

The effectiveness of fisheries subsidies as a trade policy tool to achieving sustainable development goals at the WTO

Radika Kumar^{a,*}, Ronald Ravinesh Kumar^b, Peter Josef Stauvermann^c, Jadhav Chakradhar^d

^a School of Economics, University of the South Pacific, Suva, Fiji

^b School of Accounting & Finance, University of the South Pacific, Suva, Fiji

^c Dept. of Global Business & Economics, Changwon National University, Republic of Korea

^d Institute for Social and Economic Change (ISEC), Bangalore, India

ARTICLE INFO

JEL classification:

H71
O13
Q01
Q22
Q27

Keywords:

Fisheries subsidies
Oligopoly
UNCLOS
Limited entry technique
Open access
Least developed countries
Sustainable Development Goals (SDGs)
ASC

ABSTRACT

At the 11th Ministerial Conference of the WTO in Argentina, despite being steadfast in achieving an outcome on fisheries subsidies disciplines, member countries were unable to reach consensus on the matter. While members of the WTO have been advocating for sustainable management of fisheries resources and advocating the Sustainable Development Goal (SDG) 14.6, some developing countries were concerned about its impact on low income and poorly resourced fishers, who are surviving because of the subsidies under the discipline. This study provides possible implications of the fisheries subsidies as a trade policy tool for market access and its effectiveness in achieving the overall sustainable development goals. To examine the effectiveness of subsidies in fisheries negotiations, the study focuses on the global supply and demand side of the fisheries resources from the perspective of the fish resource holders and the fishing resource capacity. The analysis considers budgetary support in fisheries, the vessel capacity (tonnage), the fish development technologies and the total marine catch processing, to indicate the demand for extraction of the fish resources. The supply of the fish resources is determined by the regions with major fishing areas and the licenses issued for fishing. Using both the market demand and supply for fisheries resource extraction, the study examines the effectiveness of subsidies as a trade policy tool to attain the overall sustainable development goals. Based on the analysis, certain policy strategies follows, which are important for countries to consider before the elimination of fisheries subsidies at the WTO.

1. Introduction

The negotiations on fisheries subsidies has been ongoing since 2001 when the negotiation was launched at the Doha Ministerial Conference with a mandate to initially clarify and improve the WTO disciplines in fisheries. In 2005, at the Hong Kong Ministerial Conference the mandate was further explained with a call for prohibition of certain forms of fisheries subsidies that contribute to overcapacity and overfishing. In 2017, the Ministers at Buenos Aires at the 11th WTO Ministerial Conference (MC 11) agreed to work towards a programme with a possible delivery of an agreement on fisheries subsidies by 2019 [19]. Within the germane of the WTO, subsidies issued are discussed within

the context of Article 1 and 2 of the Agreement on Subsidies and Countervailing Measures (ASC). Henceforth, numerous debates and discussions have been tabled by developed and developing countries in the Committee on Rules Negotiations.

Despite members being steadfast in ensuring an outcome on fisheries negotiations is achieved, many contentious issues require resolution. Some members of the WTO including the “Friends of the Fish”¹ have strongly attributed the outcomes of the negotiations to the Sustainable Development Goals (SDGs) 14.6.² However, from an economic perspective and without undermining the merits of SDG 14.6, an understanding of the real needs of a country will be equally important as for some countries, fisheries is the main economic sector where largest

* Corresponding author.

E-mail addresses: radika.kumar@usp.ac.fj (R. Kumar), kumar_RN@usp.ac.fj (R.R. Kumar), pstauvermann@t-online.de (P.J. Stauvermann), jadhav@isec.ac.in (J. Chakradhar).

¹ The members of the negotiation group “Friends of Fish” are Argentina, Australia, Chile, Colombia, Ecuador, Iceland, New Zealand, Norway, Pakistan, Peru, United States.

² SDG 14.6 prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, and eliminate subsidies that contribute to IUU fishing, and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the WTO fisheries subsidies negotiation.

<https://doi.org/10.1016/j.marpol.2018.11.034>

Received 22 June 2018; Received in revised form 20 November 2018; Accepted 20 November 2018

Available online 27 November 2018

0308-597X/ © 2018 Elsevier Ltd. All rights reserved.

employment and livelihood comes from. Such countries are poised with the challenge on how they can attain their development goals if the sector is adversely affected. Whilst fulfilling SDG 14.6 goals, members of the WTO need to also ensure that other qualifying and relevant economic and development goals such as ending poverty (Goal 1) and maintaining food security (Goal 2) for developing countries and in particular for the Least Developed Countries (LDCs) and Small Island Countries, are intact. For developing countries that have low income and poorly resourced fishers, achievement of these goals will depend in most part on the fisheries sector and with the removal of subsidies, the consequences can be catastrophic.

Fish is a major source of protein for a large portion of the world's population. Fish is a renewable resource however it can perish if not managed properly. Fishery resources around the world are threatened by over-exploitation ([8], p. 376). More than 75% of the global fish produce is used for direct human consumption. The global market for fishmeal and fish oil is projected to reach a value of USD 14.28 billion by 2022 [9].

According to the 2016 FAO report on the 'State of World Fisheries and Aquaculture', both "fisheries and aquaculture remain an important source of food, nutrition, income and livelihoods for hundreds of millions around the world". The report also shows that in 2016, developing countries accounted for more than half of the fish exports. This clearly indicates that developing countries hold a greater share of the fisheries market compared to the developed economies. For developing and least developed countries, fish is not just used for human consumption, similarly important the sector creates jobs and generates value added by producing processed products. Emerging landlocked developing countries that are exporters of pharmaceutical products including generics of fish oil, use fish as a raw material to produce medicines. Consequently, any disciplines on fisheries subsidies will have an impact on the supply side of the fisheries sector both in terms of consumption and production of high value products.

The paper is organized as follows. Section 2 discusses the various perspectives on subsidies as a trade policy tool; Section 3 briefly highlights the existing mandates on fisheries management; and Section 4 assesses the dynamics of fisheries subsidies as a trade policy tool in the resource extraction and international trade market, and the market access implication of the fisheries subsidies. Finally, Section 5 concludes with a discussion on balancing the disciplines on fisheries subsidies as a trade policy tool on one hand and achieving the SDG on the other.

2. Concept of subsidies in the context of multilateral trade rules

There are different definitions of what constitutes a subsidy. In the context of the WTO, a subsidy is defined in the Agreement on Subsidies and Countervailing Measures (ASCM). Article 1 of the ASCM states three conditions that qualifies a subsidy. A subsidy is a financial contribution by a government or any public body within the territory of a member which involves: (i) a direct transfer of funds (such as grants, loans and equity infusion), potential direct transfers of funds or liabilities (such as loan guarantees); (ii) government revenue that is due, forgone or not collected (for example, fiscal incentives such as tax credits); (iii) goods or services provided by the government, other than general infrastructure or purchased goods; government's payments to a funding mechanism, or for entrusting or directing a private entity to carry out similar functions which would not normally be vested by the government. However, the practices should not differ from those followed by the governments. Moreover, a subsidy is a form of income or price support in the sense of GATT Article XVI where a benefit is conferred. (UNCTAD, 2003, 14). The *Economic Times of India* defines a subsidy as a transfer of money from government to an entity that leads to a fall in prices of subsidized products with the objective of bolstering the welfare of the society.³

³ <https://economictimes.indiatimes.com/definition/subsidy>. A general definition would be that a subsidy is a transfer of money from the government to entity to encourage production and consumption.

Given the widespread subsidization of energy-intensive deep-sea fisheries and the relatively tiny catches they generate globally, a persuasive argument for sustainable fisheries is to shut these fisheries down and redirect subsidies currently allocated to them toward compensating the affected fishers, and helping to rebuild fish populations in highly productive waters closer to fishing ports and markets; and those involved in deep-sea fisheries should assume the burden of proving their sustainability if these fisheries are to develop or continue. Also, it has been argued that ending deep-sea fisheries would be particularly appropriate for the high seas outside the EEZs of maritime countries where fisheries from just a few countries are harming the biodiversity [10].

On fisheries subsidies within the WTO, member countries' have aimed at defining and granting subsidies based on prohibition and elimination. For example, the EU proposal aims to prohibit capacity enhancing subsidies. These include: (i) subsidies that increase the marine fishing capacity of a fishing vessel or support the acquisition of equipment that increases the ability of a fishing vessel to find fish; (ii) subsidies that support the construction of fishing vessels; and (iii) subsidies for the transfer of fishing vessels to other countries through the creation of joint ventures with partners of those countries.⁴ The condition to grant or maintain any subsidies under the EU proposal has been linked to stringent conditions on fisheries management [21]. The proposals of Iceland, New Zealand and Pakistan aim to prohibit subsidies for: (i) illegal, unreported and unregulated fishing; (ii) fishing activities where stocks are not assessed or are assessed as being overfished and (iii) fishing activities on the high seas and in the waters of another member. Also, the aim is to prohibit all subsidies which contribute to overfishing and overcapacity [16].

The disciplines in relation to fisheries subsidies can also be attributed to the open access and limited entry policies in the sector. According to Kahn [8], the open access regulations modify the fishing behavior of the participants in the fishery without directly affecting their participation. The open access regulations typically raise the cost of fishing. However, they may indirectly affect the participation in the fishery by causing the marginal fisher to become unprofitable and leave the fishery. Thus, the regulations are designed to maintain fish stocks at some target level. The Limited Entry Technique on the other hand imposes a cap on the total catch. Thus, each fisher in the fishery is allocated a portion of this total catch. The initial allocation can be conducted through several means, including auction, lottery or based on previous catch data. The allocation is given to individual fisher as a quota and the fisher can sell all or part of the quota. The level of effort is restricted and dependent on their available quotas to fish.

A further study by Teh et al. [15] tests the hypothesis of eliciting the discount rates of fishers in an open access small-scale reef fishery, and compares these rates to fishers in a customary managed reef fishery. Results indicate that fishers in both open access and traditionally managed reef fisheries have high annual discount rates that are on average over 200%. Contrary to expectations, fishers in an open access system are not associated with higher discount rates compared to customary management. It also appears that a larger proportion of open access fishers are more long-term oriented than those in the customary managed fishery, which is encouraging for the future conservation and sustainability of open access fisheries resources.

In general it is not clear, which countries are likely to be major beneficiaries from the disciplines on fisheries subsidies. Grynberg [7] highlights that there is a "mixed collection of countries with

⁴ It should be noted that in relation to vessel repair, depreciation would be possibly included. Depreciation is the monetary value of an asset over time due to use, wear and tear or obsolescence. Repairs do not cover this monetary value, repairs makes it possible to continue to use a fishing vessel.

commercial interest and those which believe that fisheries subsidies disciplines will constitute an important step towards environmental sustainability. With the “Friends of Fish” group, substantially and clearly demonstrable commercial interest is at stake for Iceland and New Zealand. Both nations have a highly efficient and competitive fishing fleet but neither carry significant bargaining power. Iceland fisheries constitutes 75% of export earnings and hence the government simply cannot compete with other WTO members on subsidies i.e., the Icelandic economy cannot subsidize. In the case of New Zealand, which has pursued a policy of aggressive unilateral liberalization, there is no opposition to such subsidies.” Thus, New Zealand and Iceland will both benefit from the exit of other players which are currently subsidizing their fisheries. The EU has reduced its subsidies over time and has achieved the required level of fleet capacity. It is thus advocating for an even stronger position in relation to the elimination of subsidies arguing that such a strategy will also be beneficial for fisheries because of fewer players in the market. Although it is politically very popular to claim that sustainability is the driving motive for the proposal to cut and abolish subsidies, it must be doubted if this is the real driving force. The simple reason from national view is that a small number of people benefit from a huge amount of subsidies (for example the EU subsidizes every job in the fishery sector with roughly with \$ 32,000 per job and year⁵) while the amount of subsidy financed per consumer is relatively small (\$ 11 per capita and year⁶). These numbers indicate the collective action problem [11] in which the fishery sector has a very strong political power and the taxpayer close to none. Under these circumstances, a rational government will propose only a cut of subsidies if it expects that their fisheries will be implicitly compensated through a bigger market share so that the income of the fishery sector remains at minimum constant. This outcome is confirmed by Grynberg [7], who argues that if the EU and the other so called “Friends of Fish” are genuinely interested in fish stock depletion, fisheries would have been a component of the disciplines on Agreement on Agriculture. Moreover, “during the Uruguay Round political opposition to the inclusion of fisheries under the reduction commitment disciplines of the Agreement on Agriculture came from the EU and those countries called ‘the Friends of Fisheries.’” ([7], p. 503).

As noted, the fisheries subsidies negotiations in the context of the WTO is complex. For developing countries, effective special and differential treatment are core to ensuring that it benefits from the rules in relation to fisheries subsidies discipline. According to Fritz [6], the special and differential treatment provision has six categories. These include: (a) a provision aimed at increasing trade opportunities; (b) a provision to safeguard the interests of developing countries; (c) a flexibility of commitments; (d) transitional periods; (e) technical assistance; and (f) provisions related to Least Developed Countries. Therefore, to ensure that fisheries resources are sustainably managed, it is important to examine the effect of subsidies as a trade policy tool from the demand and supply perspectives.

3. Mandates on fisheries resource management

There are several mandates and international instruments that recognize the importance of fisheries. At the international level, within the ambit of the United Nations, the two legally binding instruments in relation to fisheries management are the United Nations Convention on

the Law of the Sea (UNCLOS) and the UN Fish Stock Agreement. Under the UNCLOS, member states have the sovereign right to explore, exploit, conserve and manage the fisheries in their EEZ. Article 61 of UNCLOS and the “Conservation of Living Resources” states that “the coastal state, taking into account the best scientific evidence available to it, shall ensure through proper conservation and management measures that maintenance of living resources in the exclusive economic zone is not endangered by over-exploitation. As appropriate, the coastal state and competent international organizations, whether sub regional, regional or global are required to cooperate”. Article 61 of UNCLOS further states that such measures shall also be designed to maintain or restore populations of harvested species at levels which can produce the maximum sustainable yield, as qualified by relevant environmental and economic factors, including the economic needs of coastal fishing communities and the special requirements of developing states” ([4]:46).

Furthermore, the UNCLOS is complemented with the UN Fish Stock Agreement. The latter aims to ensure long-term conservation and sustainable use of straddling and highly migratory fish stocks through effective implementation. Article 5 of the agreement states that in order to conserve and manage straddling and highly migratory fish stocks, coastal states and states fishing on the high seas should: (a) adopt measures to ensure long-term sustainability of straddling fish stocks and highly migratory fish stocks and promote the objective of their optimum utilization; (b) ensure that such measures are based on the best scientific evidence available – designed to maintain or restore stocks at levels capable of producing maximum sustainable yield as qualified by relevant environmental and economic factors, including the special requirements of developing states, and to take into account fishing patterns, the interdependence of stocks and any generally recommended international minimum standards, whether sub regional, regional or global; (c) prevent or eliminate overfishing capacity; (d) ensure that levels of fishing effort do not exceed those commensurate with the sustainable use of fishery resources; and (e) take into account the interest of artisanal and subsistence fisheries. A study on the global assessment of mean tropic level from catches, trawl surveys and fisheries stock assessment recommends that greater efforts to measure the true abundance trends of marine species, especially those most vulnerable to fishing, are required to detect the impacts of fishing on marine biodiversity [1].

A study on scombrids and billfish [2] recommends that the future of these threatened species rests on the ability of regional fisheries management organizations (RFMOs) and fishing nations to properly manage these species. In the case of Southern and Atlantic bluefin, their populations have been reduced to an extent that the most expeditious way to restore abundances and to avoid a collapse with great certainty is to shut down the fishery until stocks are regenerated to healthy levels. However, this would cause substantial hardship and hinder the ability of RFMOs to control fishing because of the increased incentive for illegal fishing which would be created.

Part VII of the UN Fish Stock Agreement recognizes the special requirements of developing countries. It stipulates that countries shall give full recognition to the special requirements of developing states in relation to conservation and management of straddling fish stocks [17]. Apart from the legally binding instruments there are other non-binding voluntary international commitments regarding to fisheries, which the involved states aim to implement. These commitments include the FAO Code of Conduct for Responsible Fishing, the International Plan of Action on illegal and unreported fishing (IPOA-IUU), the International Plan of Action for reducing Incidental Catch of Seabirds in Long-line Fishing, the International Plan of Action for Conservation and Management Measures (CMMs) of Sharks, the International Plan of Action for Fishing Capacity, the FAO Voluntary Guidelines for Securing Small Scale Fisheries and the FAO Agreement on Port State Measures. Apart from these voluntary standards on fisheries, there are certain private standards that have become the norm on fisheries product certification

⁵ Please note this number is calculated very roughly, based on Sumaila et al. [14] regarding the subsidies and European Commission [5] regarding the number of jobs.

⁶ Please note this number is roughly estimated based on Sumaila et al. [14] regarding the subsidies this number is divided by population. Thus, we did not consider the effect that the price of fish is decreased by the subsidies, but if we would consider it the costs of the fishery subsidies per capita would decline and our argument would become stronger.

such as the Marine Stewardship certification (MSC).

The MSC harnesses the consumers' purchasing power to generate changes and promote environmentally responsible stewardship. In order to reward the environmentally responsible fisheries management and fishing practices, a product label is developed on the basis of specific general standards defining sustainable fisheries. After extensive certification process the label can be awarded for 5 years and subsequently renewed. By 2006, 21 fisheries had received the MSC label of which eight were found in United Kingdom, six in United States, two in Australia and others in New Zealand, South Africa, the Netherlands, Mexico and Sweden. Once a fishery is certified and the traceability requirements are met throughout the supply chain, the use of the MSC logo on the final product is licensed [12].⁷

In addition, SDG 14.6 states that members are to, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, and eliminate subsidies that contribute to illegal and unreported fishing. Moreover, member countries must refrain from introducing new such subsidies. The SDG 14.6 also underscores that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the WTO fisheries subsidies negotiation.

In the context of the WTO, Annex D of the Doha Mandate on the Rules on Anti-Dumping and Subsidies and Countervailing Measures include, fisheries subsidies and recalls the commitment at Doha on enhancing the mutual supportiveness of trade and environment. Moreover, the Annex notes a broad agreement that the participants should strengthen disciplines on subsidies in the fisheries sector, including through the prohibition of certain forms of fisheries subsidies that contribute to overcapacity and over fishing, and to promptly undertake further detailed work on establishing the nature and extent of such disciplines like transparency and enforceability.⁸ The Doha mandate in relation to fisheries also stated that “appropriate and effective special and differential treatment for developing and least-developed members should be an integral part of the fisheries subsidies negotiations, taking into account the importance of this sector to development priorities, poverty reduction and livelihood and food security concerns” [20].

The Hong Kong Ministerial Declaration further augmented the need to strengthen the disciplines on subsidies that contribute to overcapacity, overfishing and the provision of appropriate and effective Special and Differential Treatment (S&DT) for developing countries. The mandate states that “appropriate and effective” special and differential Treatment for developing and least-developed members should be an integral part of the fisheries subsidies negotiations, taking into account the importance of this sector to development priorities, poverty reduction, livelihood and food security concerns (World Trade Organization, 2005).

The Hong Kong mandate reflects the reality of the challenge for developing countries. While requiring the prohibition of subsidies that negatively impact fisheries resources, the mandate recognizes that the fisheries sector is crucial for many developing countries, where the role of fisheries subsidies cannot be excluded. As such, subsidies disciplines and developmental aspirations are not contradictory and need to be reconciled to achieve meaningful results in the fisheries subsidies negotiations.

In 2015, at the Nairobi Ministerial Meeting, the WTO members had further aimed at reaching a conclusion on fisheries subsidies

⁷ It should be noted that recently the MSC was criticized by 50 environmental NGOs in open letter (https://awionline.org/sites/default/files/uploads/documents/FINAL_letterMSC_19JAN2017.pdf) and Christian et al. [3] for its lax certification policy. Additionally, Ponte [13] criticized the MSC that not only one fishing enterprise from a LDC is certified. The latter implies that the high costs of certification act like a barrier to market entry in favor for fisheries from developed countries.

negotiations. However, an agreement could not be reached. On the sidelines, a group of 28 States had issued a Ministerial Statement on the importance of the fisheries sector [22]. Since then, the WTO members have tried to intensify negotiations on formulating disciplines on fisheries subsidies. Members were steadfast in achieving an outcome on fisheries subsidies negotiations in Buenos Aires in December 2017. Some members have premised the negotiations on specifics of the SDG 14.6 goals which further make reference to the prohibition of certain forms of fisheries subsidies that contribute to overcapacity and overfishing – these included International Plan of Action for Fishing Capacity, the FAO Voluntary Guidelines for Securing Small Scale Fisheries, and the FAO Agreement on Port State Measures.

At the recent 11th Ministerial Conference in 2017 in Argentina, the WTO members decided to build on the progress made in fisheries subsidies negotiations. The members' agreed to continue engaging constructively in the fisheries subsidies negotiations with the prospect that an agreement on comprehensive and effective disciplines will be adopted by the Ministerial Conference in 2019 that: (a) prohibit certain forms of fisheries subsidies that contribute to overcapacity and overfishing, and (b) eliminate subsidies that contribute to illegal unreported and unregulated fishing on the understanding that appropriate and effective special and differential treatment for developing and least developed country members should be an integral part of these negotiations.

4. An assessment of fisheries subsidies as a trade policy tool in resource extraction and international trade

4.1. Methodology for analysis

Based on the limited entry technique (LET) policy in fisheries, the analyses consider fisheries subsidies as a trade policy tool from a demand and supply perspective on resource extraction and international trade. The demand for fish resources in this case is assumed to be the demand for the extraction of fisheries resources. The demand for extraction of fisheries resources is assessed by the size of the fishing vessels in selected developed countries measured in gross tonnage, by the estimated budgetary support by these countries in the fisheries sector (these includes both specific and non-specific subsidies) and by the availability of fisheries technology by these countries. Further underlying assumptions attributed to the three variables in assessing the demand for the fisheries resource extraction are as follows:

- The capacity of fishing vessels in selected developed countries is measured in gross tonnage – the greater the number of fishing vessel with higher gross tonnage owned by a country, the greater is the capacity to extract fisheries resources (i.e. demand for license to fish);
- The higher the budgetary support to the fisheries sector, the greater is the assistance provided for the development of the sector, and thus the greater is the demand for the fish resources;
- The more advanced fishing technologies owned by countries are available, the greater is the demand for the fish resources.

In relation to the supply side of fisheries, the variables examined regarding the supply side are, the list of countries with highest marine catch, and the size of the fishing area by region. The following assumptions are made for these two variables:

- For those countries that are currently ranked as highest marine catch producers are the major global suppliers of the fish products in the international market.
- The countries within the region that are within the major fishing areas are the holders of the fisheries resources and thus are the suppliers of fisheries, either by own extraction (fishing) or by issuing licenses to the demanders or the marine catch producers to do the fishing.

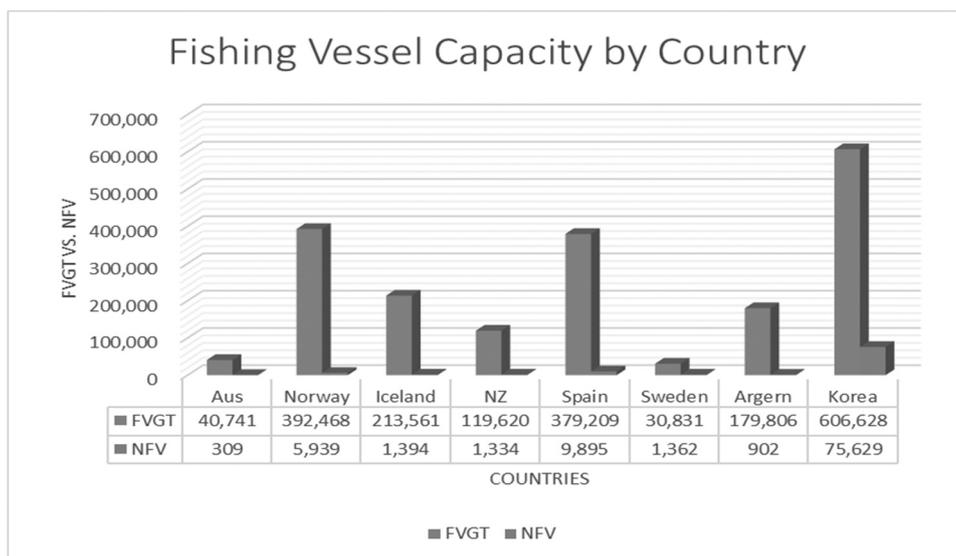


Fig. 1. Fishing Vessel Capacity of Selected OECD Countries.

4.2. An assessment of the demand side of the fisheries resource extraction market

4.2.1. Fishing vessel capacity by country

Data from the OECD database is used to analyze the fishing vessel capacity of selected countries. Fig. 1 shows the number of fishing vessel (NFV) and the total fishing vessel by gross tonnage (FVGT) for selected countries. (Australia, Norway, Iceland, New Zealand, Spain, Sweden, Argentina and Republic of Korea). The fishing capacity is measured by the Gross Tonnage of the Fishing Vessel. (FVGT). As per the OECD definition, the Gross Registered Tonnage of the vessel represents the total cubic content of the permanently enclosed spaces of a vessel, with some allowance or deduction for exempt spaces such as living quarters. Within the group, Korea has the largest FVGT of 606,628 t and the total number of vessel (NFV) of 75,629. Next is Norway (FVGT of 392,468 t and NFV of 5939), followed by Spain (FVGT of 379,209 t and NFV of 9895), Argentina (FVGT of 179,806 and NFV of 902), New Zealand (FVGT of 119,620 and NFV of 1334), Australia (FVGT of 40,741 and NFV of 309) and Sweden (FVGT of 30,831 and NFV of 1362). These countries have a high fishing capacity in relation to the gross

tonnage of their respective fishing vessels thus forming the demand for fisheries resource extraction.

4.2.2. Fishing vessel numbers and capacity in tonnes per vessel size

Fig. 2, analyses the fishing vessel capacity in the selected countries of the OECD by the vessel size. The gross tonnage per vessel size of selected countries are examined. The vessel size of 24 m and above in this case indicate large scale commercial fishers and thus the increase in demand for fish resource extraction. Fig. 2 shows the number of vessels owned by selected countries that range from 24 m to greater than 75 m in size and the gross tonnage per vessel. For Australia its gross tonnage per vessel size (GTPVS) is highest for vessel range between 24 and 29.9 m. The gross tonnage per vessel in the range of 24–29.9 m for Australia is 5498 t per vessel. The second largest GTPVS for Australia is for vessels range of 75 m and above. The gross tonnage per vessel in the range of 75 m and above is 3558 t. On average the gross tonnage per vessel size that range between 24–75 m and above for Australia is 3740 t per vessel. For Norway, the highest GTPVS is between 60 and 74.9 m with a gross tonnage of 155,542 per vessel. The second largest

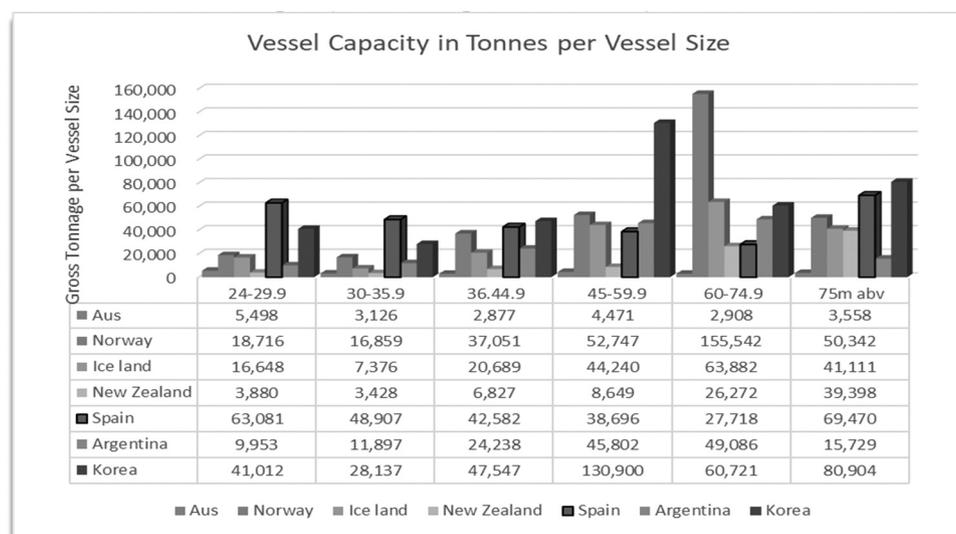


Fig. 2. Vessel capacity in tonnes per vessel size by selected OECD countries.

GTPVS for Norway, is between 45 and 59.9 m with 52,747 t per vessel. On average the gross tonnage per vessel size that range between 24–75 m and above for Norway is 55,300 t per vessel.

For Iceland, the highest GTPVS is between 60 and 74.9 m with a gross tonnage of 63,882 per vessel. The second largest GTPVS for Iceland is between 45 and 59.9 m with 44,240 t per vessel. On average, the gross tonnage per vessel size that range between 24–75 m and above for Iceland is 32,324 t per vessel.

For New Zealand, the highest GTPVS are for vessels 75 m and above. The gross tonnage for vessel size of 75 m and above is 39,398 t per vessel. The second largest GTPVS are for vessel size that range from 60 to 74.9 m. The GTPVS for these vessels are 26,272 t per vessel. On average the gross tonnage per vessel size that range between 24–75 m and above for New Zealand is 147,42 t per vessel. For Spain, the highest GTPVS are for vessels of 75 m and above. The GTPVS for vessel size of 75 m and above is 69,470 t per vessel. The second largest GTPVS for Spain, is between 24 and 29.9 m with 63,081 t per vessel. On average the gross tonnage per vessel size that range between 24–75 m and above for Spain is 48,409 t per vessel.

For Argentina, the highest GTPVS is between 60 and 74.9 m with a gross tonnage of 49,086 t per vessel. The second largest GTPVS for Argentina, is between 45 and 59.9 m with 45,802 t per vessel. On average GTPVS that range between 24–75 m and above for Argentina is 26,118 t per vessel. For Korea, the highest GTPVS is between 45 and 59.9 m with a GTPVS of 130,900 t per vessel. The second largest GTPVS for Korea is for vessel range of 75 m and above with 80,904 t and 45,802 t per vessel. On average GTPVS that range between 24–75 m and above for Korea is 64,885 t per vessel.

The estimated budgetary support from the OECD database comprise of non-specific subsidies of a selected group of countries. Under the limited entry policy of fisheries, incentives also have an impact on the fish resources. In this case, it is assumed that the budgetary support of the fisheries sector also affects the demand for the extraction of fisheries resources. The greater the budgetary support in the fisheries sector, for example research and development, the stronger the demand for the fisheries resources, *ceteris paribus*. Fig. 3 represents the list of OECD countries that are major providers of budgetary support to its fisheries sector. Japan provides the highest level of budgetary support of USD 1196 m. Other selected developed countries also provide significant budgetary support for the fisheries sector. These include in terms of millions (m) of US dollars, Australia (\$121 m), Belgium (\$4.3 m), Canada (\$655 m), Croatia (\$236 m), Denmark (\$60 m), Estonia (\$6 m), France (\$92 m), Germany (\$35 m), Greece (\$37 m), Iceland (\$6 m), Ireland (\$34 m), Netherlands (\$7 m), and New Zealand (\$47 m).

Table 1

List of Major Fishing Areas by regional EEZ and Percentage of major fishing area.

Source: Food and Agriculture Organization (FAO)

Region	Major Fishing Area (km.sq).	Percentage
Indian Ocean, Western	29,300,000	8.1
Indian Ocean, Eastern	31,100,000	8.6
Total Indian Ocean	34,100,000	16.7
Pacific, Northwest	21,500,000	6.0
Pacific, Northeast	7,600,000	2.1
Pacific, Western Central	33,300,000	9.2
Pacific, Eastern Central	48,100,000	13.3
Pacific, Southwest	27,700,000	7.7
Pacific, Southeast	30,800,000	8.5
Total Pacific Ocean	169,000,000	46.8
Atlantic, Antarctic	11,800,000	3.3
Indian Ocean, Antarctic	12,700,000	3.5
Pacific, Antarctic	9,600,000	2.7
Total Southern Ocean	34,100,000	9.5
Arctic Sea	9,300,000	2.6
Atlantic, Northwest	6,300,000	1.7
Atlantic, Northeast	14,400,000	4.0
Atlantic, Western Central	14,500,000	4.0
Atlantic, Eastern Central	14,100,000	3.9
Mediterranean and Black Sea	3,000,000	0.8
Atlantic, Southwest	17,500,000	4.8
Atlantic, Southeast	18,300,000	5.1
Total Atlantic Ocean and adjacent seas	79,100,000	21.8

Netherlands (\$7 m) and New Zealand (\$47 m). The subsidies which are provided by these countries are non-specific in nature and hence are not covered by the Agreement on Subsidies and Countervailing measures.

4.3. Supply of fisheries resources

The supply of fisheries is determined by the owners of fisheries resources and the countries that are ranked as the largest marine catch producers.

4.3.1. Owners of fisheries resources

The owners of fisheries resources are countries within various regions in the FAO database which have large EEZ that are declared as major fishing areas. The assumption is that these countries within the

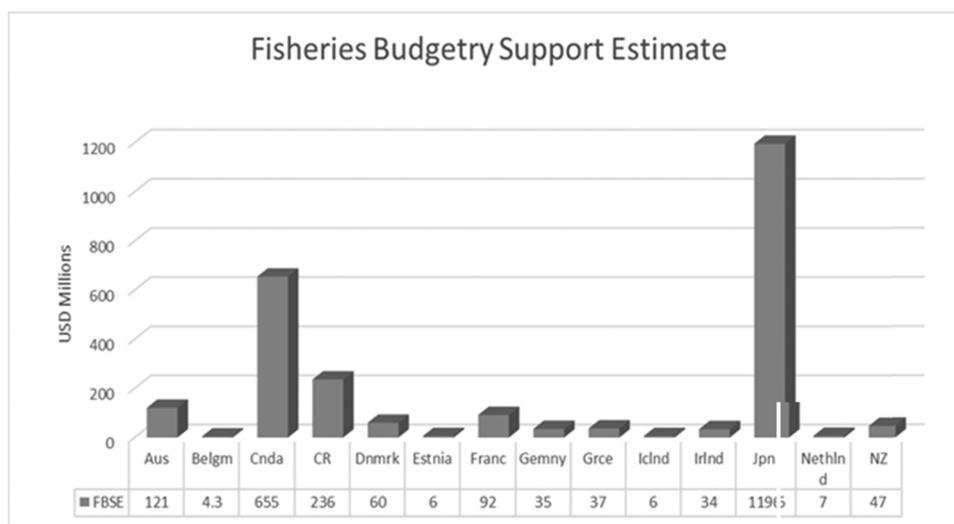


Fig. 3. Fisheries Budgetary Support Estimate by OECD Countries.

major fishing areas zone of the EEZ are the holders of the fish resources. These countries can either: (i) fish and export, or (ii) they can issue fishing licenses to nations that have the vessel capacity to fish in the waters under the terms, conditions and jurisdiction of the resource holder countries. [Table 1](#) shows that the Pacific Ocean contains the major fishing areas. The major fishing countries are abundant in fisheries resources and thus are the major holders of the fish resources. For the Western Central Pacific countries, the Western Central Pacific Fishing Commission (WCPFC) managing the resources. From the [Table 1](#) it can be derived that the major fishing areas by country are located in the Pacific Ocean. Within the Pacific Ocean region, the countries in the Eastern Central Pacific and the Western Central Pacific own major fishing areas. Countries within the Western Pacific region comprise of small island states which include countries such as Fiji, Marshall Islands, Federated States of Micronesia, Samoa, Tonga, Palau, Kiribati and others. All these countries are members of the United Nations and some are members of the WTO.

Most of these small island states with major fishing areas are holders of fish resource but do not have large industrial fishing. As a result, they issue licenses to other countries that have the sufficient fishing capacity. The licenses are issued through a bilateral fisheries access arrangement which stipulates the terms and conditions of harvesting fisheries. These conditions are embedded in the agreements to ensure sustainable management of the fisheries resources. The access fees from the arrangement also forms a major source of income for many small island states. Given the demand for fishing licenses, the holder of the fish resources are able to determine the price of a license by varying the quantity of fishing licenses they offer. The small island countries are therefore the price setters for the access to fish resources.

4.3.2. Current global marine suppliers of fisheries resources

[Table 2](#) shows world ranking of marine catch and producers. The world's major marine catch producers are China (17.7%), Indonesia (6.54%), Peru (6.28%), USA (5.6%), EU-28 (5.17%), India (4.92%), Russia (4.65%), Myanmar (4.05%), Japan (4%), Vietnam (3%), Philippines (2.5%), Chile (2.45%), Norway (2.38%) and Thailand (1.97%). The rest of the world produces 28.75%. The data clearly shows the market share in fisheries is dominated by China, followed by Indonesia, Peru, USA, and others. Among these, 9 are developing countries. The major competing developed countries are USA, Japan and Norway. With respect to the world's major marine catch producers ([Table 2](#)) it can be noted that: (i) they are the current global suppliers of fish resources; (ii) they hold the capacity to bid for the fish access resources and (iii) they are the major competitors to countries identified with major fishing capacity (i.e. the demanders for access to fish resource extraction).

Table 2

World Top Marine Catch Producers.

Source: EC Facts and Figures in Common Fisheries Policy, 2016.

Country	Marine Catch (Volume in tonnes)	Marine Catch (%)
China	16,557,949	17.70
Indonesia	6,120,137	6.54
Peru	5,876,322	6.28
USA	5,242,379	5.60
EU-28	481,560	5.17
India	4,645,182	4.92
Russia	4,351,209	4.65
Myanmar	3,786,840	4.05
Japan	3,741,959	4.00
Vietnam	2,803,800	3.00
Philippines	2,335,404	2.50
Chile	2,288,874	2.45
Norway	2,228,513	2.38
Thailand	1,843,747	1.97
Others	26,899,394	28.75

4.4. Market access implication of subsidies in the fisheries resource extraction sector

From the above analysis, an examination of the market for fisheries resource extraction follows. The market access for fisheries resource extraction has three major groups of countries that have varied interest in fisheries resources: (i) the holders of fisheries resources; (ii) the holders of fish extraction capacity; and (iii) the current suppliers of marine capture in fisheries. The holders of the fisheries resources hold the major fishing areas and are primarily the small island states. These countries have a low export base but are abundant in fish resources within its EEZs. In addition, these countries have the potential to sell fish access rights to the highest bidder through bilateral fisheries access arrangement.

The holders of fish extraction capacity are those countries that hold the largest number of fishing vessels by gross tonnage, have the largest fishing capacity and technological advancements in the fisheries sector, but do not have enough quantity of raw fisheries resources. If these countries intend to maintain a vibrant fisheries sector, they will have to compete and bid with other countries for fishing licenses. As a result, these countries are demanders of extraction of fish resources.

The third category includes countries that represent the largest share of the marine capture producers. As noted from [Table 2](#), these are mainly the larger developing countries. These countries are suppliers of marine capture as processors of the fish in the international fish trade market and are also the demanders for fishing licenses.

The matrix ([Fig. 4](#)) given below shows the outcomes in relation to two scenarios: (i) the instance of retention and introduction of fisheries subsidies; and (ii) the removal of fisheries subsidies in relation to global market domination and competition in the market for fisheries resource extraction and exports.

As a result, there are two scenarios that are possible in the fisheries market when discussing the fisheries subsidies as a trade policy tool and sustainability. These are discussed in turn.

4.4.1. Scenario 1: retention of fisheries subsidies

The access to fish resources are based on the access rights provided to the fishers. The access fees are paid to the holders of the fisheries resources, which in this case are the countries in the region with major fishing areas and those that are willing to sell fishing licenses to the demanders of the fish resource extraction. The price is paid to the coastal state that owns the resources in the EEZ. The fishing license is provided either by the country selling its fishing rights to the nation individually or through access arrangements.

Given that the fish resources are limited, the holders of fish resources (the coastal states) usually determine the price. Each access rights are granted with terms and conditions on management based on the fisheries law and regulation of the access granting member. A price is paid for the license to access the fisheries resources.

As per scenario 1, with the retention of the fisheries subsidies, the countries that are also the major marine capture producers can compete in the market for fisheries resource sector. As such, there is competition from: (i) the major developed countries that have the fishing capacity but limited to no fish resources; and (ii) the major marine capture producers. These two groups form the total demand in the market for fish resource extraction. In this case, the provision of subsidy is an important trade policy measure to ensure that the countries that are demanders of fisheries resources (some from the major marine capture producers of fish) can compete with the countries that have the fishing capacity and the technology to bid for the licenses. As a result, the fisheries subsidy as a trade policy measure creates a level playing field for the developing countries to compete in bidding for the fisheries resources. Additionally, fisheries subsidy as a trade policy tool aids the small island states (i.e. fish resources holders) to venture into commercial fisheries in future. In this case, the provision of subsidies acts as a positive tool for development and achieving the SDG including Goal 1

Scenarios	Developed countries' producers with vessel capacity and non-specific subsidy are issued license	Developed countries' producers with vessel capacity and non-specific subsidy are <u>not</u> issued license
Developing countries' current global marine catch producers retain existing and introduces new subsidies, and are issued fishing licenses	Competition	No market domination Competition
Developing countries' current global marine catch producers eliminate specific fisheries subsidies and are <u>not</u> issued fishing licenses	Exit fisheries market	Exit fisheries market Compete and dominate

Fig. 4. Possible outcomes based on fisheries subsidies and licenses.

on ending poverty, Goal 2 on maintain food security and Goal 14.7 on sustainable use, and increasing the benefits, of marine resources to small island states and least developed countries.

4.4.2. Scenario 2: removal of fisheries subsidies

The next part of the analysis considers the removal of fisheries subsidy as a trade policy measure in fisheries.

- (a) *The countries with fisheries capacity and technology:* These are countries which have already eliminated fisheries subsidies that are specific in nature but are heavily subsidized through budgetary support i.e. non-specific subsidies. In addition, they have the fisheries resources in relation to the vessel capacity and the technology. Thus, if subsidies are eliminated, some of the countries that depend on specific subsidies may not be able to compete with fish capacity holding countries. As a result, such an approach will provide a competitive edge to the fishers from the developed countries that are providing non-specific subsidies and have huge fishing vessel capacity.
- (b) *The countries that are major marine capture producers:* The elimination of fisheries subsidies would affect the countries that are marine capture producers that provide competition in the market. Based on the limited entry policy, the removal of fisheries subsidies would deter the fishermen from these countries to fish. Given that these comprise of developing countries, it would severely affect large number of low income and poorly resourced fishermen. At the macroeconomic frontier, the balance of payments of the developing countries will be affected if they are major exporters of fisheries products. Hence, the removal of subsidies will have a negative effect regarding the achievement of the SDGs.
- (c) *Fish resource holders:* The price of the fisheries resources, which is the price of fishing licenses that small coastal states receive as their major source of revenue, will also be affected. If subsidies are eliminated and the fishermen from the countries that are major marine producers are affected by the measure and supposedly exit the market, the price of the fisheries resources may be negatively affected. Initially when subsidies are allowed, there are many fishing nations demanding fishing rights, as in the situation of too many firms in a perfectly competitive market. If the existing marine capture producers (of developing fishing nations) are unable to compete due to reduction or elimination of subsidies, they will exit the market for fish resource extraction. As a result, the demand for fish resources and therefore the demand for fishing licenses

weakens with the consequence that the price of licenses also decreases. Consequently, a lower price of fishing licenses will affect the revenue of small coastal states negatively and create a situation of oligopolistic behavior from the developed countries, due to the limited number of demanders. (Fig. 4). If this happens, the entire global value chain of fisheries will be affected, because the demanders of fish resources are the suppliers of caught fish. Thus, the number of suppliers in this market also decrease with the consequence that the price of raw fish will increase. In such a situation, the attainment of the SDGs will also be hampered, because all consumers in developing countries will be adversely affected by an increased price of fish. As an outcome this will lead to an adverse effect on food security and poverty alleviation thus affecting the attainment of SDGs by 2030.

5. Conclusion

From the analysis, it is evident that given the different stages of development between countries, particularly in regards the developed and the developing countries (including the LDCs), a direct elimination of fisheries subsidies will not have the desired outcome of achieving the SDGs. Even though there will be a positive welfare effect resulting from the elimination of fisheries subsidies, the resulting adverse welfare effects on countries that are major producers of marine capture (which comprise mostly of developing countries), will probably be much bigger. As a result, the overall global welfare will be negatively affected given that most of the world's low-income fishermen are living in the developing countries.

Thus, to ensure that the utilization of subsidies as a trade policy tool benefits all the members of WTO, and addresses the concentrate issue of illegal unreported and unregulated fishing, a number of global commitments in the fisheries sector are needed prior to the elimination of fisheries subsidies. Commitments are required at the global level in fisheries sector pertaining to the development assistance in the sector. The development assistance should target the developing countries fisheries private sector to develop its fishing capacity, so they are able to compete with major global players and retain the competition for the world market price of fisheries.

To make subsidies an effective tool in the fisheries sector, prior commitments in the following areas are required:

- (a) Commitment on fisheries technology and knowledge transfer in a transparent manner from the developed countries to the developing

countries. Technology transfer in fish and aquaculture harvesting and processing should be prioritized. Such technologies are required to address the concerns of the export standards in the fishing sector to a large extent. Financial and technical assistance, as well as technology transfer (Target 14.a), will be important to many small island developing states (SIDS) and LDCs as they strive to create and implement national and regional strategies for sustainability, preservation and protection of their fisheries industries. (UNCTAD, 2016). This will assist in improving the governance of trade in fish products. Fisheries governance regimes are very expensive to set up and operate, and their cost can depend on the type of conservation and management measures implemented. These costs range from scientific advice and management to enforcement – monitoring, control, and surveillance [18].

- (b) The developed countries with the large fishing capacity need to reduce its fishing capacity which can then be allocated or transferred to the developing countries with the priority given to LDCs and SIDS. The right of coastal states to domesticate their fisheries sector is assured under UNCLOS and any possible WTO disciplines should not undermine the fundamental principles [7].
- (c) In order to ensure that developing countries are able to fully integrate into the fisheries export market without creating an imbalance in its trade, issues of illegal unreported and unregulated fisheries certification in terms of mutual recognition and equivalence of standards has to be discussed first and foremost in the WTO context. These need to be addressed in the trade arena in order to ensure reasonable and effective utilization and/or elimination of fisheries subsidies as a trade policy tool for sustainability. Failure to discuss these issues will result in a situation of making certain countries better off and others worse, giving rise to a global market failure in fisheries resources. It must be emphasized that failure to address the needs of developing countries will have negative welfare effects caused by the elimination of subsidies. As a result, the overall effect of the SDGs will be derailed when assessed in terms of food security and poverty alleviation and elimination of fisheries subsidies in 2030.

Acknowledgements

The authors are thankful the comments and advice of anonymous reviewers and the editor in Chief, Professor Hance Smith. Also, one of the co-authors, Peter Stauvermann thankfully acknowledges the financial support of the Changwon National University 2018–2019. The usual disclaimer applies.

References

- [1] T.A. Branch, R. Watson, E.A. Fulton, S. Jennings, C.R. McGilliard, G.T. Pablico,

- S.R. Tracey, The trophic fingerprint of marine fisheries, *Nature* 468 (7322) (2010) 431.
- [2] B.B. Collette, K.E. Carpenter, B.A. Polidoro, M.J. Jorda, A. Boustany, D.J. Die, C. Elfes, W. Fox, J. Graves, L. Harrison, R. McManus, C.V. Mente-Vera, R.J. Nelson, V. Restrepo, J. Schratwieser, C.-L. Sun, A. Amorim, P.M. Brick, C. Canales, G. Cardenas, S.-K. Chang, W.-C. Chiang, L.J.N. de Oliveira, H. Harwell, R. Lessa, F.L. Fredou, H.A. Oxenford, R. Serra, K.-T. Shao, R. Sumaila, S.-P. Wang, R. Watson, E. Yáñez, High value and long-lived - double jeopardy for tunas and billfishes, *Science* 333 (6040) (2011) 291–292, <https://doi.org/10.1126/science.1208730>.
- [3] C. Christian, D. Ainley, M. Bailey, P. Dayton, J. Hocevar, M. LeVine, J. Nikoloyuk, C. Nouvian, E. Velarde, R. Werner, J. Jacquet, A review of formal objections to marine Stewardship Council fisheries certifications, *Biol. Conserv.* 16 (2013) 10–17.
- [4] J.S. Davidson, New Zealand - United Nations Convention on the law of the Sea act 1996, *Int. J. Mar. Coast. Law* 12 (3) (1997) 404–412, <https://doi.org/10.1163/157180897x00275>.
- [5] European Commission, Facts and figures on the common fisheries policy, Brussels https://ec.europa.eu/fisheries/sites/fisheries/files/docs/body/pcf_en.pdf, 2016.
- [6] T. Fritz, Special and differential treatment for developing countries, *Glob. Issue Pap.* 18 (2005) 1–47 <http://germanwatch.org/tw/sdt05e.pdf>.
- [7] R. Grynberg, WTO fisheries subsidies negotiations: implications for fisheries access arrangements and sustainable management, *Mar. Policy* 27 (6) (2003) 499–511.
- [8] J.R. Kahn, The economic approach to environmental and natural resources. Thomson/South-Western, 2005.
- [9] R. Kumar. Fisheries subsidies negotiations at the WTO: The real catch. Center for WTO Studies, CWS/WP/200/45, 1–59. <http://wtocentre.iift.ac.in/workingpaper/WorkingPaper45.pdf>.
- [10] E.A. Norse, S. Brooke, W.L. Cheung, M.R. Clark, I. Ekeland, R. Froese, K.M. Gjerde, R.L. Haedrich, S.S. Heppell, T. Morato, L.E. Morgan, D. Pauly, R. Sumaila, R. Watson, Sustainability of deep-sea fisheries, *Mar. Policy* 36 (2) (2012) 307–320.
- [11] M. Olson, Logic of collective action: public goods and the theory of groups, Harvard University Press, Cambridge, MA, 1965.
- [12] P. Oosterveer, Governing global fish provisioning: ownership and management of marine resources, *Ocean Coast. Manag.* 51 (12) (2008) 797–805.
- [13] S. Ponte, The marine Stewardship Council (MSC) and the making of a market for 'sustainable fish', *J. Agrar. Change* 12 (2012) 300–315.
- [14] U.R. Sumaila, V. Lam, F. La Manach, W. Swartz, D. Pauly, Global fisheries subsidies: an updated estimate, *Mar. Policy* 69 (2016) 189–193.
- [15] L.S. Teh, L.C. Teh, U.R. Sumaila, Time preference of small-scale fishers in open access and traditionally managed reef fisheries, *Mar. Policy* 44 (2014) 222–231.
- [16] Third World Network, New Proposal on fisheries to undermine S&D flexibilities, <https://www.twn.my/title2/wto.info/2017/ti170505.htm>, 2017.
- [17] United Nations, Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks. United Nations Conference on Straddling Fish Stock and Highly Migratory Fish Species, 6th Session (December 1982). 40. <https://doi.org/10.1093/oxfordhb/9780199560103.003.0005>, 1995.
- [18] World Bank, The Sunken Billions Revisited: progress and Challenges in Global Marine Fisheries, World Bank Group, 2017, <https://doi.org/10.1596/978-1-4648-0919-4>.
- [19] WTO, Fisheries Subsidies-Ministerial Decision of 13 December 2017, WT/MIN(17)/64, World Trade Organization, 2017.
- [20] WTO, Doha Work Programme Ministerial Declaration adopted on 18 December 2005, WT/MIN(05)/DEC, World Trade Organization, 2005.
- [21] WTO Negotiating Group on Rules, Advancing Towards a Multilateral Outcome on Fisheries Subsidies in the WTO, TN/RL/GEN/181Rev.1. doi: 10.1002/efs2.2016.14.is-sue-S1/issuetoc, 2017.
- [22] WTO, Ministerial Declaration and Decisions Nairobi 15-19 December 2015 (Ministerial Conference 10th Session), World Trade Organization, 2015.