



How subsidies affect the economic viability of small-scale fisheries



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ABSTRACT

This article presents the first bottom-up analysis of the proportion of global marine fisheries subsidies to small-scale fisheries (SSF). Using existing data, the reported national subsidy amounts are split into the fraction that goes to small- and large-scale fishing sectors. Results reveal a major imbalance in subsidy distribution, with SSF receiving only about 16% of the total global fisheries subsidy amount of \$35 billion in 2009. To bring this into perspective, a person engaged in large-scale fishing received around 4 times the amount of subsidies received by their SSF counterparts. Furthermore, almost 90% of capacity-enhancing subsidies, which are known to exacerbate overfishing go to large-scale fisheries, thus increasing the unfair competitive advantage that large-scale fisheries already have. The developmental, economic and social consequences of this inequity are huge and impair the economic viability of the already vulnerable small-scale fishing sector. Conclusions indicate that taxpayers' money should be used to support sustainable fishing practices and in turn ocean conservation, and not to foster the degradation of marine ecosystems, often a result of capacity-enhancing subsidies. Reducing capacity-enhancing subsidies will have minimal negative effects on SSF communities since they receive very little of these subsidies to begin with. Instead, it will help correct the existing inequality, enhance SSF economic viability, and promote global fisheries sustainability.

1. Fisheries subsidies and small-scale fisheries

The objective of this article is to understand the role that subsidies play in marine small-scale fisheries (SSF) globally. Therefore, following research questions are addressed: What is the proportion of global fisheries subsidies that reach SSF compared to large-scale fisheries (LSF)? How much of these subsidies are categorized as beneficial and capacity-enhancing for each sector? What does this mean for the economic viability of small-scale fishers?

The amount provided globally to the fisheries sector as subsidies is estimated at 35 billion USD (in 2009), which is between 30% and 40% of the total gross revenue from global marine fisheries [1–3]. After the 2nd World War, fisheries subsidies were provided to help lower the cost of fishing and thus enable the fishing industry to catch more fish. The higher the subsidies provided, the more fish was caught. With fish stocks in decline worldwide today, the majority of the subsidies provided by governments turn to stimulate exploitation of already over-harvested resources [4–8]. Therefore, many of these capacity-

enhancing subsidies are considered to be harmful rather than beneficial and have been identified as one of the main contributors to the current global fisheries crisis [e.g., 3,4,9–11].

Fisheries subsidies are defined here as all financial transfers, which can be direct or indirect, from public entities to the fishing sector [4,8,9]. The support from governments to the fishing sector can take many forms, including those provided by parastatals, through direct capital infusion, financial assistance and preferential tax treatment, expenditures on market promotion, fisheries management and research, as well as negotiating access agreements for distant water fleets [12]. It should be noted that the term subsidy is being used interchangeably with support programs, financial support, economic assistance, and government financial transfers, all of which are payments that governments provide to the fisheries sector.

Fisheries subsidies and their different impacts on fish and fisheries around the world have been studied extensively over the last two to three decades [e.g., 3,4,9,10,13,14]. Notably, the World Trade Organization (WTO) has taken on the subject of fisheries subsidies and

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included them as one of the key issues within the Doha Trade Round of Negotiation [15–18]. An agreement was made in 2005 to implement rules that would regulate subsidies leading to overcapacity and over-fishing, with the supporting argument that they negatively impact global trade, development and the environment [19,20]. Unfortunately, the negotiations seem to have lost their impetus since 2011, and thus, until today no specific WTO agreement has been reached [20] (see discussion Section 4.1 for details on more current agreements including different organizations).

The discussion within the WTO Doha Round has also included the plight of SSF and it has been argued that SSF, especially those in developing countries, should receive special treatment when international rules regarding harmful fisheries subsidies are implemented [16,21–23]. However, negotiations have proven to be more prolonged and complicated than anticipated and no special rules have been defined [17]. One of the main reasons for this is that SSF, as for all other fisheries, need to reach sustainability and are not immune to the negative impacts caused by capacity-enhancing fisheries subsidies [17]. On the contrary, some have argued that SSF need subsidies to help them minimize the effects of poverty and enhance their food security [22].

Almost all current studies on fisheries subsidies focus on large-scale (industrial) fisheries (LSF) while the impact of fisheries subsidies on SSF (including subsistence and artisanal fisheries) is essentially unexplored [24]. Despite being understudied, the importance of SSF in economies worldwide cannot be ignored [25–29]. According to the FAO [30], between 85–98% of the 3.2 million marine fishing vessels active in the world can be classified as small-scale. It has been estimated that SSF support up to 22 million fishers, who make up about 44% of all fishers in the primary production sector [29]. Additionally, another 100 million people are involved in the post-harvest sector of SSF as reported in [26].

Small-scale fisheries face many challenges, including ineffective management and weak governance; poverty and undernourishment in fishing communities; pressure from industrialization and global changes such as market shifts and climate change [31–33]. The under-representation of local stakeholders in decision making processes has, furthermore, contributed to the political marginalization of SSF as their interests and needs are often neglected or not accounted for [28,34–36]. Economic viability assessments have informed management and policy decision making and presented trade-offs necessary to balance food security needs with ecosystem conservation of SSF communities [37,38]. Understanding the economic viability of these fisheries is essential to help rectify their marginalization and bolster them against potential crisis [39,40]. Here, economic viability is accomplished when net benefits of an active fishery to the whole society are non-negative over time [40]. The fact that subsidies are shouldered by taxpayers demonstrates that subsidies are an integral part of society and therefore of economic viability.

This study therefore aims to estimate the proportion of total subsidies received by the small-scale fishing sector. With this knowledge, policy recommendations on how to address some of the challenges SSF face and thereby improve their economic viability are suggested.

2. Methods

2.1. Subsidy data assessment

The starting point for the analysis is the country-level fisheries subsidies database reported in [3,8]. Of the 146 maritime countries that are included in the database, subsidies in 81 countries, are analyzed selected based on data availability and the total amount of subsidies they provide globally. In all, these countries gave 98% of the estimated \$35 billion annual global fisheries subsidies in 2009 (Fig. 1).

A definition of SSF for the purpose of this study can be found in the supporting information A.

Countries were grouped into developing and developed nations based on each country's Human Development Index (HDI) as was done in [8]. To split country-level subsidies into SSF and LSF, two approaches were applied for: 1. non-fuel subsidies and 2. fuel subsidies. Sources and references used to split each country and subsidy subtype can be found in the supplementary information B. The following Section 2.2 describes how the subsidies are split into SSF and LSF for each country and subsidy subtype.

2.2. Assessing SSF non-fuel fisheries subsidies

Of the 81 countries, data on non-fuel subsidies was available for 73 countries. Subsidies can be divided into various categories. The categorization applied in this study is based on a given subsidy's possible impact on fish stocks over time, which may or may not result in investment in sustainable fish stocks. Non-fuel subsidies include 12 subtypes found in one of three categories: 1. Beneficial subsidies: Fisheries management; fisheries research and development and marine protected area. 2. Capacity-enhancing subsidies: Boat construction, renewal and modernization; development programs; port development; infrastructure for market and storage; tax exemptions and fishing access agreements and 3. Ambiguous subsidies: Fisher assistance; vessel buy-back and rural fisher community development programs [3,8,41]. For each subsidy subtype the collected information that was found in the literature was grouped into three data categories as illustrated in Fig. 2.

Group 1) Is there quantitative data available? If yes, then the indicated subsidy quantity to SSF is recorded (Fig. 2).

Group 2) Is qualitative data available? If yes, use the qualitative information to estimate the amount of subsidies provided to SSF (Fig. 2). Qualitative data is often found in government documents and technical reports, in the form of bullet points and tables which are broken down into objectives. If a subsidy amount was described by more than one objective/bullet point, the total subsidy was split equally between the stated objectives (see example in Fig. 3). To be consistent, the following words describe SSF: artisanal; subsistence; small-scale; non-motorized; coastal and community-based and LSF: industrial; large-scale; freezer trawlers; off-shore; over sea and deep sea.

To better illustrate the procedure of the methods, a description of the subtype "boat construction and renovation" from Thailand is presented in Fig. 3 [42].

Group 3) If no quantitative or qualitative data are available, we have a no data situation. However, as no data does not necessarily mean zero subsidy, the percentage of SSF catch (in volume) to total catch of each country was used as a proxy to allocate the proportion of subsidies to SSF. Catch information is obtained from the *Sea Around Us* (www.seaaroundus.org last accessed on February 2016), which are more comprehensive than FAO catch data because they include more information specifically on SSF catches [43–45]. It is important to highlight that the proportion of SSF to total catch differs depending on the size of a country's distant water fishing fleet and number of foreign vessel fishing with the country's EEZ. The *Sea Around Us* catch information distinguishes between the catch that has been caught in a country's Exclusive Economic Zone (EEZ) and the amount caught by a country's fleet. This is important because beneficial subsidies (such as management) benefit the fisheries in a country's EEZ. Capacity-enhancing and ambiguous subsidies (e.g., boat construction), on the other hand, are directed at a country's fishing fleet.

It should be noted that if no data was available for the subtype rural fisher community development, it is assumed that 100% of the subsidy go to the SSF. This is because the description of the subsidy subtype rural fisher community and the definition of SSF suggest that only SSF would benefit from this subsidy. On the other hand, 0% of foreign access agreement subsidies are assumed to go to SSF since, by definition, no SSF operate in the waters of another country. See [6] for a detailed description of each subsidy subtype.

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