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Abstract

This bottom-up study provides an up-dated and improved analysis highlighting the importance of understanding how each fishing sub-sector receives financial support from tax-payers money. Estimates show that of the USD 35.4 billion global fisheries subsidies in 2018, 18.7% are provided to the small-scale fishing (SSF) sub-sector, including artisanal and subsistence fisheries, compared to the large-scale fisheries (LSF). Compared to the previous study which split SSF and LSF subsidies based on 2009 global fisheries subsidy data, the proportion within the capacity-enhancing category, which are known to exacerbate overfishing, increased from 11% to 17% while the proportion provided as beneficial subsidies decreased from 24% in 2009 to only 19% in 2018. Regional results show that the highest proportion to SSF is provided by African countries and the lowest proportion is provided by Europe (including Russia), with 34% and 11%, respectively. Recommendations include to remove capacity-enhancing subsidies across

all sub-sectors and instead use available funds to support coastal fishing community projects with a focus on fisheries sustainability and social justice.

1. Introduction

The vast majority of studies on fisheries subsidies focus on marine fisheries as a whole, without looking into the different fishing sub-sectors the subsidies are provided to (e.g., Milazzo 1998, OECD 2005, Sumaila et al. 2010). The impact of fisheries subsidies on small-scale fisheries (SSF, including subsistence and artisanal fisheries) has only recently been investigated more closely (Jacquet & Pauly 2008, Schuhbauer et al. 2017). The latest study and first bottom-up assessment of the distribution of fisheries subsidies between SSF and large-scale fisheries (LSF, including industrial and semi-industrial fisheries) by Schuhbauer et al. (2017), was based on total fisheries subsidies reported in Sumaila et al. (2016) which used subsidy data information from the years 2003 until 2013. Results revealed a major imbalance in subsidy distribution, with SSF receiving only about 16% of the total global fisheries subsidy amount (Schuhbauer et al. 2017). When considering the amount of people employed in each sub-sector this means that large-scale fisheries (LSF) receive about four times more subsidies per fisher, than those involved in SSF (Schuhbauer et al. 2017). It is therefore of essence to pay attention to which fishing sub-sector receives the subsidies in order to better understand the underlying impact that fisheries subsidies have, not only on the natural marine environment, but more so to the people who depend on the marine resources.

With the creation of a global fisheries subsidies database for the year 2018 (Sumaila et al. 2019a,b) and in light of on-going negotiations within the World Trade Organization (WTO) to discipline harmful fisheries subsidies, this report presents an up-dated estimate of the proportion that goes to small- and large-scale fishing sub-sectors.

2. Methodology:

The current database on fisheries subsidies presented in Sumaila et al. (2019) reports subsidy estimates for 152 maritime countries, which amounts to a total of approximately 35.4 Billion USD in 2018. Fisheries subsidies are defined here based on Sumaila et al. (2019) as all financial transfers, direct or indirect from public entities to the fishing sub-sector. The present study analyses data from 61 countries (out of the 152), selected based on information availability and their overall contribution to global fisheries subsidies, meaning the highest subsidizing countries were prioritized. Together, the 61 assessed countries represent 92% of the total global fisheries subsidies amount based on (Sumaila et al. 2019b).

Fisheries subsidies are divided into 13 different subsidy types which fall within three broader categories based on their impact on fish stocks over time: 1. Beneficial subsidies: Fisheries management; fisheries research and development and marine protected areas (MPAs). 2. Capacity-enhancing subsidies: Boat construction, renewal and modernization; development programs; port development; infrastructure for market and storage; fuel subsidies, non-fuel tax exemptions and fishing access agreements and 3. Ambiguous subsidies: Fisher assistance; vessel buyback and rural fisher community development. Please see the attachment of Sumaila et al. (2019) for a detailed definition and description of each subsidy type.

2.1 Defining SSF and LSF

To estimate the proportion of fisheries subsidies that goes to SSF and LSF, we must first outline a consistent approach to defining the two sub-sectors. However, currently there exists no single definition of what is regarded as SSF and LSF at the global level. We therefore apply the national definition(s) for each country under study, in order to determine the distribution of that country's subsidies. Where no such national level definition could be found, we applied the overarching European Union (EU) definition (European Union 2006, 2014) for EU Member States, and for all remaining countries we used the *Sea Around Us* definition, which describes SSF as fisheries that operate in domestic waters, within their national EEZ, maximum 50 km off

the coast, or 200 m depth (whichever comes first), and include both commercial and non-commercial fisheries such as subsistence and artisanal fisheries (Pauly & Zeller 2016).

2.2 Determining the SSF-LSF split

In order to determine the SSF-LSF split of each subsidy amount for each country analysed in this study, reported subsidies information was grouped and assessed based on three different data types, quantitative data, qualitative data, or no data reported. Both quantitative and qualitative data were found based on sources used in Sumaila et al. (2019), which include: a) federal and state budgets; b) WTO subsidies and policy notifications; c) the OECD's Fisheries Support Estimates; d) national fisheries department reports and financial summaries; e) European Commission annual implementation reports and Operational Programmes for the European Maritime Fisheries Funds (EMFF); f) peer-reviewed and grey literature; g) personal communication with academics and country officials; h) national financial law documents; and i) national tax expenditure reports.

Each source for each country and subsidy type was assessed independently to search for specific evidence in regard to SSF and LSF, and if available new sources were assessed. The following questions were asked to decide under which data type each source would fall: 1. Is quantitative data available regarding the SSF-LSF split? If yes, dollar amount is recorded. If no, the next question follows: 2. Is qualitative information regarding the SSF-LSF split available? If yes, use the qualitative information to estimate how much of the total subsidies amount is allocated to the SSF and LSF. Qualitative data can be found in a variety of forms including a (usually very short) description of the objectives, regional areas or specific groups (or communities) or individual fisheries that receive the financial support. If a subsidy amount was described by more than one objective or bullet point without indicating how much was dedicated to each, the total subsidy amount was divided equally between the stated objectives. To be consistent when assessing qualitative data and descriptions of subsidies within the sources, the following key words, found in either original English documents or translated where possible and necessary, were assumed to describe SSF: artisanal, subsistence, small boats/vessels, small-scale, canoe, non-motorized or

outboard motors, rural, traditional, coastal, inshore, community-based and beach landing site. The following key words were assumed to describe the LSF: industrial, large-scale, freezer trawlers, onboard processing, sea-farer, off-shore, distant water, high sea, over sea and deep sea (see e.g., Gibson & Sumaila 2017).

Specific assumptions were made with regard to subsidy types 'rural fisher community' and 'fisheries access', it is assumed that 100% and 0% of the subsidy is provided to SSF, respectively. This is because the description of the subsidy type 'rural fisher community' suggests that only SSF benefit and that, by definition, no SSF operate in the EEZs of another country[1]. A detailed description and definition of each subsidy type can be found within Sumaila et al. (2019). There was no up-dated information found on the subsidy type MPA, and therefore all MPA subsidies were divided between SSF and LSF based on data from (Schuhbauer et al. 2017). For all other countries and subsidy types where no information was found, a model was built using geographical proximity and data from (Schuhbauer et al. 2017) to fill the gaps in information regarding SSF-LSF splits.

2.3. Filling the gaps

All 61 maritime countries were divided into 21 sub-regions (based on the UN geoscheme[2]). We then computed the proportion of subsidies provided to SSF for each subsidy type and for each sub-region based on all reported and assessed data in this study (equation 1).

$$propSSF_{s,j} = \frac{(\sum_{i,j=1}^{I,J} SSF_{i,j})_s}{(\sum_{i,j=1}^{I,J} Total_{i,j})_s} \quad (1)$$

[1] Except in the special case of few countries e.g., Tanzania, where SSF vessels fish within their neighbouring EEZ, but no evidence of official access agreements or fees paid could be found and in the case of European Union Member States, but no fisheries access payment is required due to the shared nature of EU EEZs.
[2] United Nations Standard country or area codes for statistical use (M49) geoscheme: http://unstats.un.org/unsd/methods/m49/m49regin.htm last accessed September 2019.

Where, *propSSF* stands for the proportion of SSF subsidies to total subsidies, $s = 1$ to S denotes sub-region; $j = 1$ to J represents subsidy subtype and $i = 1$ to I denotes country.

We calculate the 2009 proportion of SSF subsidies of each country i and type j for the sub-region s in which country i is located using data from Schuhbauer et al. (2017). This information (equation 2) is used as an adjustment factor to estimate the SSF subsidies for all countries and subsidy types, which have not been assessed.

$$Adjustmentfactor_{i,j} = \frac{2009\ propSSF_{i},j}{2009\ propSSF_{s,j}} \quad (2)$$

The adjustment factor is then multiplied with the up-dated SSF subsidy per sub-region s and subsidy type j (equation 3).

$$propSSFestimate_{i,j} = propSSF_{s,j} \times Adjustmentfactor_{i,j} \quad (3)$$

The proportion of all SSF subsidy estimates for each country and subsidy type is then multiplied with the total amount of subsidy per type for each country to present the SSF subsidy amount in USD for the year 2018.

2.4. Caveats of data and analysis

The main challenge experienced in this study, which has been reported in previous studies on fisheries subsidies (e.g., Charles 2011, Schuhbauer et al. 2017, Sumaila et al. 2019), was the scarcity of information and lack of transparency. Additionally, when information was found, it often did not include much detail on the aim of the subsidy which made it sometimes very difficult to assess how much is provided to SSF versus LSF. Therefore, some of the gap filling process became challenging as not many data points per geographic subregion and subsidy type were available to calculate sound averages. Regions with very low data availability were Middle Africa, Western Asia, Micronesia and Polynesia, which makes their final output more dependent on the data modeled in Schuhbauer et al (2017) compared to the other regions.

3. Results

Our up-dated analysis shows that 18.7% of the estimated global fisheries subsidies of USD 35 billion in 2018 are provided to SSF, some USD 6.6 billion. As presented in Fig 2, estimates by subsidy category show USD 3.9, 2.0 and 0.7 billion for Capacity-enhancing, Beneficial and Ambiguous subsidies, respectively. It is important to note that a total of USD 18.3 billion subsidies go to the LSF as capacity-enhancing subsidies which accounts for almost 52% of the global total.

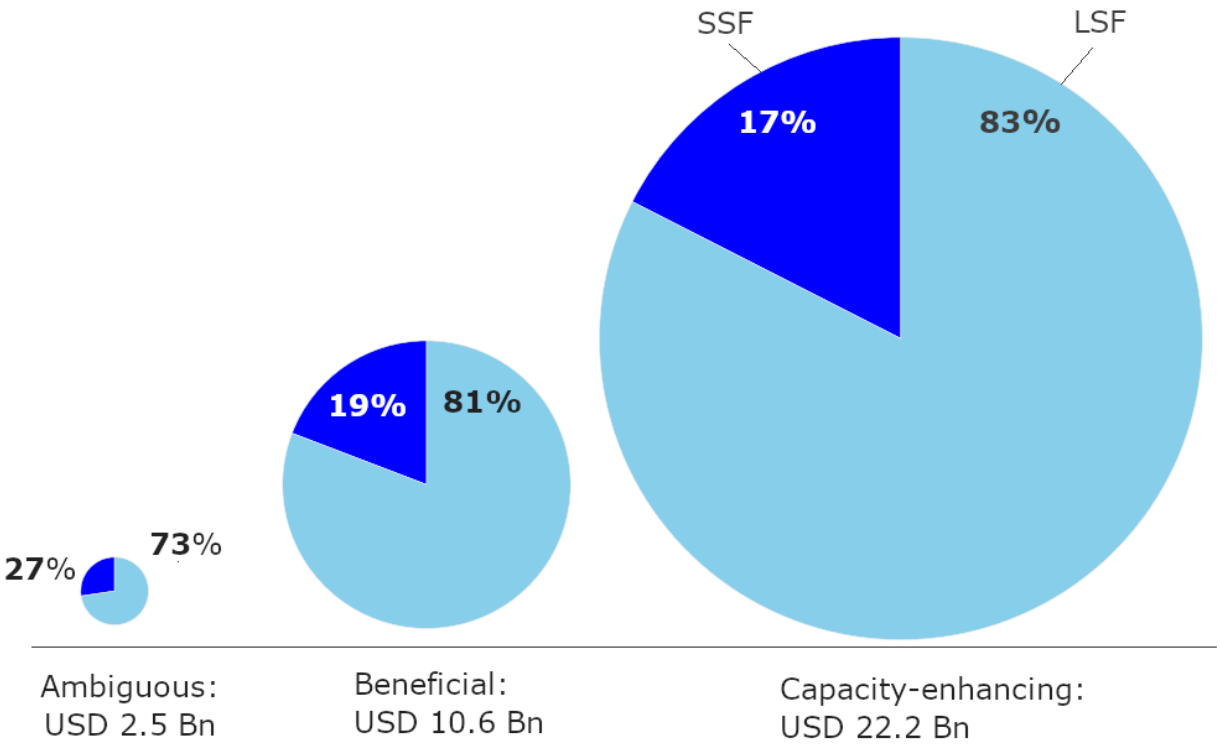

Figure 2: Global fisheries subsidy amounts by category and grouped by SSF and LSF for 2018 (constant USD).

Fuel subsidies are the highest subsidy amount provided to the fishing sector globally and only about 7.4% of this goes to the SSF (Fig 3). For the next highest capacity-enhancing subsidies such as tax exemption, fisheries development project and market & storage, SSF receive 16%, 30% and 32%, respectively (Fig 3). The lowest amount of the total global subsidies is provided to rural fisher communities, which is allocated 100% to SSF. For beneficial subsidies on the other hand, the SSF receive 19%, 24% and 13% for Management, MPAs and Research and Development, respectively.

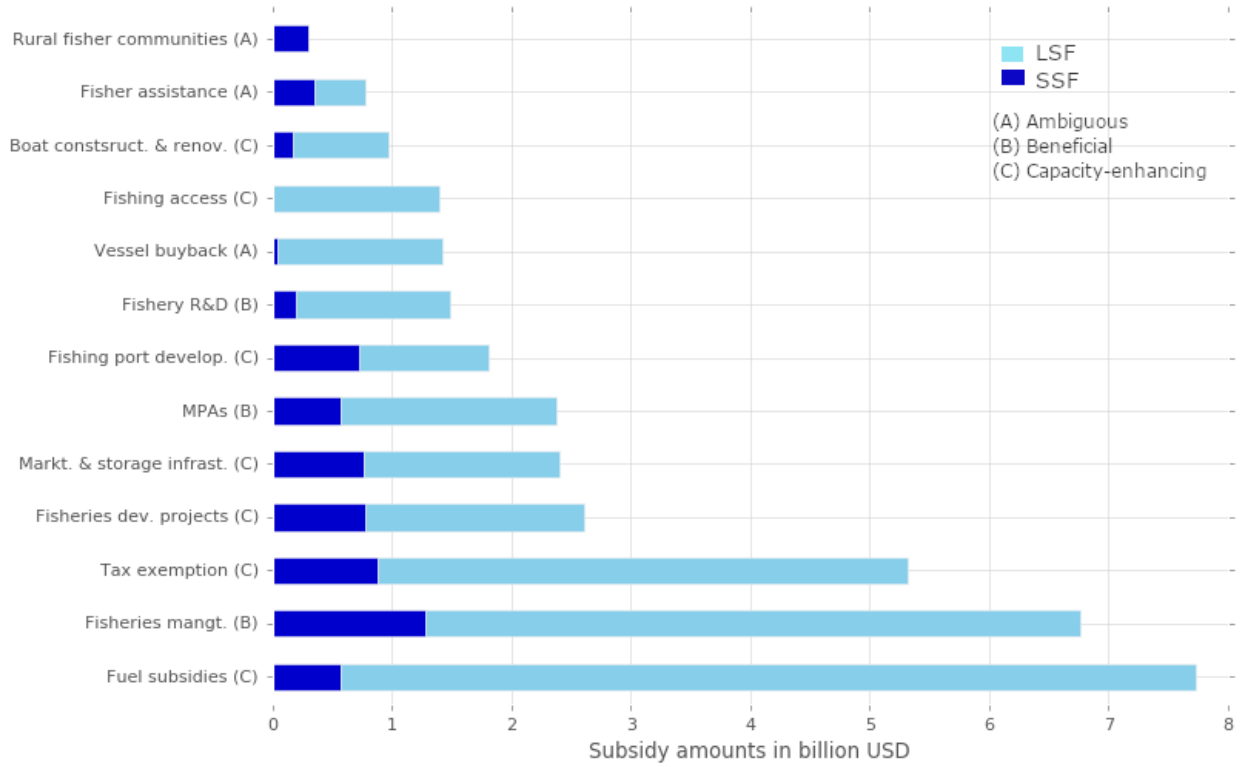

Figure 3: Composition of 2018 fisheries subsidies amounts by type and grouped by SSF and LSF for 2018 (constant USD).

Subsidies estimates for SSF grouped into different regions show that the largest proportion of subsidies provided to the SSF is by Africa, at 34%, while only providing a total of about USD 2 billion (Fig 4). The largest region in terms of overall subsidies, Asia (excluding China), provides

about 25% to SSF and China itself only 4% (Fig 4). The reason China was presented separately from Asia is that it is such a large subsidizing entity, providing about 21% of the global total, making it difficult to compare the different regions if included within Asia.

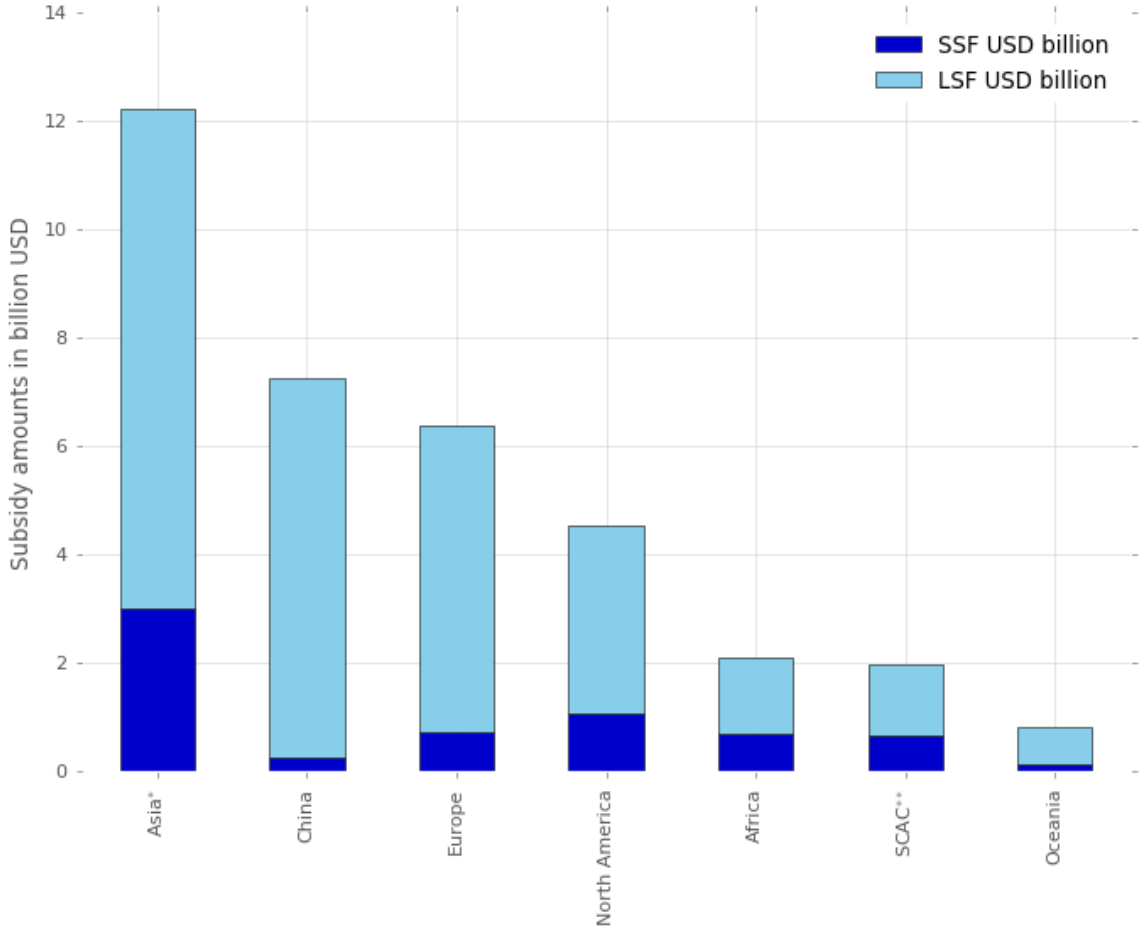

*Figure 4: Subsidy amounts by major region broken down into SSF and LSF for 2018 (constant USD), showing China separately. * excluding China, ** South, Central America and Caribbean.*

When analysing fisheries subsidies provided to the SSF grouped in developing and developed countries, based on the United Nations definition, results indicate that the largest amount is provided as capacity-enhancing subsidies to the LSF sub-sector in the developing countries with USD 13.6 billion. The lowest amount is around USD 245 million, which is the ambiguous category for SSF in developed countries.

Table 1) Global fisheries subsidies (2018) grouped by category and by developed and developing countries for small- and large-scale fisheries.

Category	Developing		Developed	
	LSF (USD in million)	SSF (USD in million)	LSF (USD in million)	SSF (USD in million)
Ambiguous	1,138	439	677	245
Beneficial	4,259	984	4,327	1,055
Capacity-enhancing	13,644	2,451	4,711	1,441
Total	19,041	3,873	9,715	2,749

5. Conclusion

Of the total global fisheries subsidies 18.7 % are provided to the SSF. This is similar to the assessment based on 2009 subsidies information, where results showed a total of 16% being provided to the SSF (Schuhbauer et al. 2017).

Globally, capacity-enhancing subsidies, as a percentage of the global total, has increased from 2009 to 2018 and so has the percentage provided to SSF, which has increased from 11% to 17%. On the other hand, the percentage of beneficial subsidies received by SSF has decreased from 24% in 2009 to 19% in 2018. Additionally, the proportion of ambiguous subsidies provided to the SSF has increased from 15% in 2009 to 27 % in 2018.

Capacity-enhancing subsidies are known to exacerbate overfishing and fuel subsidies alone make up 22% of the total global (Sumaila et al. 2019a). For a chance to bring balance to our global fisheries, which are in bad shape, these subsidies need to be removed for all sub-sectors to be able to support the long-term well-being of fisher and fishing communities (Sumaila et al.

2019c). While it is understandable that subsidies towards SSF are increased to support their short-term needs. However, to really help SSF communities, current capacity-enhancing subsidies provided to the SSF sub-sector need to be redirected with long term goals in mind to work on projects for coastal communities that help them achieve social equity, economic viability and resilience. Otherwise, the depletion of coastal resources that these fishers' livelihoods depend on will continue and their future viability will continue to be threatened.

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