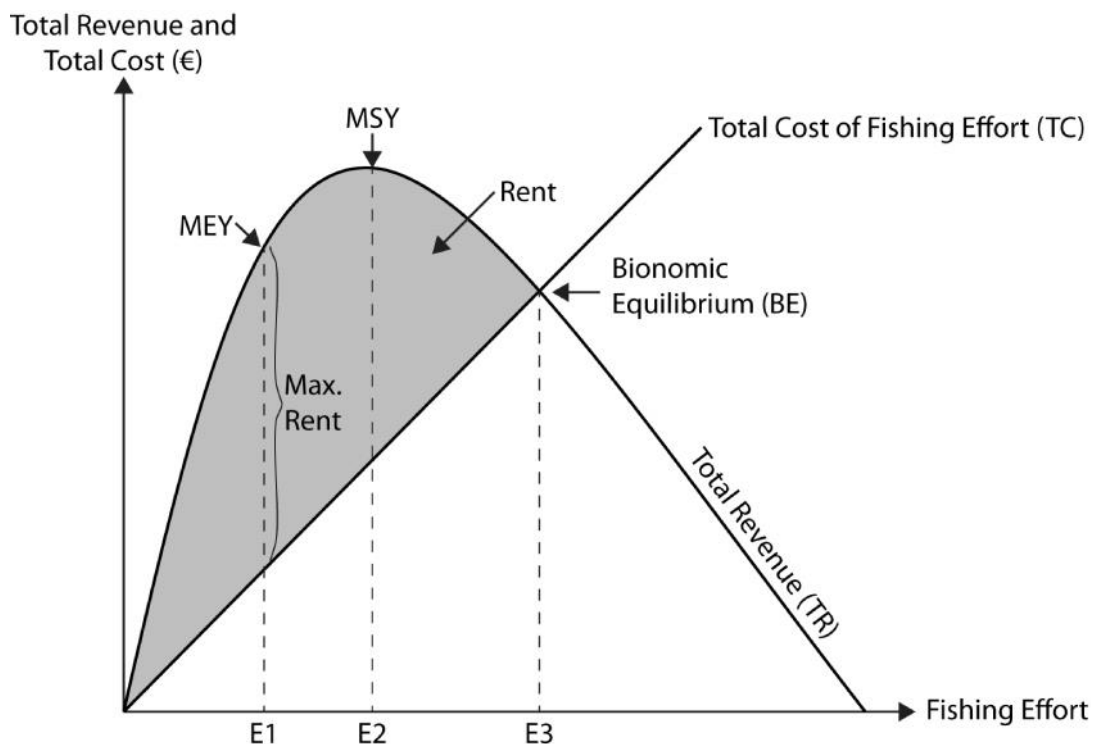
Fisheries management programs and services have been questioned on the basis that the services mostly benefits the private sector, and not the public, i.e., the rightful owners of marine resources (WWF 2001). However, most countries have justified it as their sovereign right to manage and conserve their marine resources within their EEZs as espoused under the 1982 United Nations Convention on the Law of the Sea (United Nations 1994).

3.2.2. Capacity-enhancing subsidies

Capacity-enhancing 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.

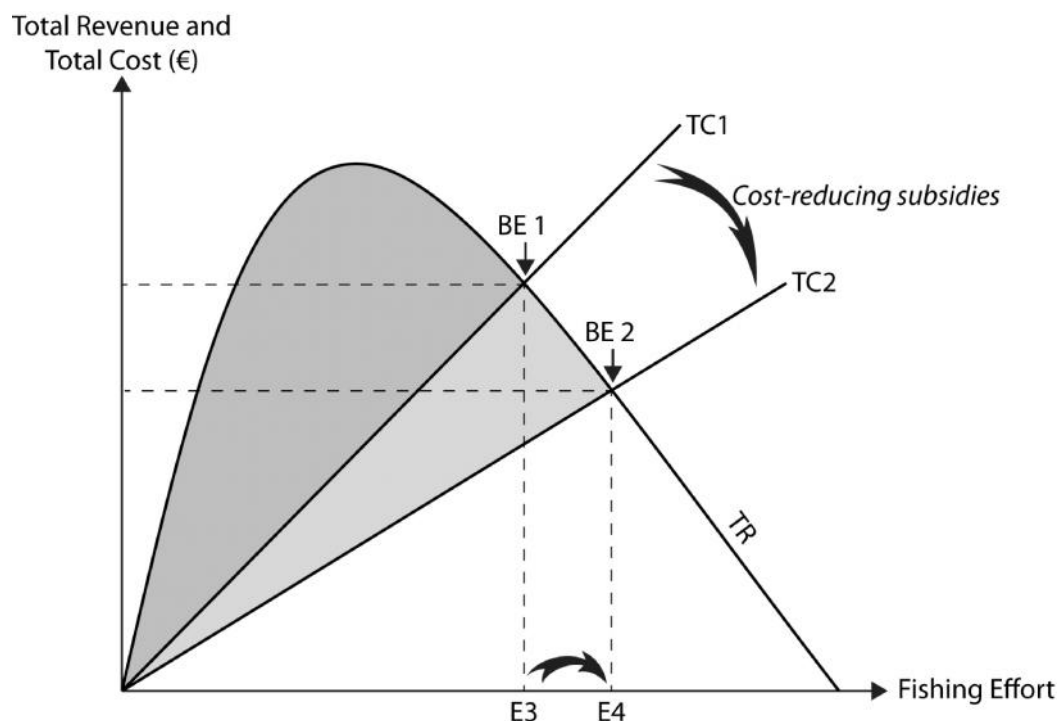
Fishery economics theory holds that, in an open-access fisheries, in which fishing cost is assumed to be proportional to fishing effort, effort will continue to increase even though revenues per unit of effort are declining, and that ultimately revenues will decline until they equal costs (Gordon 1954). 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 1). With subsidies, the fishing effort can actually exceed E3 (Figure 2; Sumaila 2002).

Figure 1: Gordon-Schaefer bioeconomic model (Gordon 1954). This model describes the different parameters commonly used in bioeconomics theory.



Source: Adapted from Sumaila and Pauly (2006).

Figure 2: Effect of cost-reducing subsidies on fishing effort. This figure demonstrates that subsidies lowering the cost from TC1 to TC2, will also lower the bionomic equilibrium from BE1 to BE2, thus encouraging the growth of fishing effort from E3 to E4, hence the name 'capacity-enhancing' subsidies.



Source: Adapted from Sumaila and Pauly (2006).

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

- Boat construction, renewal and modernization programs: These support programs include below-market rate loans geared toward fishing vessel construction, renewal and modernization, loan guarantees, restructuring and other capacity-enhancing lending programs. This subsidy type also involves support programs to augment fishing technology from public funds for fishing enterprises, parastatals and firms;
- 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), harbour maintenance, jetty and landing facilities and low or free moorage for fishing fleets;
- 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;
- Fishery development projects and support services: These are support programs towards fisheries enterprises development. It also includes support programs such as the provision of institutional support and services, the provision of bait, and search and rescue programs. The nature and sources for such support programs are diverse and includes development grants and concession credits either from national sources or through bilateral and multilateral assistance programs;

- 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; and
- 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).

3.2.3. Ambiguous subsidies

Ambiguous 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:

- 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 can, given the circumstances, 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;
- Vessel buyback programs: These are fishing capacity reduction programs including two types: (a) permit buybacks, and (b) license retirements. These subsidies are specifically intended to 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) because the disbursed funds can be used, under a wide variety of circumstances, for further investments in fishing capacity, for example for fleet modernization; and
- 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 consultations have concluded that projects concentrated on enhancing productive capacity in developing countries are contributing to overcapacity, and have a low rate of management success (World Bank 1992).

4. MAGNITUDE OF SUBSIDIES

KEY FINDINGS

- Global fisheries subsidies were estimated at about USD 35 billion in 2009 dollars, which is close to the earlier estimate of 2003 subsidies once inflation is accounted for;
- Capacity-enhancing subsidies constituted the highest categories provided at over USD 20 billion;
- For all regions, the amount of capacity-enhancing subsidies is higher than other categories, except both North and South America, which have higher beneficial subsidies;
- This analysis shows that fuel subsidies represent the largest part of total subsidies (22% of the total), followed by subsidies for management (20% of the total) and ports and harbours (10% of the total);
- Subsidies contributed by the governments of developed countries are far greater (65% of the total) than those contributed by the governments of developing countries (35%);
- Subsidies therefore disadvantage developing country fishers because developed countries provide by far the majority of global subsidies;
- The above also means that subsidies disadvantage small-scale fishers, given that most small-scale fishers are found in developing countries, and large-scale fishers in developed countries;
- Asia is by far the greatest subsidizing region (43 % of total), followed by Europe (25 % of total) and North America (16 % of total);
- Japan provides the highest amount of subsidies among developed countries (19.7% of total), followed by China (19.6% of total).

Attempts to provide empirical results on the impact of subsidies on fishery resources have been limited both in scope and time. The impact of subsidies on the cost and revenue structure in open-access fisheries has been demonstrated using the Gordon-Schaefer equilibrium model illustrated above. The underlying theory still holds on the effect of subsidies even though most fisheries are not open-access. However, the data needed in analysing the impact of contemporary subsidies on fishery sustainability require, among other things, an understanding of the nature and extent of fishery subsidies in different regions. Such comprehensive study can contribute significantly to an understanding of the current nature of fishery subsidies, and 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, would be useful for policy reforms toward the reduction of overcapacity in marine fisheries worldwide and for long term socioeconomic development.

Previous global estimates of fishery subsidies (not adjusted for inflation) have ranged from US\$ 14-20 billion (Milazzo 1998) to US\$ 54 billion (FAO 1992), the former probably too low, and the latter probably too high, while intermediate values, of around US 20 - 30 billion were presented in Sumaila and Pauly (2006) and Sumaila et al. (2010). 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).

Currently, within the OECD, fishery subsidy data are published annually as part of the review of fisheries and country statistic bulletin (OECD 2004, 2005a). 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 Kaczynski and Fluharty (2002), are either limited in scope or qualitative in nature. Subsidies provided by donors to developing countries under international aid / bilateral agreements, and domestic subsidies provided within both the small-scale and industrial fisheries sector in developing countries have been estimated by Sumaila and Pauly (2006) and Sumaila et al. (2010). The numbers presented in the section below update the estimates in Sumaila and Pauly (2006) and Sumaila et al. (2010).

4.1. Magnitude of global fisheries subsidies

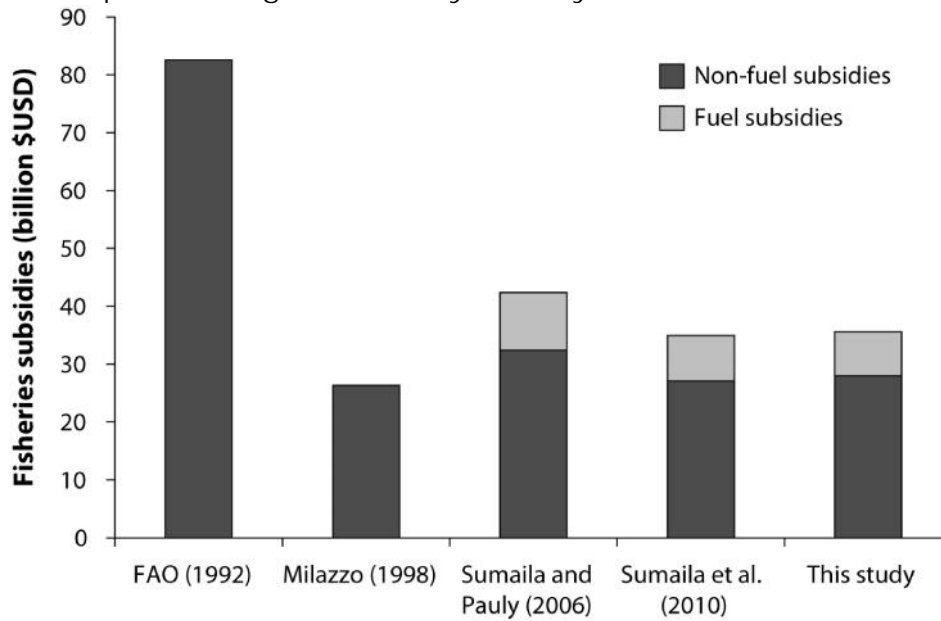
The major difference between the studies documented in Sumaila and Pauly (2006) and subsequent studies based thereon versus their predecessors is that 'subsidy intensity', i.e., the ratio of subsidies over the ex-vessel value of countries' catches were used, in the absence of better information, to assess the likely subsidization rate in similar countries with positive information that a certain type of subsidy was granted, but not its amount. Thus, the subsidies in our databases differentiate between published estimates taken 'as is' (and whose source is given) from estimates that are calculated via subsidy intensity (see www.seararoundus.org/sponsor/feru.aspx).

The updated figures presented below use the same approach, but with catch data from the Sea Around Us project and FAO extending to 2009. However, we do not distinguish here between published and calculated data, whose ratios are not likely to differ markedly from those in the above-cited database.

The subsidy data were assigned to each of the 13 categories, which we used in this study and the previous subsidy estimations (Sumaila and Pauly 2006; Sumaila et al. 2010), based on their descriptions in the data sources. These categories include management, research and development (R&D), MPAs, fleet modernization, development projects, ports and harbours, marketing & storage, tax exemption, fishing access, fuel subsidies, fisher assistance, vessel buyback and rural communities.

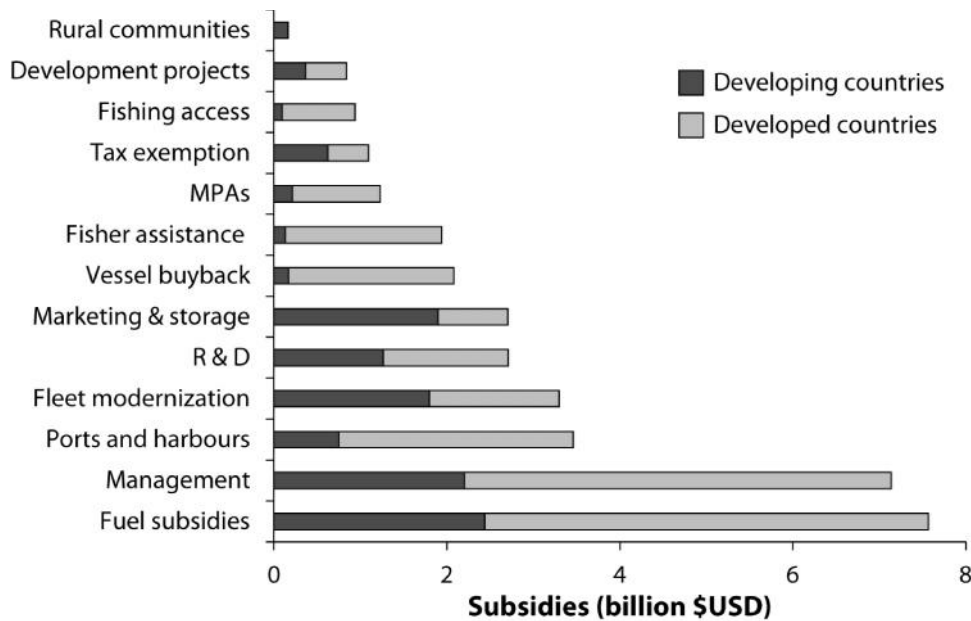
The new global estimate of subsidies in year 2009 is \$US 35 billion, which is similar to two latest estimates, once inflation is taken into account, as shown and compared with previous estimates in Figure 3. The composition of this total is illustrated in Figure 4, which shows that fuel subsidies still represent the largest subsidy category. Indeed, capacity-enhancing subsidies still predominate over beneficial and ambiguous subsidies (Figure 5).

Figure 3: A comparison of global fishery subsidy estimates



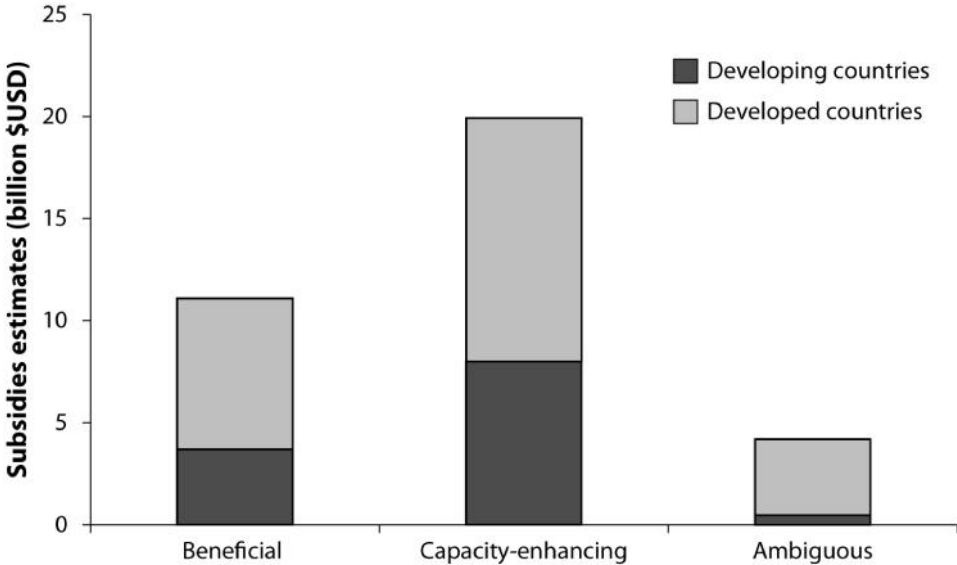
Source: Adapted from FAO (1992), Milazzo (1998), Sumaila and Pauly (2006), and Sumaila et al. (2010). Note that the numbers in the figure are all in 2009 real USD, in order to make them comparable (subsidy data adjusted to 2009 real value using CPI).

Figure 4: Composition of the subsidy estimates by sectors. This shows that fuel subsidies contribute to the greatest part of the total subsidy (22% of the total), followed by subsidies for management (20% of the total) and ports and harbours (10% of the total). Subsidies contributed by developed countries (65% of the total) are far greater than that contributed by developing countries (35% of the total).



Source: Adapted from FAO (1992), Milazzo (1998), Sumaila and Pauly (2006), and Sumaila et al. (2010).

Figure 5: Global fisheries subsidy estimates by categories. This shows that capacity-enhancing subsidies are far greater than ambiguous and beneficial subsidies, in both developing and developed countries.



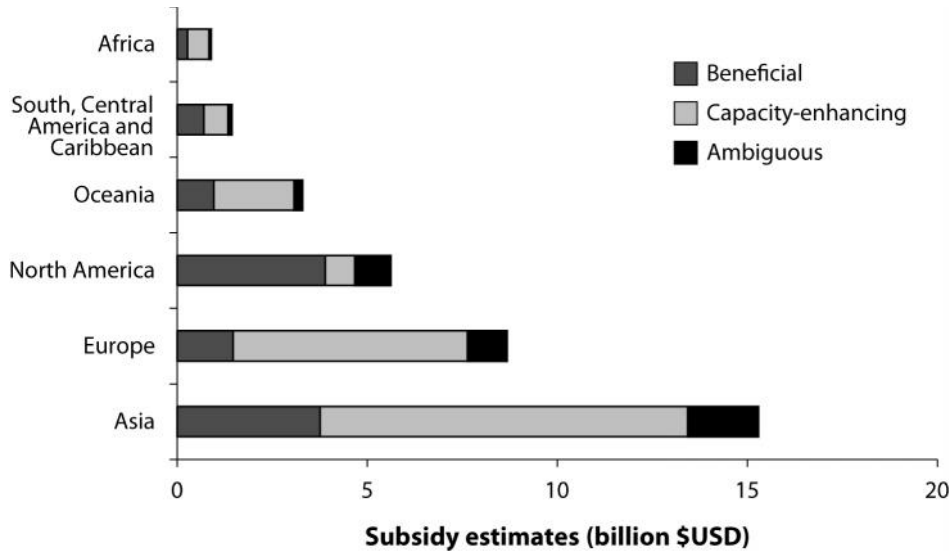
Source: Adapted from FAO (1992), Milazzo (1998), Sumaila and Pauly (2006), and Sumaila et al. (2010).

The above figure shows that the developed world provides most of the world’s subsidies. Since most of the world’s small-scale fishers are in the developing world, it can be concluded that small-scale fishers generally receive relatively less subsidies compared to large-scale fishers.

4.2. Global fisheries subsidies by major geographical area

As in previous studies, Asia, distantly followed by Europe dominates in term of subsidies awarded to marine fisheries, both in term of total and in term of capacity enhancing subsidies (Figure 6), and this is obviously the reason for the enormous growth of fishing capacity and effort reported by Anticamara et al. (2011) and the observed worldwide decline in catch per effort (i.e., abundance) of fish stock worldwide (Watson et al. 2012).

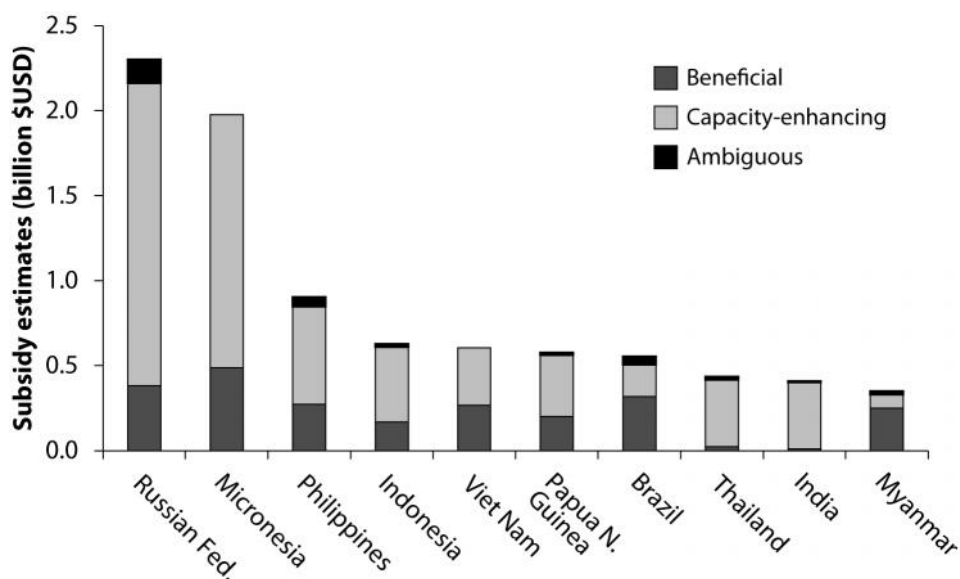
Figure 6: Subsidy estimates by major geographic region. This shows that Asia is by far the greatest subsidizing region (43 % of total), followed by Europe (25 % of total) and North America (16 % of total). For all regions, the amount of capacity-enhancing subsidies is higher than other categories, except both North and South America, which have higher beneficial subsidies.



Source: Adapted from FAO (1992), Milazzo (1998), Sumaila and Pauly (2006), and Sumaila et al. (2010).

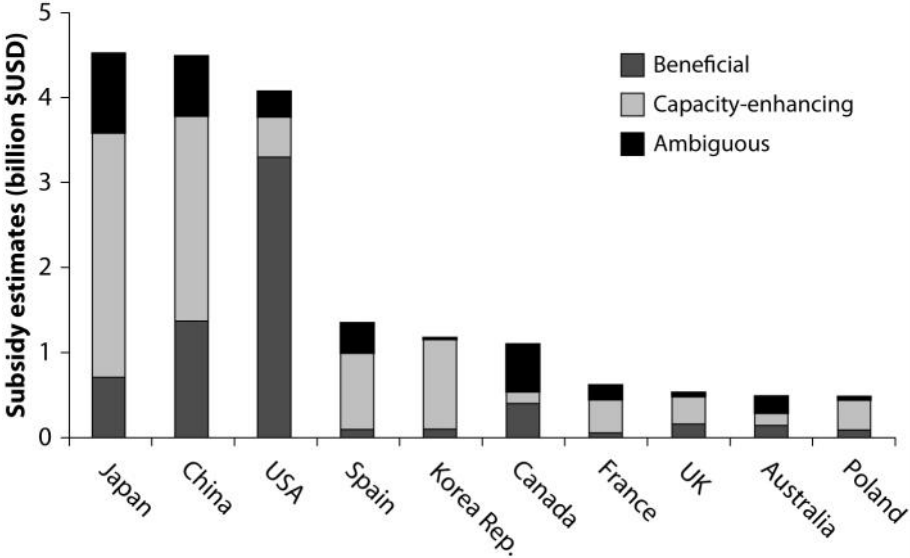
4.3. Fisheries subsidies by developed and developing countries

Figure 7: Subsidy estimates for the ten largest subsidizing developing fishing countries. The Russian Federation has the highest amount of subsidies among developing countries (19 % of total), followed by the Micronesia (16 % of total). For all countries except Brazil and Myanmar, the amount of capacity-enhancing subsidies is higher than any other categories.



Source: Adapted from FAO (1992), Milazzo (1998), Sumaila and Pauly (2006), and Sumaila et al. (2010).

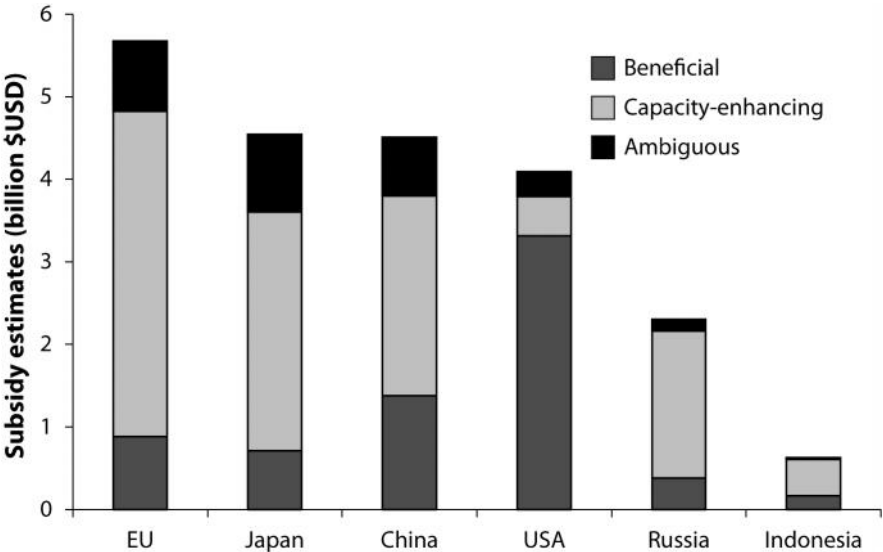
Figure 8: Subsidy estimates for the ten largest subsidizing developed fishing countries. This figure shows that Japan has the highest amount of subsidies among developed countries (19.7% of total), followed by China (19.6% of total). For all countries, the amount of capacity-enhancing subsidies is higher than other categories, except for the United States, for which the level of beneficial subsidies is higher, and Canada and Australia, for which the level of ambiguous subsidies is higher.



Source: Adapted from FAO (1992), Milazzo (1998), Sumaila and Pauly (2006), and Sumaila et al. (2010).

4.4. Fisheries subsidies by top fishing countries

Figure 9: Subsidy estimates by major fishing countries/political entities. This figure shows that Europe has the highest amount major fishing entities (26% of total), closely followed by Japan (21% of total) and China (20.7% of total). All entities have higher capacity-enhancing subsidies, except the United States, for which the level of beneficial subsidies is higher.



Source: Adapted from FAO (1992), Milazzo (1998), Sumaila and Pauly (2006), and Sumaila et al. (2010).

5. ADDRESSING SUBSIDIES

KEY FINDINGS

- There have been many global efforts to discipline subsidies, especially, by the United Nations and the World Trade Organization;
- On the other hand, regional and national efforts have been lacking, and efforts at this level are crucial for addressing subsidies.

Fishery subsidy issues are now widely addressed worldwide by national agencies; inter-governmental organizations, including the Organization for Economic Cooperation 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 countries. The roles played by the International Centre for Trade and Sustainable Development (ICTSD), and of various NGOs such as the World Wildlife Fund for Nature (WWF), Oceana, BirdLife International, Greenpeace and the Fisheries Secretariat, regarding both public outreach and advocacy on these issues cannot be over-emphasized (see e.g., their numerous communications with the European Commission and Member of Parliaments with regards to the Reform of the Commons Fisheries Policy; Anon. 2013a, 2013b; Pastor 2013).

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 Sea. The Millennium Ecosystem Assessment (UNEP 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 workshop, reports by UNEP (2002, 2003, 2004), and expert consultations in partnership with international agencies by FAO (2001, 2003). These efforts have also brought particular attention 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, for example, Kaczynski and Fluharty (2002). 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.

An example of a regional effort address subsidies is that by the Trans-Pacific Partnership (TPP) trade negotiations, which involves 12 countries that are currently planning to scrap fishing subsidies that clearly cause overfishing. As we write, tough negotiations are going on among the ministers of the TPP countries in a three-day discussion on tariffs, etc. (KODO, October, 2013).

6. RECOMMENDATIONS

- Eliminate capacity-enhancing subsidies, i.e., those that incentivise overfishing;
- Increase beneficial subsidies such as financial aid for data collection, control, enforcement, and those that improve fisheries management by reducing fishing capacity and effort, minimizing by-catch and promoting important policy goals;
- Improve significantly the transparency and accountability in subsidy reporting; in particular, effective WTO notification requirements are needed;
- Require better transparency of the industry's account books in order to better quantify the need for subsidies;
- Consider the special concerns of developing countries and small-scale fishers, which need to be taken into account in a way that does not continue to undermine the resource base;
- Increase the monitoring of the impact of these subsidies on the sector in order to determine which subsidies are the most beneficial;
- Redirect capacity-enhancing subsidies to support sustainable activities, e.g., these subsidies can be used to support 'fishing for plastic' rather than fishing depleted fish stocks, result in a win for fishers to keep their subsidy money); a win for the ocean (it is cleaned of plastic), and a win for the fish (they get a break from being targeted by fishing vessels);
- Bring education and skill development to coastal communities to increase employment opportunities available to fishers.

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ANNEX

METHODOLOGY FOR COMPUTING SUBSIDY ESTIMATES²

Data collection and compilation

- Subsidy information is recorded for twenty-five fishery non-fuel subsidy types identified in this study³ for 148 maritime countries/political entities. Of the countries/political entities under investigation, subsidy information (both qualitative and quantitative) was found for 146 countries ranging from one to all twenty-five subsidy types identified below. No information regarding fishery subsidies was found for Bosnia-Herzegovina or Gaza Strip and they are assumed not to provide any.
- Recognizing that subsidy strategies vary with development goals, maritime countries/political entities are grouped into two categories: developed (Group I) and developing (Group II) countries. The United Nations Human Development Index (HDI), which is a composite index measuring development by considering three basic components of human development: (i) life-expectancy; (ii) education attainment; and (iii) standard of living.⁴ Countries/political entities with HDI scores ranging from 0.80-1.00 are classified as Group I, and those with HDI scores from 0.00-0.79 are classified as Group II. Recognizing that our definition of developed or developing refers more to fishing capacity than to the country/political entity in general we make a few adjustments to these groupings. The Russian Federation, China and Taiwan are assigned to the developed category based on their level of fishing capacity. Similarly, Trinidad and Tobago, Cuba and Uruguay, whose fisheries sectors are less developed, are assigned to the developing group of countries/political entities.
- Data collected and recorded for any given country, year and subsidy type can be (i) quantitative figures; (ii) boolean (true/false) where sources indicate a subsidy program in effect without quantitative estimate; and (iii) blank entries where information for a given country/political entity, year, and subsidy type is not available.
- Data is obtained from the following major sources: (a) OECD (2000, 2004, 2005b, 2006); (b) APEC (2000); (c) European Commission; (d) FAO, web resources on sections that concern 'aid' and 'international cooperation' under specific country profiles and 'investment' or 'subsidies' under the fisheries management information link for any given country; (e) national fisheries department web links, financial and budgetary reports, and fishery reports and documents; (f) the web resources of the SIFAR, now known as the 'onefish' community directory program; (g) UNEP (2002, 2003, 2004); (h) Global MPA costs database (Cullis-Suzuki and Pauly 2010b); (i) regional financial institution portfolios such as the African Development Bank (ADB); (j) overseas development project reports on fishery issues such as the UK's Department for International Development⁵ (DFID); (k) the WTO notifications

² Material in this section is from Sumaila et al. (2010).

³ These twenty-five subsidy types are mapped to the eleven categories in the section above. Table 1 in the results section of Sumaila et al. (2010) describes how each of the subsidy types is related to parent categories.

⁴ <http://hdr.undp.org/en/statistics>.

⁵ 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 (Insull and Orzeszko 1991). Thus, for developing countries, fisheries subsidies are identified from both domestic and international sources, and data is collected from both the subsidy providers and the recipients.

(www.wto.org); (l) NGO reports on marine issues, such as WWF (2001); and (m) various on-line resources including news articles and grey literature.

- To improve the accuracy of collected data, we contacted more than five hundred fisheries representatives from all maritime countries/political entities of the world, including ministers responsible for fisheries, WTO negotiators and UN permanent mission representatives. The purpose of this effort was to bring the preliminary estimates reported in Sumaila and Pauly (2006) to the attention of these representatives, and ask for official data to improve our estimates where necessary and possible. Despite receiving valuable input from representatives in thirty-five countries/political entities, more than 60% of data cells within the database are assumed to be zero because there is no information indicating a subsidy program's existence.

Analysis of collected data

- We create a database of 25 subsidy types identified for 148 maritime political entities which span the years 1989 to present. Though this is a static analysis for the year 2009 where a subsidy is known to exist but values are not stated, values are estimated based on information from within five years of 2009. The data from years prior to or after 2009 are normalized to constant 2009 US dollars by applying the consumer price index (CPI), extracted from the World Development Indicators.⁶
- Every entry in the database used for this study, is supported by documentation of the source(s) of information, nature of the program, and recipients. For each entry where program information is supplemented with information on the amount and duration, the absolute annual amounts in United States dollars (US\$) are recorded in the database. This information is referred to as 'known subsidy amounts'. In the OECD (2004) report, from which some of the subsidy data is obtained, the Government Financial Transfer (GFT) categories are reclassified under the twenty-five types of subsidies identified in this study. The values of GFT from this report are 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 are not considered.
- Several steps are taken to normalize collected data: (a) subsidy programs towards capital cost such as infrastructure are annualized by considering depreciation costs (if available), or by using World Bank statistics; (b) multi-year subsidy programs are assumed to last five years if the project cycle is not provided; (c) subsidy programs in the form of concession loans (i.e., subsidized interest rate or interest-free) are calculated on the basis of forgone interest rate. The real subsidy benefit is 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 reasonable measure of benefits for all subsidized lending. This rule-of-thumb is applied where information on subsidized loans is not available.
- It should be noted that payments for fishing access are provided by only a few countries, mostly in the EU, USA and some Asian political entities, including Japan,

⁶ www.worldbank.org.

China, Taiwan and South Korea. The most significant are the European Union – African, Caribbean and Pacific Countries (EU-ACP) fishing agreements, which involves lump sum payments from the EU. Other kinds of payments from the US and Japan included access fees for tuna fishing fleets to the Pacific Island States. It has been reported that the EU devotes one third of its fisheries budget to these agreements, resulting in a subsidy of some US\$ 400 million in total (MRAG 2000). These foreign agreements are funded mainly for the benefit of Spanish, French and Portuguese fleets (Milazzo 1998).

- Known subsidy amounts for fishing access payments are about three quarter billion dollars (Milazzo 1998), which is scaled up to US\$ 1 billion assuming other payments from Russia, China, USA, Taiwan and South Korea sum to at least US\$ 250 million (Milazzo 1998; MRAG 2000; Mwikya 2006).

Estimating Missing Data

- Two approaches are used to fill missing data for non-fuel and fuel subsidies, respectively. Fuel subsidies estimated in Sumaila et al. (2008) are used where data collected was expressed as a subsidy per litre of fuel usage or where the total fuel subsidy is not reported. In cases where total fuel subsidy is reported we use this data rather than estimates from Sumaila et al. (2008). The approach for estimating non-fuel subsidies is presented below.
- Using collected quantitative data, we compute the subsidy intensity for each type of subsidy. We define subsidy intensity as the ratio of known subsidies for a given subsidy type to a country's total landed value. We then compute estimates of the mean subsidy intensity for our two groups of countries, i.e., developed (Group I) and developing (Group II) countries. The mean subsidy intensity for each subsidy type and country group is used, along with the 2009 landed value for a given country, in cases where subsidies are reported but with unknown magnitude, to compute estimates of subsidies provided by each country. Mathematically, we estimate fisheries subsidies using the equation:

$$\widehat{subsidy}_{i,j} = \left(\sum_{i=1}^n \frac{subsidy_{i,j}}{LV_i} \right) LV_i$$

where n is the number of recorded data entries for a given subsidy type j , and i indexes countries/political entities. Once we have estimated values for qualitative data, we aggregate twenty-five subsidy types into eleven parent categories when reporting our estimates.

Lastly, we assume that all countries with a fisheries ministry or department do spend resources towards fisheries management. The four subsidy types classified as fisheries management – stock assessment, stock enhancement, monitoring and other beneficial subsidies – are first estimated individually and then aggregated into the broader fisheries management category. We use subsidies for fisheries management in countries for which we have data to infer fisheries management subsidies for countries/political entities that have fisheries ministries or department but no reported data.

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