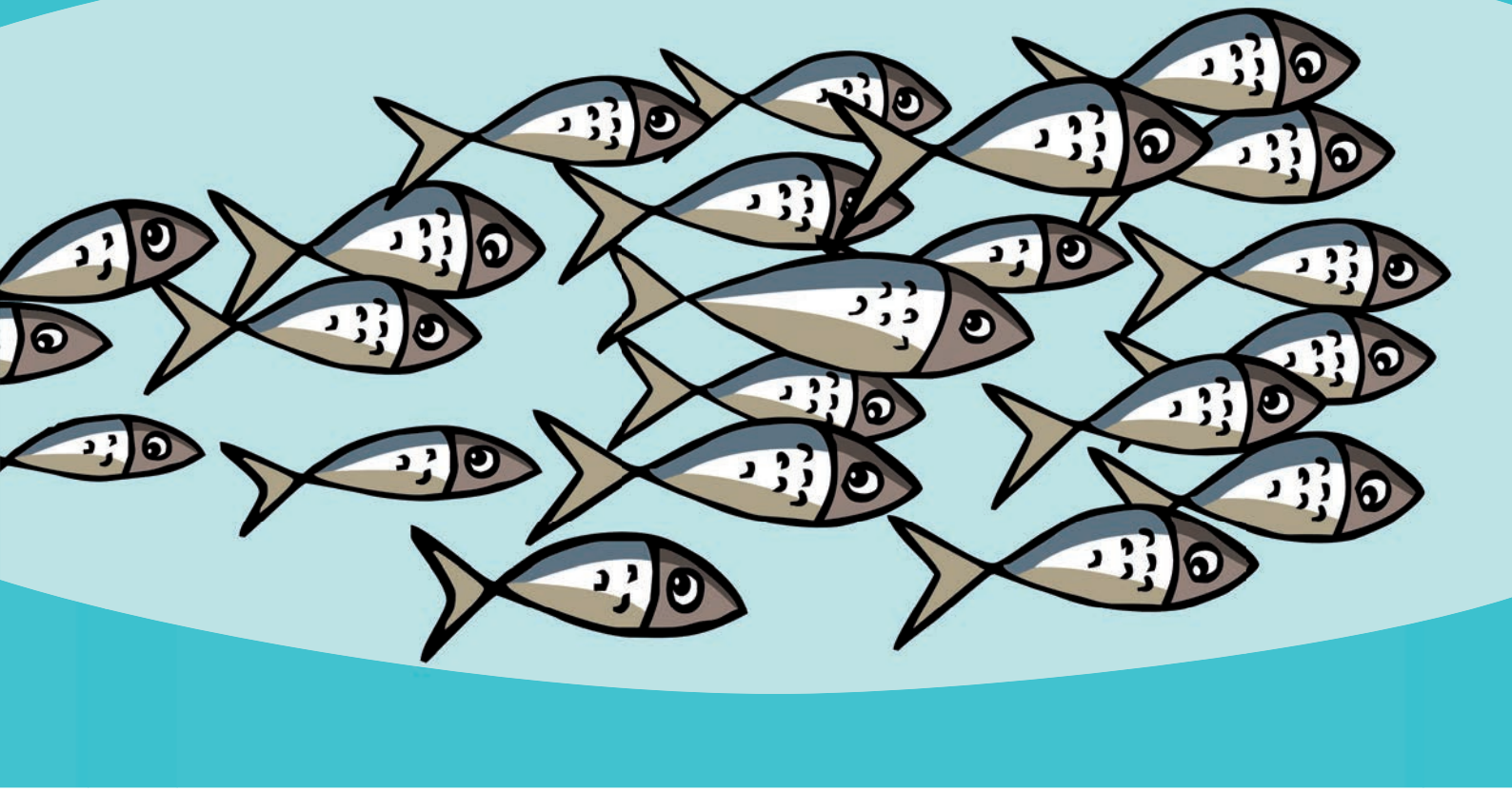
OECD Review of Fisheries 2022



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Preface

This edition of *OECD Review of Fisheries* is the first to be published since the landmark agreement reached by members of the World Trade Organization (WTO) in June 2022. After more than 20 years of negotiations, they agreed to prohibit subsidies for illegal, unreported and unregulated fishing, fishing of overfished stocks, and fishing in the unregulated high seas. They also agreed to take special care and exercise due restraint when subsidising fishing of stocks which are not monitored.

Our *Review* provides key information that policymakers need to implement the agreement, including on fish stock health, fisheries management, and support to fisheries in OECD countries as well as other large fishing nations. It also provides data and tools for countries to develop fisheries policies that respond to domestic priorities, such as adapting to climate change, and building resilience in the face of inflation and supply chain disruptions.

The OECD Fisheries Management Indicators indicate that 64% of assessed stocks are in good health, while 18% fall below sustainability standards, and for a further 18% assessments are not conclusive (and their health status remains undetermined). Investments in stock assessments, tighter stock management, and rebuilding plans for overfished stocks could improve the sustainability of fish resources while generating more food and more value in the sector.

The *Review* also assesses support policies, based on Fisheries Support Estimate (FSE) data that covers 40 countries and economies, accounting for 90% of world landings over 2018-20. On average, these countries provided total annual support of USD 10.4 billion to the fisheries sector during that period. This support was granted through a wide variety of policies, from fuel subsidies to spending on stock assessment research. The *Review* proposes a framework that countries can use to evaluate the risks to fish stock health from support policies when fisheries management is not fully effective.

Reform is already under way: support that presents the highest risk of encouraging unsustainable fishing in the absence of effective management has significantly declined and accounts for a relatively low share of support in OECD countries. However, fuel support increased in absolute terms in OECD countries in recent years and remains the single largest type of support provided by the emerging economies covered in the report.

The benefits of reform and improved fisheries management to reduce the risks of unsustainable fishing are clear: improved economic and environmental performance of fisheries and more secure livelihoods for fishers and the communities in which they live. Now is the time to scale up action. By being among the first to accept the WTO Agreement on Fisheries Subsidies, OECD countries can help make progress towards the ratification process. Through our OECD Fisheries Committee we can also support countries in their reform efforts, to make global fisheries more sustainable and beneficial, and achieve Sustainable Development Goal 14.

Mathias Cormann

OECD Secretary-General

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Table of contents

Tables

Figures

Boxes

Abbreviations and acronyms

ASFIS	Aquatic Sciences and Fisheries Information System
CMQ	Community-managed quota
CPUE	Catch per unit of effort
DSI	Support to individuals and companies in the fisheries sector
EBFM	Ecosystem-based fisheries management
EEZ	Economic exclusive zone
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FSE	Fisheries Support Estimate
GHG	Greenhouse gas
gt	Gross tonne
IPOA-IUU	International Plan of Action against IUU Fishing
IQ	Individual quota
ITQ	Individual transferable quota
IUU	Illegal, unreported and unregulated
MARPOL	International Convention for the Prevention of Pollution from Ships
MEY	Maximum economic yield
MMCS	Management, monitoring, control and surveillance
MPA	Marine protected area
MSY	Maximum sustainable yield
NSSF	Non-specific support to fisheries
PMS	Payments made by the fisheries sector
PSMA	Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing
R&D	Research and development
SDG	Sustainable Development Goal
SSS	Support to services for the sector
TAC	Total allowable catch
t CO_2-eq	Tonne of carbon dioxide equivalent
UN	United Nations
WTO	World Trade Organization

Executive summary

Globally, fisheries are an important source of nutritious food and play a key role in global food security. They also provide livelihoods and play an important role in the local economy of coastal communities in many countries. As such, governments regulate and support fisheries to ensure they are both productive and sustainable, maintain fishers' incomes in the face of shocks, such as the COVID-19 pandemic and the large-scale aggression by Russia against Ukraine, and ensure the well-being of people living in areas where alternative income sources are scarce.

However, government support can also pose risks to the sustainability and productivity of fisheries when it encourages the build-up of excess fishing capacity; overfishing; and illegal, unreported and unregulated (IUU) fishing. This is more likely to happen when fishing is not limited to sustainable levels. When government support encourages unsustainable fishing, it ultimately compromises fishers' livelihoods – harming the productivity, and the very existence, of the resource on which they depend, while potentially making them more dependent on support in the process. In such cases, support is also generally not effective at raising fishers' incomes and can have unintended negative impacts on the competitiveness of small-scale fishers.

The health of fish stocks is one of the main determinants of fisheries performance. Sustainably managing fish stocks and supporting fisheries in ways that do not compromise the health of resources is fundamental to the social, economic and environmental performance of the fisheries sector and its resilience to shocks, including those caused by climate change.

This edition of the *OECD Review of Fisheries* brings together available data on fish stock health, fisheries management, and support to fisheries in OECD countries and the main fishing nations outside the OECD to assess the health of fisheries and investigate how public policies could better support fisheries' contribution to global food security and the ocean economy towards blue transformation.

According to the most recent stock assessments from the 32 countries and economies covered by the OECD fisheries management indicators, 64% of assessed stocks are in good health, 18% fall below sustainability standards, and for another 18%, assessments are not conclusive (and their health status remains undetermined). Further, just under half of the stocks in good health also meet higher management standards for optimising productivity (i.e. they are abundant enough to allow the maximising of catch volume or value).

Effective fisheries management is vital for maintaining fish stock heath and optimising their productivity. Data collected for this report show that fisheries management typically involves a range of measures to control how much fish can be caught and how, when and where it can be caught. Management also varies considerably across fisheries. In 2021, about three-quarters of the fish stocks making up the most valuable species for the countries and economies considered were managed with total allowable catch (TAC) limits, that is, caps on the amount of fish that can be harvested. TACs are believed to be one of the most important tools for ensuring the health of fish stocks. In 2020, species covered entirely by TACs accounted for USD 9.2 billion in landings, or 61% of the value of landing for all the species in the data set. This equates to 12.6 million tonnes of fish, or 81% of all these landings by volume.

The OECD *Fisheries Support Estimate* (FSE) *data set* covers 40 countries and economies, which together accounted for 90% of world landings over 2018-20. On average, during that period, they together provided annual support of USD 10.4 billion to the fisheries sector. This support equated to about 11% of the average value of landings in these countries and economies over the period, down from about 14% in 2012-14.

The countries providing the greatest levels of support to their fisheries also tend to have some of the largest fisheries sectors. Six economies accounted for 86% of all support reported in the FSE in 2018-20: the People's Republic of China – 38% (down from just under half of all reported support in 2012-14), Japan – 13%, the United States – 10%, Canada – 8%, Brazil – 6%, while EU Member countries together accounted for just under 9%. These six economies were also in the top seven in terms of global catch volume, fleet capacity or employment. When considered as a share of the value of landings, per gross tonne of fleet capacity or on a per fisher basis, the support was highest in Poland, Sweden, Slovenia, Denmark and Brazil.

The FSE database is, however, made up of many different support policies that vary in nature and potential socio-economic or environmental outcomes. Thus, when comparing levels of support, it is informative to distinguish between the types of policies being considered and to contextualise the levels of support with appropriate measures of sector size.

In OECD countries, on average, 42% of the support provided over 2018-20 was targeted at ensuring productive and sustainable fisheries through spending on management, monitoring, control and surveillance (MMCS). Spending on MMCS has increased over time and is now the largest type of support in OECD countries. At the same time, 12% of fisheries support in the OECD was granted through policies that present a high risk of encouraging unsustainable fishing in the absence of effective fisheries management – primarily as support to fuel and vessels. Another 33% of support was granted through policies that can present a moderate, yet non-negligible, risk of encouraging unsustainable fishing – notably through support to infrastructure and support to income (which respectively accounted for 19% and 12% of total support). In emerging economies, the majority (53%) of support provided in 2018-20 came from policies that present a high risk of encouraging unsustainable fishing in the absence of effective fisheries management – primarily as support to fuel.

Key recommendations

Governments should rebuild the 18% of stocks which fall below sustainability standards. This is needed to ensure their long-term health and will also improve their productivity and economic returns in the fisheries sector. Where rebuilding plans have not already been adopted, fisheries managers should consider reviewing their current management action to help rebuild stocks. Going further to ensure the stocks already in good health are also fished optimally (to maximise value or harvest volume) will also lead to economic gains.

In addition, governments should continue to invest in science-based stock assessments to understand the health and productivity of unassessed fish stocks and stocks with undetermined status, notably those of commercial importance. This would likely improve fisheries' sustainability and increase economic returns where overfishing is occurring but has not been detected or where stocks are underfished. Developing methods to assess stocks even where data are scarce and capacity limited will become increasingly important to inform adaptive management, notably as climate change continues to impact fish abundance and the location of stocks.

Further, investing in linking information on stock management and stock health would help governments understand better where management is effective, optimise fisheries management plans, and ultimately improve the health and productivity of fish stocks further. To facilitate such analysis, governments should consider adopting an internationally agreed-upon naming convention for reporting information on stocks,

which could include using ASFIS (Aquatic Sciences and Fisheries Information System) species codes, where possible. Consistent stock naming is especially important for shared stocks, which are likely to increase in number due to climate change.

There is also scope to improve fisheries support policy mixes to minimise the potential for detrimental impacts on fish stocks. Countries should carefully review the policies that can present risks of encouraging unsustainable fishing and determine whether recipients of such support operate in sustainably managed fisheries. Where this is not the case, countries should consider better targeting these policies; for example by attaching eligibility conditions or using alternative forms of support. Countries may also want to move away from policies which can present risks of harming fish stocks more generally, as a precautionary approach, given the difficulty and cost of regularly monitoring whether individual recipients of support are operating in sustainably managed fisheries. In addition, countries should ensure they can effectively exclude those involved in illegal, unreported, and unregulated (IUU) fishing from government support. This report presents a range of policy options to this effect.

Eliminating support that can present a high risk of encouraging unsustainable fishing will also have beneficial impacts on the resilience and equity of the fisheries sector, as these types of policies can have inequitable impacts on small-scale fishers and are generally not effective at raising fishers' incomes. Money can be repurposed for sustainable fisheries management, enforcement, and research into the health of fish stocks and the impact of climate change. Where needed, direct income support can help ensure fishers' livelihoods in particular circumstances.

In June 2022, members of the World Trade Organization (WTO) agreed on a series of disciplines to eliminate some of the most potentially harmful types of subsidies: those that benefit IUU fishing; those that benefit the fishing of overfished stocks; and those that benefit fishing in the unregulated high seas. Governments should accept the WTO Agreement on Fisheries Subsidies so that it can enter into force and continue negotiating at the WTO to agree on disciplines to eliminate other potentially harmful subsidies, such as those that encourage overcapacity and overfishing. The evidence presented in this report, and the risk-based framework proposed to auto-evaluate the risks that some support policies may present to fish stock health, can support countries in implementing these reforms.

1 Overview and key results of the *OECD Review of Fisheries 2022*

Fisheries play a key role in global food security and in the local economy of coastal communities in many countries. Sustainably managing fish stocks and supporting fisheries in ways that do not compromise the health of resources is fundamental to the social, economic, and environmental performance of the fisheries sector and its resilience to shocks, including those caused by climate change. This edition of the *OECD Review of Fisheries* brings together available data on fish stock health, fisheries management, and support to fisheries in OECD countries and the main fishing nations outside the OECD to assess the health of fisheries and investigate how public policies could better support fisheries' contribution to global food security and the ocean economy. This chapter discusses the main findings.

The sustainability of fisheries is key for global food security and the livelihoods of close to 10% of the world's population. This edition of the *OECD Review of Fisheries* brings together and analyses data on fisheries management and support policies to inform decision makers and help foster sustainable and resilient fisheries that can provide jobs, food and livelihoods for future generations. In particular, this edition will allow policy makers to assess whether their support policy mixes carry risks of encouraging unsustainable fishing in the absence of effective fisheries management and consider how to better target and design support policies to avoid such risks.

1.1. Fisheries in the countries and economies of the *OECD Review of Fisheries 2022*

Globally, fisheries are an important source of nutritious food. Fish (including molluscs and crustaceans) is a central element of traditional diets in many cultures and a major source of animal protein and vital micronutrients.[1] In 2020, fish provided 17% of total animal protein and 7% of all protein consumed globally, while it accounted for at least 20% of the average per capita protein intake for 3.3 billion people (FAO, 2022[1]). Fisheries and related industries also play an important role in providing livelihoods to coastal communities. According to the Food and Agriculture Organization of the United Nations (FAO), about 38 million people worked in fisheries in 2020. In many coastal communities in developing countries, small-scale fisheries can be the source of income and employer of last-resort (HLPE, 2014[2]). The High Level Panel of Experts on Food Security and Nutrition (2014[2]) also estimates that, globally, between 660 million and 820 million people depend on aquatic food production (from fisheries and aquaculture) and its associated processing industries.

This edition of the *OECD Review of Fisheries* covers 30 OECD countries and 10 of the main fishing nations outside the OECD (Argentina, Brazil, the People's Republic of China [hereafter "China"], India, Indonesia, Malaysia, Peru, the Philippines, Chinese Taipei and Viet Nam).[2] In 2020, these 40 countries and economies together captured about 58 million tonnes of fish in marine waters, down from a high of 63 million tonnes in 2018.[3] Their landings were worth around USD 83 billion in 2020, almost double their value in the mid-2000s, but down from an all-time high of USD 91 billion in 2018 (Figure 1.1 in Box 1.1). OECD countries accounted for 38% of the catch volume and 41% of the value of landings in 2020; these shares have declined constantly over the last 15 years.

Fish is one of the most traded food commodities. In 2020, exports of fish products from the countries and economies covered in this report were worth about USD 118 billion, down from the peak in 2018 of USD 131 billion, mainly due to the impact of the COVID-19 pandemic (Figure 1.2 in Box 1.1). These trade figures include both captured fish (from fisheries production) and farmed fish (from aquaculture production), as trade data do not distinguish between the two.

Employment in fisheries has been relatively stable in recent years, fluctuating between 25 million and 27 million jobs since the mid-2000s (Figure 1.3 in Box 1.1). In 2020, in OECD countries, the fisheries sector employed about 1 million people, or about 4% of the total number of fisheries jobs in the countries and economies considered. This share has remained relatively stable over the last 15 years. In relative terms, the fisheries sector accounts for a much higher share of total employment in emerging economies than in OECD countries (about 2% of total employment in emerging economies compared to about 0.2% in OECD countries, on average, over the period 2010-20). Fisheries, therefore, play a particularly important role in providing livelihoods in emerging economies.

The combined fleets of all countries and economies considered totalled about 16 million gross tonnes in 2020, down from a peak of 17 million gross tonnes in 2017, which was reached after a decade of slow growth (about +1% yearly, from 15 million in 2005). OECD countries accounted for 28% of the gross tonnage in 2020, returning to the level it was in the mid-2000s (after having declined to a low of 23% in 2012-16). In 2020, 2 million vessels of all sizes were recorded by the countries and economies covered in this report, down from over 2.5 million vessels in 2005 (Figure 1.4 in Box 1.1). OECD countries accounted for 29% of these vessels in 2020, following a steady decline since the mid-2000s, when it was 39%.

1.2. Effective management and smart support can enhance fisheries' environmental, social and economic performance as well as their resilience to shocks

The health of fish stocks is one of the main determinants of fisheries performance. Ensuring stocks are in good health, that is, they can deliver long-term sustainable yields, is necessary to achieve any socio-economic objectives governments and stakeholders may have for fisheries. Healthy fish stocks are also important for protecting biodiversity and ensuring the provision of ocean ecosystem services such as climate regulation, food provision and nutrient cycling (Barbier, 2017[3]). Further, improving stock health can lead to significant gains in fisheries productivity, with benefits to fishing profitability and the well-being of coastal communities that depend on fisheries (Costello et al., 2016[4]).

The international community recognises the importance of good fisheries management to conserve and sustainably use the ocean, seas and marine resources for sustainable development, as demonstrated through the fisheries-specific targets of Sustainable Development Goal (SDG) 14 of the 2030 Agenda for Sustainable Development adopted by members of the United Nations (UN) in 2015. Target 14.4 of SDG 14, in particular, calls for restoring fish stocks at least to levels that can produce the maximum sustainable yield in the shortest time feasible. Aichi Target 6, adopted in 2010 by the Parties to the Convention on Biological Diversity also called for keeping the impacts of fisheries on stocks, species and ecosystems within safe ecological limits.[4]

Fisheries management is, however, a difficult task. It requires regularly gathering information on the health of individual fish stocks, designing and effectively implementing stock-specific management regimes, and monitoring and surveillance of fishing at sea. This task is further complicated by the influence of external factors on the health of fish stock, notably climate change and other non-fishing related economic activities. Fisheries management is often publicly funded and requires significant resources.

Governments generally support the fisheries sector to enhance its contribution to global food security and the ocean economy. They also typically support fisheries to achieve other socio-economic goals that fisheries management cannot achieve alone, such as maintaining fishers' incomes in the face of shocks or increasing their incomes in areas where alternative income sources are scarce.

Government support is beneficial to fisheries when it helps ensure the health of fish stocks and ecosystems, increases fish stock productivity, and builds resilience in the fisheries sector. But government support can also result in undesirable outcomes for fish stocks in the absence of effective fisheries management as it can encourage the build-up of excess fishing capacity; overfishing; and illegal, unreported and unregulated (IUU) fishing (OECD, 2020[5]; Martini and Innes, 2018[6]). Furthermore, when government support encourages unsustainable fishing, it ultimately compromises the fishers' livelihoods – harming the productivity, and the very existence of the resource on which they depend, while potentially making them more dependent on government support. In such cases, support is also generally not effective at raising fishers' incomes and can have unintended negative impacts on the competitiveness of small-scale fishers (Martini and Innes, 2018[6]).

The international community has recognised the need to reform government support to fisheries to eliminate the policies that encourage unsustainable fishing. With Target 14.6 of SDG 14, members of the UN called for prohibiting fisheries subsidies, which contribute to overcapacity, and overfishing, and eliminating subsidies that contribute to IUU fishing by 2020.[5] In June 2022, after more than 20 years of negotiations, members of the World Trade Organization (WTO) agreed to binding disciplines that prohibit subsidies that benefit IUU fishing; subsidies that benefit the fishing of overfished stocks; and subsidies that benefit fishing in the unregulated high seas (WTO, 2022[7]). The WTO Agreement on Fisheries Subsidies (WTO, 2022[8]) also calls for "due restraint" in subsidising vessels not flying the subsidising member's flag; and in subsidising the fishing of stocks where the health is not documented. Further, it contains notification requirements, which cover information on subsidies themselves, how fisheries are managed, the status of

subsidised stocks and the provisions countries are taking to avoid subsidising IUU fishing. In addition, members of the WTO committed to continue negotiating to agree on disciplines to eliminate other potentially harmful subsidies, such as those that encourage overcapacity and overfishing.

Sustainably and productively managing fish stocks, while using smart support policies, is thus fundamental to the social, economic and environmental performance of the fisheries sector and its resilience to shocks. Reforming fisheries management and support policies to avoid adverse impacts on stocks is particularly important given the numerous challenges facing global fisheries, from adapting to the impacts of climate change and reducing emissions to building resilience in the face of increasing energy prices and disruptions to global value chains. How best to support the changes required in an environmentally sustainable and equitable way is a critical question for governments, particularly as other sectors face similar challenges, thus adding to budgetary pressures. This report addresses this question holistically by providing a data-driven, in-depth assessment of fisheries management and fisheries support in the countries and economies covered.

1.3. What does this report tell us about the health and productivity of fish stocks and how they are managed?

Chapter 2 of this report analyses a unique data set of information on the status of 1 456 individual fish stocks assessed by 32 OECD countries and emerging economies (which together account for 45% of global catches by volume). It uses these data to produce indicators at a country level, which inform about both fish stock health and productivity. These indicators add further nuance to the trends observed at global and regional levels and help identify priorities for action.

The data show that 64% of the stocks assessed are in good health, 18% fall below sustainability standards and another 18% have an undetermined status as assessments were inconclusive. Further, the data tell us that just under half of the stocks that are in good health also meet higher management standards sometimes set by fisheries managers for optimising productivity (i.e. these stocks are abundant enough to allow the volume or value of catch to be maximised under sustainability constraints).

The data also show significant variation at the country level, both in terms of the number of stocks assessed and their status with regard to sustainability and higher management standards. On average, countries and economies in the data set assessed 57 stocks, with Australia reporting the highest number of assessed stocks (449), followed by the United States (326) and New Zealand (183). In all the countries and economies considered, some fish stocks are not assessed and are thus not included in the analysis. There are many reasons countries and economies assess different numbers of stocks, including the number of stocks exploited and institutional capacity, which depends on the resources devoted to conducting assessments. Also, sometimes it may not be practical or even possible to conduct stock assessments where a large number of species are exploited in the same area, such as tropical reef fisheries.

Several countries – Estonia, Finland, Iceland, Korea, Latvia, Lithuania and Poland – report all the stocks assessed to be in good health. However, in all these countries except Korea, few stocks were assessed. In other countries, over half of the stocks assessed fall below biological sustainability standards. Generally speaking, stock status numbers must be considered within their country-specific contexts, which will impact the number and type of assessments conducted, as well as the standards considered for biological sustainability. Natural variation in stock health, or the impacts of exogenous factors not linked to fishing, such as climate change, can have significant impacts on the health of stocks and lead to unexpected declines (or increases) irrespective of management regimes. Care must therefore be taken not to draw strong conclusions from the evidence of this single data snapshot. Finally, it should be noted that the data do not provide insight into the efficacy of management in a particular country or across countries.

Chapter 2 of this report also presents data on the management of commercially important fisheries. It shows that fisheries management typically involves a range of measures to control how much fish is caught and how, when and where it is caught. Management also varies considerably across fisheries. In 2021, the most frequently used management tools were gear restrictions, which were used in the management of 87% of stocks in the data set. They were followed by total allowable catch (TAC) limits, or caps on the amount of fish that can be harvested. TACs were used in 76% of stocks. TACs are believed to be one of the most important tools for ensuring the health of fish stocks. In 2020, species covered entirely by TACs accounted for USD 9.2 billion in landings, or 61% of the value of landings for all the species in the data set. This equates to 12.6 million tonnes of fish, or 81% of these landings by volume.

1.4. What can governments do to improve the health and productivity of fish stocks?

Governments should rebuild the 18% of stocks which fall below sustainability standards. This is needed to ensure their long-term health and will improve their productivity and economic returns in the fisheries sector. Where rebuilding plans have not already been adopted, fisheries managers should consider reviewing their current management action to help rebuild stocks. Going further to ensure that the stocks already in good health are also fished optimally (to maximise value or harvest volume) will also lead to economic gains.

In addition, governments should continue to invest in stock assessments to understand the health and productivity of unassessed fish stocks and stocks with undetermined status, notably those of commercial importance. This would likely improve fisheries sustainability and increase economic returns in cases where overfishing is occurring but has not been detected or where stocks are underfished. Developing methods to assess stocks even where data are scarce and capacity limited will become increasingly important to inform adaptive management, notably as climate change continues to impact fish abundance and the location of stocks.

Further, investing in linking information on stock management and stock health would help governments understand better where management is effective, optimise fisheries management plans, and ultimately improve the health and productivity of fish stocks further. To facilitate such analysis, governments should consider adopting an internationally agreed-upon naming convention for reporting information on stocks, which could include using ASFIS (Aquatic Sciences and Fisheries Information System) species codes, where possible. Consistent stock naming is especially important for shared stocks, which are likely to increase in numbers due to climate change.

1.5. How has government support to fisheries evolved and how might it impact fisheries' sustainability?

1.5.1. Levels and trends in support to fisheries

Chapter 3 of this report describes and analyses support to fisheries, its impacts on fish stock health and how it has evolved in recent years. This analysis builds on the *OECD Fisheries Support Estimate* (FSE), a unique database that measures, describes and classifies fisheries support policies consistently and transparently in 40 countries and economies, which together account for about 90% of world landings. The FSE records two main types of support policies: 1) support to services for the sector; and 2) direct support to individuals and companies. Support to services to the sector is government spending that benefits the sector as a whole, or entire segments, such as: spending on management, monitoring, control and surveillance (MMCS); research and development; or payments to access foreign waters. Direct support to

individuals and companies, on the other hand, includes policies like support to fuel, vessel construction or income support.

Between 2018 and 2020, the 40 countries and economies covered by the FSE database provided average annual support of USD 10.4 billion to the fisheries sector. This support equated to about 11% of the average value of landings in these countries and economies over the period, down from about 14% in 2012-14.

Countries providing the greatest levels of support to their fisheries also tend to have some of the largest fisheries sectors. Six economies accounted for 86% of all support reported in the FSE in 2018-20: China – 38% (down from just under half of all reported support in 2012-14), Japan – 13%, the United States – 10%, Canada – 8%, Brazil – 6%, while EU member countries together accounted for just under 9%. These six economies were also in the top seven in terms of global catch volume, fleet capacity or employment. Following them, India, Norway and Poland individually accounted for 2-3% of total reported support, while Denmark, Italy, Korea and Sweden each accounted for 1-2%. The remaining countries and economies in the FSE database each accounted for less than 1%. The overall magnitude of support provided by China means it continues to have an influence on levels and trends in overall support numbers (and on levels and trends at the level of emerging economies), despite having fallen in absolute and relative terms.

The FSE database is, however, made up of many different support policies that vary in nature and potential socio-economic or environmental outcomes. Thus, when comparing levels of support, it is informative to distinguish between the types of policies being considered. It is also important to contextualise the levels of support with appropriate measures of sector size. When considered as a share of the value of landings, per gross tonne of fleet capacity, or on a per fisher basis, support was highest in Poland, Sweden, Slovenia, Denmark and Brazil.

On average, the relative level of support and the policy mix differ significantly between OECD countries and emerging economies. The OECD countries reporting to the FSE delivered support totalling USD 5.11 billion per year, on average, in 2018-20, which equated to USD 5 163 per fisher in that period. Having increased over time, spending on MMCS is now the largest type of support in the OECD support policy mix. It accounted for 42% of the support provided by OECD countries over 2018-20 followed by spending on infrastructure (19%), income support (12%) and support to fuel (8%).

In contrast, on average, emerging economies' fuel support accounted for 33% of total support, followed by income support (15%), spending on infrastructure (5%) and MMCS (4%). Together, the emerging economies covered in the FSE database provided a combined total of USD 4 billion per year in support on average over 2018-20, which is equivalent to USD 222 per fisher.

1.5.2. The sustainability impact of support

Determining a single support policy's likely impact on the health of fish stocks requires granular information on all the factors that influence it; that is, information on the recipients of support, how the fisheries in which they operate are managed, the fish stocks they harvest, the health of those fish stocks and the type of support received, including any eligibility conditions. However, linking information on support policies to individual fisheries, recipients and harvested stocks is challenging using information typically available at the country level. Notably, this is because many fish stocks remain unassessed and their status is unknown.

In the absence of such granular information, Chapter 3 of this report discusses the risks of encouraging unsustainable fishing that different support policies can present in the absence of effective management and classifies them into four risk categories: 'high risk', where policies could directly lead to increased fishing capacity and overfishing, by directly affecting fishing costs and benefits; 'moderate risk', where policies could indirectly lead to increased fishing capacity and overfishing, by indirectly affecting fishing costs and benefits; 'no risk' where policies could contribute to ensuring fisheries resources; and 'uncertain

risk' where policies could result in high, moderate or low risk. Analysing domestic policy mixes through this lens can provide a pragmatic basis for considering whether support policies at the national level can present risks of encouraging unsustainable fishing.

When considering all the countries and economies in the FSE database, 33% (USD 3.4 billion) of the total FSE in 2018-20 went to support policies that present a high risk of encouraging unsustainable fishing in the absence of effective management. This is a notable decline compared to 2012-14 when support in this category represented just over 52% of the total FSE. Encouragingly, this decline has not been accompanied by an equivalent growth in policies that can present a more moderate risk of encouraging unsustainable fishing. These policies accounted for 28% (USD 2.94 billion) in 2018-20, up from 21% in 2012-14.

The proportion of support considered to present no risk of encouraging unsustainable fishing increased, to 23% (USD 2.4 billion) of the total FSE in 2018-20, from 18% in 2012-14. At the same time, however, the share of support disbursed through policies presenting an uncertain level of risk increased to 16% of the total FSE (USD 1.6 billion) in 2018-20, up from 8% in 2012-14. Further work is needed to better understand the nature of the policies in this category.

The average risk profiles of government support mixes, as defined in this report, also differ significantly between OECD countries and emerging economies. In 2018-20, 12% of fisheries support in OECD countries was granted through policies that present a high risk of encouraging unsustainable fishing in the absence of effective fisheries management – mostly as support to fuel and vessels. Another 33% of support was granted through policies that can present a moderate, yet non-negligible, risk of encouraging unsustainable fishing – notably through support to infrastructure and support to income. In the emerging economies, on average, the majority (53%) of support provided in 2018-20 came from policies that present a high risk of encouraging unsustainable fishing in the absence of effective fisheries management – primarily as support to fuel. Importantly, these countries typically have less capacity to ensure effective fisheries management and enforcement.

1.6. How can governments better support fisheries?

Countries should carefully review the support policies that can present risks of encouraging unsustainable fishing and determine if recipients of such support operate in sustainably managed fisheries. Where this is not the case, countries should consider better targeting these policies, for example by attaching conditions, or using alternative forms of support. Countries may also want to move away from policies which can present risks of harming fish stocks more generally, as a precautionary approach, given the difficulty and cost of regularly assessing whether individual recipients of support are operating in sustainably managed fisheries.

Eliminating support that can present a high risk of encouraging unsustainable fishing will also have beneficial impacts on the equity of the fisheries sector and its resilience to shocks, as these types of policies can have inequitable impacts on small-scale fishers and generally are not effective at raising fishers' incomes. Money can be repurposed for sustainable fisheries management, enforcement and research into the health of fish stocks and the impact of climate change. Where needed, direct income support can help ensure fishers' livelihoods in particular circumstances.

Governments should also accept the WTO Agreement on Fisheries Subsidies so that it can enter into force and continue negotiating at the WTO to agree on disciplines to eliminate other potentially harmful subsidies, such as those that encourage overcapacity and overfishing. To minimise the risk of supporting IUU fishing, governments should make support conditional on being flagged to the supporting country and authorised to fish in its waters. They should also use appropriate processes to exclude from support all potential

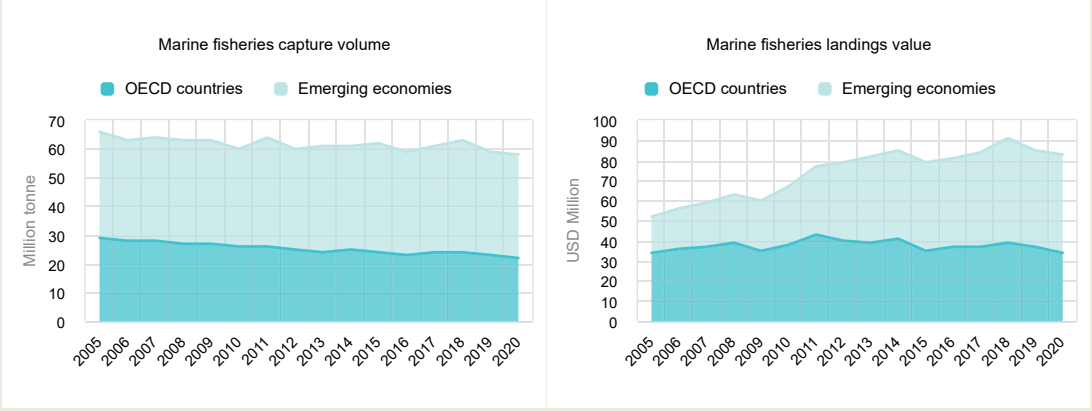
recipients linked to IUU fishing and fishing-related activities in support of IUU fishing. Finally, they should publish information on all support recipients.

Finally, like many sectors, fisheries typically also benefit from support provided through policies that benefit a range of sectors simultaneously rather than fisheries exclusively, and in particular, energy-related support. Such non-specific support to fisheries is rarely recorded in the FSE and seldom discussed in international fora. Better information is needed about all the policies that benefit the fisheries sector and their impact on its performance and sustainability. This will help understand how to best target public spending to achieve fisheries' policy objectives.

Box 1.1. Fisheries at a glance

This box provides an overview of fisheries in the countries and economies covered in this report, that is, all OECD countries with the exception of Austria, the Czech Republic, Finland, Hungary, Israel, Luxembourg, the Slovak Republic and Switzerland, as well as ten of the main fishing nations outside the OECD – Argentina, Brazil, China, India, Indonesia, Malaysia, Peru, the Philippines, Chinese Taipei and Viet Nam.

Figure 1.1. Fisheries production, 2005-20

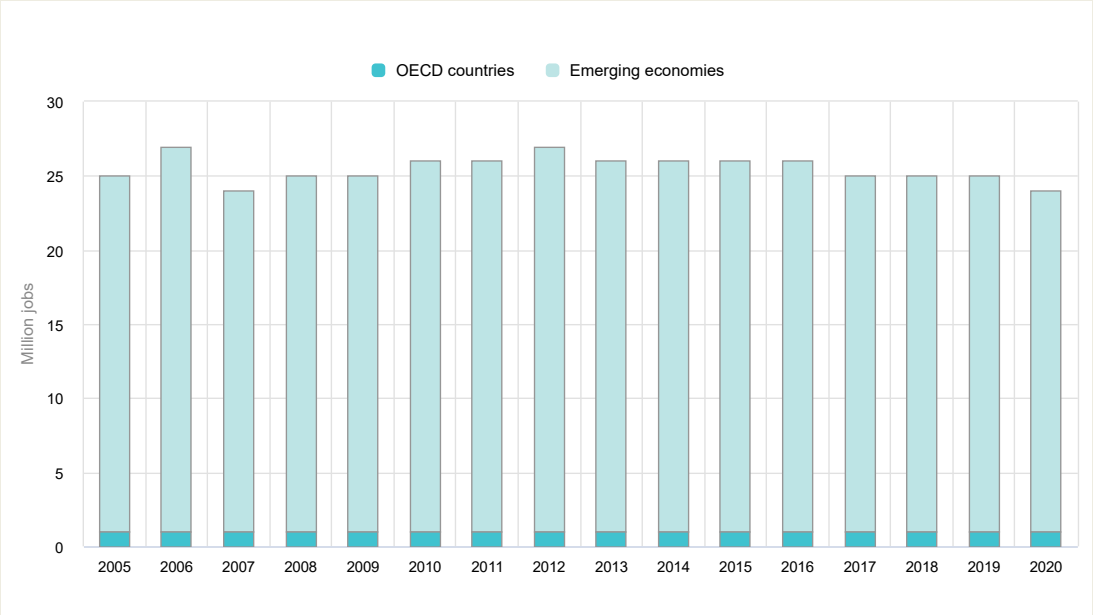


Notes: Including finfish, crustaceans, molluscs, aquatic animals, aquatic products, seaweeds and aquatic plants. Excluding mammals. Left panel: Data are expressed in live weight equivalent. Right panel: Missing observations were estimated. Brazil, India, Malaysia, Peru, the Philippines and Viet Nam are included in the right panel but not in the left one as data for landings values are not available.
Sources: Left panel: FAO (2022), Fishery and Aquaculture Statistics. Global capture production 1950-2020 (FishStatJ), https://www.fao.org/fishery/en/statistics/software/fishstatj. Right panel: OECD (2022), Marine landings (OECD.Stat), http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_LAND.

Figure 1.2. Trade in fish products, 2005-20

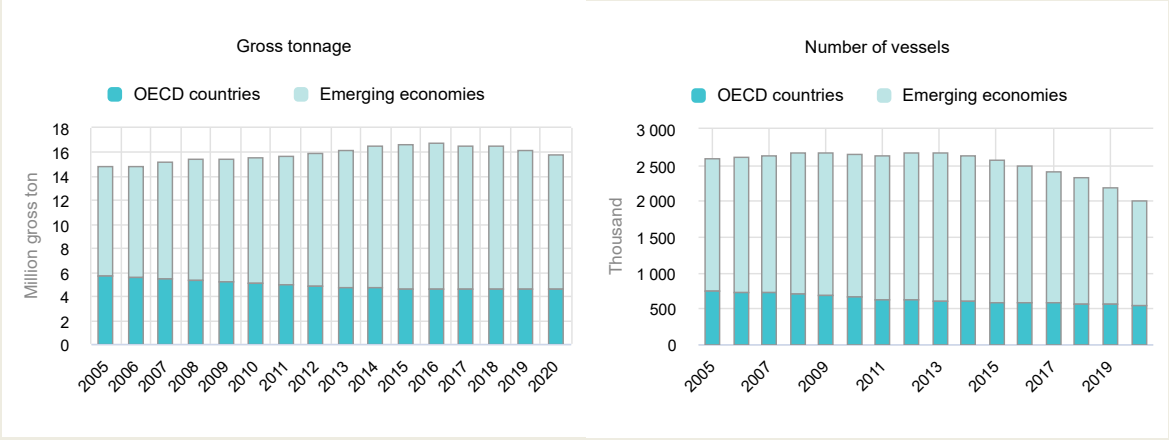
Note: Including both fishery and aquaculture products.
Source: OECD (2022), International trade of fisheries commodities, http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_TRADE.

Figure 1.3. Employment in fisheries, 2005-20



Source: OECD (2022), Employment in fisheries, aquaculture and processing, http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_EMPL.

Figure 1.4. Fishing fleet, 2005-20



Notes: Missing observations were estimated. India, Malaysia and the Philippines are not included as no data were available. Indonesia, the United States and Viet Nam are included in the right panel but not in the left one, as data for gross tonnage are not available.
Source: OECD (2022), Fishing fleet, http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_FLEET

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Notes

[1] Fish is an important source of polyunsaturated fatty acids, minerals, vitamins and micronutrients, and, combined with other foods, can improve their absorption, which can have beneficial effects on adult health and child cognitive development. This makes fish a potentially particularly useful food in the fight for food and nutrition security, particularly in developing countries, when small fish are affordable for all (Béné et al., 2016[12]; FAO, 2020[13]; Khalili Tilami and Sampels, 2017[14]; HLPE, 2014[2]; Béné et al., 2015[15]; Kawarazuka and Béné, 2010[9]).

[2] This report covers all OECD countries, with the exception of Austria, the Czech Republic, Finland, Hungary, Israel, Luxembourg, the Slovak Republic and Switzerland.

[3] According to the FAO (2022[10]), the global decline in marine captures seen in 2019 was primarily caused by fluctuating catches of pelagic species, particularly anchoveta. The further decrease seen in 2020 was mainly due to the impacts of the COVID-19 pandemic on fisheries operation.

[4] SDG 14.4 states: "By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics." Aichi Target 6 states: "By 2020, all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits."

[5] The international community has recognised the need to eliminate harmful subsidies, in particular, subsidies to IUU fishing, and has made it a priority for action for over two decades. For example, the 2001 International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IPOA-IUU) (FAO, 2001[11]) already called on countries to avoid subsidising IUU fishing.

2 Managing fisheries

The health and productivity of fish stocks are key determinants of fisheries performance. Sustainably managing fish stocks is necessary to achieve the socio-economic objectives governments and stakeholders have for fisheries. This chapter analyses the health and productivity of assessed fish stocks in 32 countries and economies and discusses how commercially important fisheries are managed. It provides a reliable approximation of the status of fish stocks at the global level and detailed information at the country level, to better target management action. The chapter closes with a special focus on how to address ghost fishing gear, that is gear lost, abandoned, or otherwise discarded at sea, which can have a significant detrimental impact on fish stock health and the ocean more generally.

Key messages and recommendations

The health of fish stocks is one of the main determinants of fisheries performance. Sustainably managing fish stocks is necessary to achieve the socio-economic objectives governments and stakeholders have for fisheries. According to the most recent stock assessments undertaken in the 32 countries and economies covered in this chapter, 64% of assessed stocks are in good health, 18% fall below sustainability standards, and for another 18%, assessments are not conclusive (and their health status remains undetermined).

Often, governments and stakeholders not only aim to ensure the sustainability of fish stocks, but also pursue higher management standards, for example optimising stock productivity by maximising the value or the volume of fish catches under sustainability constraints. Recent stock assessments tell us that just under half of the stocks that are in good health also meet higher management standards.

Effective fisheries management is key for maintaining fish stock heath and optimising their productivity. Data collected for this chapter on how commercially important fisheries are managed show that fisheries management typically involves a range of measures to control how much fish is caught and how, when and where it is caught. Management also varies considerably across fisheries. In 2021, about three quarters of the fish stocks making up the most valuable species for the countries and economies covered in this chapter were managed with limits to total allowable catch (TAC), that is, caps on the amount of fish that can be harvested. TACs are believed to be one of the most important tools for ensuring the health of fish stocks. In 2020, species covered entirely by TACs accounted for USD 9.2 billion in landings, or 61% of the value of landing for all the species in the data set. This equates to 12.6 million tonnes of fish, or 81% of all these landings by volume.

Governments should rebuild the 18% of stocks which fall below sustainability standards. This is needed to ensure their long-term health and will also improve their productivity and economic returns in the fisheries sector. Where rebuilding plans have not already been adopted, fisheries managers should consider reviewing their current management action to help rebuild stocks. Going further and ensuring the stocks already in good health are also fished optimally to maximise value or harvest volume will also lead to economic gains.

In addition, governments should invest in stock assessments for the stocks that remain unassessed. In some countries, this is still the case for many harvested and commercially important stocks. Investing in understanding the status of the 18% of assessed stocks with undetermined status, particularly where the species are of significant commercial importance (e.g. Norway lobster), would also likely improve fisheries' sustainability and increase economic returns where overfishing is occurring but has not been detected or where stocks are underfished. Developing methods to assess stocks even where data are scarce and capacity limited will become increasingly important to inform adaptive management, as climate change impacts fish abundance and the location of stocks.

Finally, investing in linking information on stock management and stock health would help governments understand better where management is effective, optimise fisheries management plans, and, ultimately, improve the health and productivity of fish stocks further. To facilitate such analysis, governments should consider adopting an internationally agreed-upon naming convention for reporting information on stocks, which could include the use of ASFIS (Aquatic Sciences and Fisheries Information System) species codes where possible. Consistent stock naming is especially important for shared stocks, which are likely to increase in numbers due to climate change.

2.1. Benefits of healthy fish stocks and good fisheries management

Good fisheries management is fundamental for the long-term economic, social and environmental sustainability of the fisheries sector and its resilience to shocks. It is also important for protecting biodiversity and ensuring the provision of ocean ecosystem services such as climate regulation, food provision and nutrient cycling (Barbier, 2017[1]). The good news is that fisheries management generally works. Increasing management intensity is correlated with increasing biomass and reduced fishing pressure, suggesting that management action can effectively help maintain stock health (Hilborn et al., 2020[2]). Further, improving stock health can lead to significant gains in profitability for fisheries, improving the economic and social sustainability of the sector (Costello et al., 2016[3]).

Climate change, however, is driving change in marine ecosystems, becoming an increasingly important context in framing management decisions (Box 2.1). To be effective, fisheries management must adapt to the impacts of climate change on species diversity, abundance and distribution, which may require changes to the way fisheries are managed and the institutions that manage them (FAO, 2021[4]). Understanding the status of fish stocks and how to manage them effectively is, therefore, more important than ever.

The international community has recognised the importance of good fisheries management in promoting healthy fish stocks and ocean ecosystems as demonstrated through the Sustainable Development Goals (SDGs) and the Aichi Biodiversity Targets. Notably, SDG Target 14.4 calls for restoring fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield (MSY), and through Aichi Target 6, which aims to keep the impacts of fisheries on stocks, species and ecosystems within safe ecological limits.[1] Further, as a key step towards meeting these goals, members of the World Trade Organization (WTO) have recently agreed to prohibit the provision of subsidies to the fishing of overfished stocks (see Chapter 3 for more details about the WTO Agreement on Fisheries Subsidies and its implications for fisheries support).

However, the health of fish stocks has not yet improved globally despite the growing understanding that good fisheries management is essential to fishers and ocean health more generally, and despite shared ambition to put it into practice. The Food and Agriculture Organization (FAO) (2022[5]) estimates the share of overfished stocks globally to be 35.4%. This global figure, however, masks significant regional variations in stock health. In the north-east Pacific, over 80% of stocks are fished sustainably. In comparison, more than 60% of stocks are in the Mediterranean and Black Seas are overfished. These regional numbers, themselves, hide significant variations across the stocks harvested by individual countries. However, they do indicate scope for improvement in all regions.

This chapter analyses a unique data set of information on the status of individual fish stocks assessed by 32 OECD countries and emerging economies. It uses these data to produce country-level indicators which not only inform about fish stock health but also their productivity. These indicators add further nuance to global and regional trends and help identify priorities for action.

The chapter starts by providing an overview of the health and productivity of assessed fish stocks and how the situation has evolved since the 2020 edition of the *OECD Review of Fisheries* (Section 2.2). It also illustrates the extent of available data on stock status and identifies where further investment in data collection and research is needed to inform science-based sustainable management.

To help governments achieve sustainable fisheries through effective management, this chapter then complements data on the status of fish stocks with data on the use of management tools. Based on these data, Section 2.3 describes the mix of tools governments are using to manage individual stocks of their most commercially valuable species. Section 2.4 then links management to stock status for a specific subset of stocks (combining information for those stocks for which both management and stock status were known and could be reconciled). Fisheries management is complex and stock health is impacted by a number of other factors (e.g. climate change), hence causal linkages between management and stock

health are difficult to identify. However, it is hoped these data can begin to answer fundamental questions in fisheries management related to the effectiveness of management approaches and do so with increasing effectiveness as the combined data set develops over time.

Finally, to help governments comprehensively manage fisheries' impact on resources and ecosystems, Section 2.5 addresses the issue of ghost fishing gear, that is, gear lost, abandoned or otherwise discarded at sea, which can account for a significant detrimental impact. The section presents the key findings of a recent OECD report, "Towards G7 action to combat ghost fishing gear" (OECD, 2021[6]), prepared in support of the UK presidency of the G7. The report highlights best practices for addressing ghost gear.

Box 2.1. Climate change and fisheries management

Impacts of climate change on fisheries

Climate change is having significant impacts on fisheries (Cheung, Watson and Pauly, 2013[7]; Barange et al., 2018[8]). Importantly, increasing ocean temperatures are expected to result in a reduction in primary productivity from the ocean (Tittensor et al., 2021[9]) and a large-scale redistribution of fisheries resources (Cheung et al., 2010[10]). These impacts, combined with changes in species composition and abundance, will impact fisheries and the communities which rely on them. The redistribution of fisheries resources will be uneven, with higher latitude regions expected to see an increase in catch potential and tropical regions a decrease of around 40% (Cheung et al., 2010[10]). Further, by 2030, 23% of transboundary stocks will have shifted, impacting 75% of the world's economic exclusive zones (EEZs) and posing challenges for fisheries governance in many regions (Palacios-Abrantes et al., 2022[11]). Ensuring fisheries can both mitigate greenhouse gas (GHG) emissions and adapt to the impacts of climate change are key challenges facing fisheries managers.

How fisheries management can mitigate greenhouse gas emissions

The contribution of capture fisheries to global emissions is relatively modest compared to its contribution to food security. Estimates put the total global GHG emissions from capture fisheries at 179 tonnes of carbon dioxide equivalent (t CO_2-eq) in 2011, which equates to 4% of GHG emissions from food production in the same year (Parker et al., 2018[12]) and 207 t CO_2-eq in 2016 (using a slightly different methodology) (Greer et al., 2019[13]). Generally, the emission intensity of production (t CO_2-eq per tonne landed) for capture fisheries is lower than that of other animal products (except chicken) (Gephart et al., 2021[14]) and their nutritional value higher (Bianchi et al., 2022[15]). However, the emissions intensity of production increased by 21% between 1990 and 2011 (Parker et al., 2018[12]), leading to an increase in emissions from fisheries despite catches remaining relatively stable in the same period (OECD/FAO, 2022[16]). Since 1950, the emission intensity of production in small-scale fisheries has more than doubled but remains 10% lower than in industrial fisheries (Greer et al., 2019[13]).

Global figures for emissions and emissions intensity obscure important regional and local trends. In some cases, the increases are significantly more pronounced; for example, the emissions intensity of production increased 530% between 1966 and 1988 in New Bedford, Massachusetts (Mitchell and Cleveland, 1993[17]). The vast majority of emissions from capture fisheries are produced by burning fossil fuels on vessels and fuel is often the largest cost associated with fishing. Thus, reducing emissions from fisheries would benefit both the environment and fishers through reduced costs and enhanced profitability.

Both theoretical and empirical research shows that rebuilding fish stocks and removing excess fishing capacity through good fisheries management to maximise the catch per unit of effort (CPUE) is the most effective method for reducing emissions from fisheries (e.g. (Parker et al., 2015[18]; Waldo and

Paulrud, 2016[19]; Driscoll and Tyedmers, 2010[20]). In simple terms, ensuring fishers can fish less for the same result will increase profitability and reduce emissions more effectively than technological interventions. Conversely, much of the growth in emissions from fisheries is driven by overcapacity, leading to lower CPUE. Management approaches, such as individual transferable quotas (ITQs), that incentivise the efficient allocation of inputs, can significantly reduce GHG emissions (Ziegler et al., 2016[21]). For example, in demersal fisheries in Iceland, the emissions per unit of catch fell by 40% between 1997 and 2008 after the introduction of ITQs (Kristofersson, Gunnlaugsson and Valtysson, 2021[22]). In this case, the rebuilding of stocks was a much more important driver of emissions reduction than technology improvement, oil price and fish price (Kristofersson, Gunnlaugsson and Valtysson, 2021[22]). The application of ITQs in more fisheries will likely lead to lower emissions (Waldo and Paulrud, 2016[19]).

In well-managed fisheries, where there is no excess capacity and CPUE is maximised, other interventions can help reduce emissions. For example, active gears are more emissions intensive than passive gears; hence, behavioral adaption can reduce emissions through changes in gear usage. Technology innovation also has the potential to reduce emissions in well-managed fisheries by increasing fuel efficiency. However, care is needed to avoid rebound effects whereby reduced fuel costs from increased efficiency lead to increased effort. Alternative fuel sources, such as liquid petroleum gas and hybrid propulsion or full electrification can also play a role reducing emissions (Gabrielli and Jafarzadeh, 2020[23]).

Challenges for fisheries management to adapt to climate change

The impacts of climate change are ongoing and likely to get worse in the coming years. Despite global studies indicating the magnitude of the impacts, there remains significant uncertainty at a local level (Tittensor et al., 2021[9]). Better data on the impacts of climate change on fisheries resources at local levels is the first priority for fisheries managers. Without accurate and recent information on fisheries resources, management plans risk becoming disconnected from the resources they are trying to manage. Several countries, such as the United States through its Climate and Fisheries Initiative, and Canada through its Aquatic Climate Change Science Program, are already investing in research to provide better data and information to fisheries managers on the impacts of climate change.

The next key challenge for fisheries managers is to ensure they can use the data effectively in management systems to create so-called climate-smart fisheries. The FAO (2021[4]) defines the four foundations of climate-smart fisheries as: 1) establishing effective fisheries management systems; 2) ensuring stakeholder participation in management systems; 3) taking a precautionary approach that allows for uncertainty and risk; and 4) ensuring management systems are adaptive to change. Adaptive fisheries management systems are particularly important under climate change if managers are to protect existing resources and take advantage of new opportunities that might occur as stocks move. In particular, the movement of transboundary stocks into new areas and the occurrence of new transboundary stocks could be problematic if existing collaborative management systems are not flexible enough to allow the inclusion of new stakeholders. In such cases, the reform of existing institutions may be required to ensure collaborative sustainable management of stocks and avoid resource conflicts. Regions where there are multiple EEZs in close proximity (such as the Caribbean) are likely to face greater issues than elsewhere and care must be taken to ensure the management of transboundary stocks continues to safeguard the sustainability of resources (Palacios-Abrantes et al., 2022[11]).

2.2. The status of assessed fish stocks

Assessing the status of fish stocks is essential for good fisheries management. Setting appropriate harvesting levels requires information on how fishing practices impact the size and health of commercially important stocks. Without good data to guide fisheries management, the harvesting of stocks is likely to be suboptimal in terms of the sector's economic, social and environmental sustainability. In extreme cases, overfishing can lead to severe declines in stock abundance, with devastating impacts on local communities and ecosystems. Regular stock status assessments are also vital for fisheries management, as they allow management regimes to adapt if they are not performing as expected or in response to exogenous factors impacting fish stocks (e.g. climate change).

To implement the appropriate management, stock assessments ideally need to determine where stocks sit with respect to key limit or target reference points – which may be quantified in terms of instantaneous fishing mortality (F) or stock biomass (B).[2] Limit reference points identify sustainability thresholds that should not be crossed as, beyond these, the long-term biological viability of a stock is likely to be threatened. Target reference points, on the other hand, are optimal levels to be reached, determined by the management objective for the stock. Indeed, good fisheries management can deliver even greater benefits, along with fewer environmental impacts, when it ensures stocks are not only biologically sustainable, but also abundant enough to allow catch volume or value to be maximised. A commonly used objective to define target reference points is MSY; that is, to produce the largest long-term average (sustainable) level of catch. Maximum economic yield (MEY) is another common objective, which aims to maximise economic productivity as opposed to the quantity of fish being produced.

To meet the growing need for more accessible and comparable information on the status of fish stocks worldwide (e.g. to ensure compliance with the new WTO Agreement on Fisheries Subsidies), the OECD created a unique data set on the status of assessed fish stocks bringing together data that are otherwise only available in a number of different forms and locations, making it both difficult to access for the non-technical policy maker and difficult to compare across countries. These data illuminate detailed trends in stock health for assessed stocks at a country level and provide information on trends in stock productivity, adding further nuance to the trends observed at global and regional levels and identifying priorities for action.

Box 2.2. OECD stock status data

As part of the *OECD Review of Fisheries,* the OECD now regularly collects data on stock assessments of harvested stocks with nationally determined biological sustainability standards (i.e. limit reference points, typically defined in terms of biomass or mortality thresholds) and higher management standards (i.e. target reference points, typically aimed at optimising catch value or volume under sustainability constraints).

In 2021, 32 countries and economies reported data on recent assessments from a total of 1 457 stocks ("recent" being defined as within the last ten years). The data do not contain any information on fish stocks where the status has not been assessed.

The OECD countries included in the data set are: Australia, Canada, Chile, Colombia, Denmark, the European Union (stock status only), Estonia, Finland, France, Germany, Greece, Italy, Japan, Korea, Latvia, Lithuania, the Netherlands, Norway, New Zealand, Poland, Slovenia, Spain, Sweden, the Republic of Türkiye, the United Kingdom, and the United States.

The emerging economies included in the data set are: Argentina, Brazil, the People's Republic of China (hereafter "China"), Peru, Chinese Taipei, and Thailand.

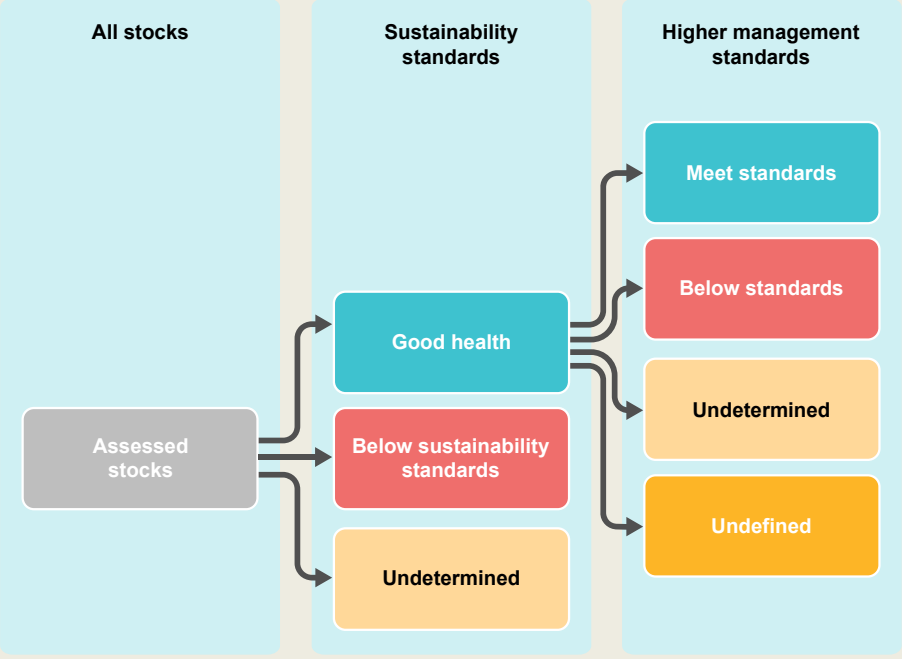
Data, which reflect the most up-to-date understanding of stock status in reporting countries and economies in 2021, were used to produce country-level indicators on the health and productivity of assessed fish stocks with regard to national management standards:

The total number of stocks assessed reported on and of those:

- the number of stocks in good health (i.e. stocks that meet all assigned sustainability standards)
- the number of stocks that fall below sustainability standards (i.e. stocks below one or more limit reference points)
- the number of stocks with an undetermined status (where an assessment was attempted but uncertainty in the results prevented a determination from being made).
- the number of stocks in good health that meet higher management standards
- the number of stocks in good health that fall below higher management standards
- the number of stocks in good health where the status with respect to higher management standards is undetermined
- the number of stocks in good health that do not have defined higher management standards.

These indicators are available on the OECD statistical portal.

Figure 2.1. Structure of the stock status data set

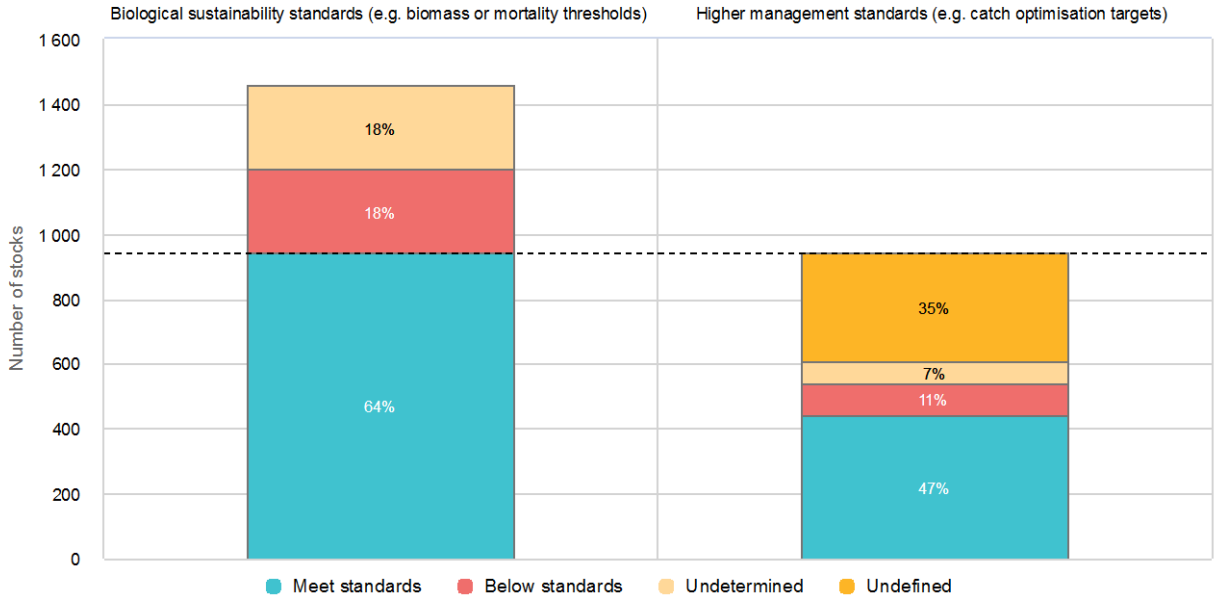


Note: The status of each stock is based on assessments conducted by the reporting countries or economies and no further calculations are conducted by the OECD.

2.2.1. The health of stocks is declining overall but varies across countries

Overall, recent assessments from 1 456 stocks were reported in 2021. Of these, 64% (939) were assessed as being in good health, 18% (258) fell below sustainability standards and 18% (259) had an undetermined status with respect to biological sustainability (Figure 2.2, left panel). Notably, stocks with an undetermined status are likely to be a mix of both stocks that are in good health and those that do not meet sustainability standards. Further, in all countries, some fish stocks have not been assessed and are not included in these data. Therefore, the actual proportions of both stocks in good health and stocks falling below sustainability standards in all harvested stocks likely vary from what is reported in the database (for assessed stocks).

Figure 2.2. Status with respect to biological sustainability and higher management standards of fish stocks assessed, 2021



Of the stocks which were in good health (939), 47% (438) also meet higher management standards (i.e. they were abundant enough to allow the volume or value of catch to be maximised under sustainability constraints). Further, 11% (103) fell below these higher management standards, 7% (67) had an undetermined status and, for 36% (331), no higher management standards were defined (Figure 2.2, right panel). As mentioned above, stocks with an underdetermined status may or may not meet higher management targets.

At the country level, there are significant variations in the number of stocks assessed and in their status with respect to biological sustainability (Figure 2.3). The mean number of stocks assessed by the countries and economies in the database is 57 and the median number of stocks assessed is 24.5. Australia reported the most stock assessments (449), followed by the United States (326) and New Zealand (183). There are many reasons why countries assess different numbers of stocks. The number of stocks that are commercially exploited, which is a factor of both the size of the sector and the marine areas of the country, is perhaps the most important one. The capacity of national authorities to conduct stock assessments also varies and can impact the number of assessments reported in the data set. Finally, in some cases where a large number of species are exploited in the same area, for example in tropical reef fisheries, it may not

be practical or even possible to conduct individual stock assessments, which will also impact the number of stock assessments (Hilborn et al., 2020[2]).

The proportion of assessed stocks in good health also varies considerably across countries (Figure 2.3). In several countries – Estonia, Finland, Iceland, Korea, Latvia, Lithuania and Poland –all assessed stocks reported are in good health. However, bar Korea, all these countries reported assessments from seven or fewer stocks, which in the case of EU Member states may indicate missing data as only EU level stock assessments are reported in the data set. Colombia has the highest proportion of stocks which do not meet sustainability standards (52%), followed by Japan (51%) and Chile (45%).

The proportion of stocks with undetermined status also varies, with Thailand (100%), Spain (54%) and the United Kingdom (44%) reporting the highest proportion. While capacity constraints can prevent effective stock assessments, as is likely the case in Thailand, other factors such as the biology of the species being assessed are also important. For example, the Norway lobster (Nephrops norvegicus) is a burrowing species that is notoriously difficult to assess and consequently many European stocks are data poor and lack limit reference points (Aguzzi et al., 2022[24]). Both Spain and the United Kingdom exploit a high number of these stocks, hence the proportion of stocks with an undetermined status is inflated relative to other countries. Finally, in some cases, the COVID-19 pandemic has prevented effective assessments, further increasing the number of undetermined stocks.

Generally speaking, stock status numbers must be considered within their country-specific contexts, which will impact the number and type of assessments conducted, as well as the standards considered for biological sustainability. Natural variation in stock health, or the impacts of exogenous factors not linked to fishing, such as climate change, can have significant impacts on the health of stocks and lead to unexpected declines (or increases) irrespective of management regimes. Therefore, care must be taken not to draw strong conclusions from the evidence of this single data snapshot. Finally, it should be noted that the data do not provide insight into the efficacy of management in a particular country, or across countries.

With 18% of stocks falling below sustainability standards, there is considerable scope to increase catch and improve the economic conditions for fishers (and reduce GHG emissions) by rebuilding these stocks. As explored above, fisheries management generally works and rebuilding stocks to levels that can support MSY will likely add significant value to the fisheries sector of the countries and economies in the data set. In some cases, management regimes will have been adjusted already, to compensate for stocks falling below the thresholds for biological sustainability. The data do not account for any remedial action taken by countries to address stocks which are not meeting sustainability standards, nor does it contain data on the level of exploitation of the stocks in question. However, where management regimes have not been adjusted, fisheries managers should consider reviewing and adjusting them.

Investing in developing methodologies and capacity to understand the status of the 18% of stocks with undetermined status, and those unassessed, would also likely improve sustainability and increase economic returns in cases where overfishing is occurring but has not been detected or where stocks are underfished, particularly where the species are of significant commercial importance (e.g. Norway lobster). Moreover, the new WTO Agreement on Fisheries Subsidies prohibits subsidies to the fishing of overfished stocks and calls on members to take special care and exercise due restraint when granting subsidies to fishing stocks the status of which is unknown (Article 5.3). Clarifying the status of undetermined and unassessed stocks is thus important for compliance.

Figure 2.3. Status with respect to biological sustainability standards of fish stocks assessed (and total number of stocks assessed) by country, 2021

Notes: For EU Member States, stock assessments are reported at the EU level then assigned to the individual countries based on their initial allocation of quotas. Quota swaps made after the initial allocation are not considered. The allocation of stocks to individual Member States also means that the number of assessments will not sum to 1 457 due to double counting.
Source: OECD (2022[25]), Fisheries and Aquaculture Indicators, http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_INDICATORS.

2.2.2. Stock status changes 2019-21

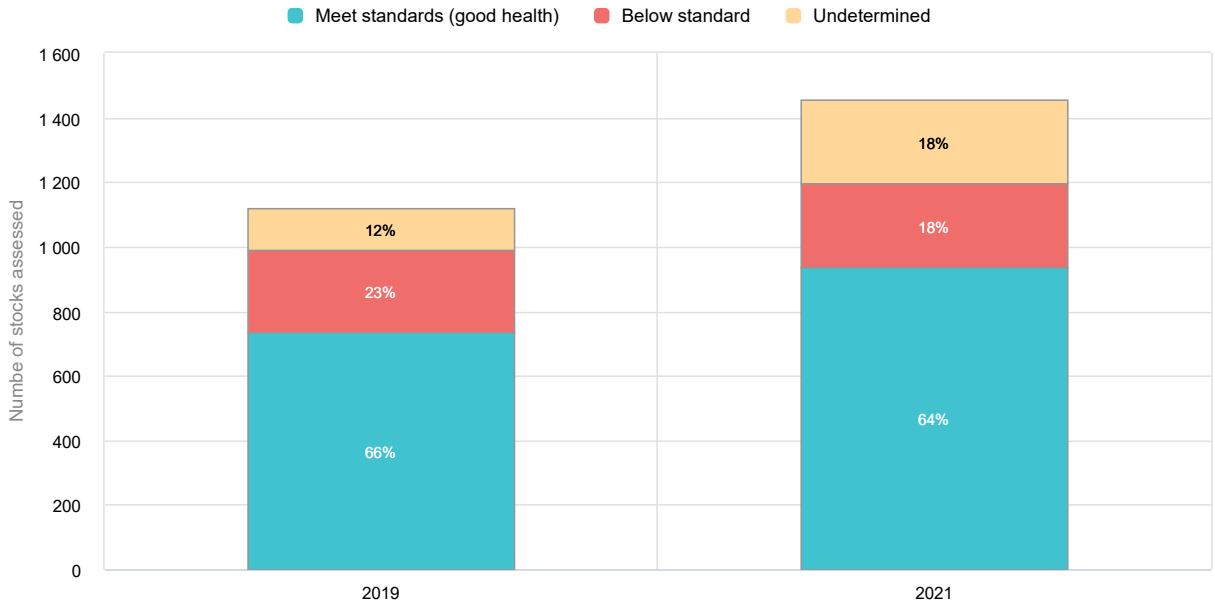
The OECD started collecting data on stock status assessments as part of the *Review of Fisheries 2020*, making it possible to compare the data collected in 2021 to the data collected in 2019. In 2021, the number of stocks reported to the OECD increased from 1 119 in 2019 to 1 456. The bulk of the 333 additional stocks reported in 2021 came from two countries: Australia, which reported 168 additional stocks, and the United States, which reported 58 new stocks. The additional stocks are unlikely to be the result of new stocks being exploited but rather the result of additional assessments and a better data compilation and collection systems. Notably, Australia and the United States both have publicly available, centralised databases of stock status assessment: the Status of the Australian Fish Stocks Report[3] in Australia and Stock Smart in the United States.[4]

The changing number of stocks between the two points in time in the data set means the relationship between the change in the share of stocks in good health in the data set and the actual trends in the health of assessed fish stocks is not straightforward. The data are not intended to be a globally representative sub-sample of stock health but rather the results of all stock assessments performed within the reporting countries and economies. As such, there is potential for biases to be introduced if the distribution of stock

health in the new stocks is significantly different from the distribution of already included stocks. However, reporting stock health in 2021 only for the stocks reported in 2019 would have meant ignoring additional data, potentially biasing results, an issue that would only worsen over time as the data set expands. As such, the data are reported as "vintages", such that 2021 and 2019 are considered snapshots of what was known about fish stock status at these dates, and comparisons are made on that basis.

The proportion of assessed stocks in good health has declined slightly, from 65.6% in 2019 to 64.5% in 2021 (Figure 2.4). Both of these proportions and the small decline seen between 2019 and 2021 closely mirror the globally representative data reported by the FAO in SOFIA 2022 (FAO, 2022[5]), which reports a slight decline in sustainably fished stocks from 65.8% in 2017 to 64.6% in 2019. The FAO data are based on a globally representative subset of stocks, so the close alignment between the two data sets suggests that the OECD data on assessed stocks may be a good approximation of the situation of fish stocks globally, despite its partial geographical coverage and the caveats discussed above.[5] The proportion of stocks that do not meet sustainability standards has declined slightly, from 22.7% to 17.7%, while the proportion of stocks with an undetermined status has increased from 11.2% to 17.8%. The increase in undetermined stocks may be driven, at least in part, by the COVID-19 pandemic interfering with normal assessment processes (OECD, 2021[26]).

Figure 2.4. Status with respect to biological sustainability standards of fish stocks assessed, 2019 and 2021

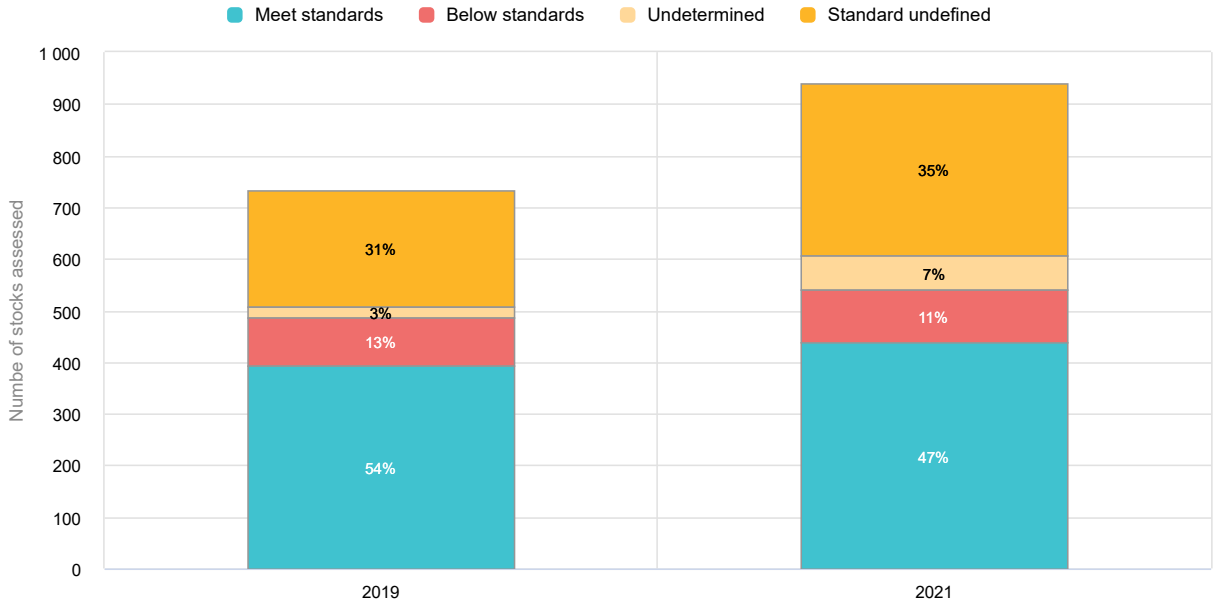


The proportion of stocks meeting higher management standards in the database has also declined, from 53.7% in 2019 to 46.6% in 2021, which is consistent with the trend in biological sustainability (Figure 2.5). Similarly, the number of stocks that fall below higher management standards has declined slightly, from 12.5% to 11%, while stocks with an undetermined status have increased from 3% to 7.1%. The proportion of stocks with undefined higher management standards has risen from 30.8% to 35.5%, largely due to the additional stocks reported for which higher management standards are not defined.

The decline in stocks meeting higher management standards (7%) is greater than the decline in stocks in good health (2%). Even when accounting for the large numbers of additional stocks with no defined higher management standards, which could exaggerate or mask trends, the decline in stocks achieving higher management standards between 2019 and 2021 is still 5%. The greater decline in stocks meeting higher management standards when compared to the decline in sustainability standards could be indicative of

future trends in biological sustainability, if the stocks that no longer meet higher management standards continue to decline – a potentially worrying trend. However, whether the trends in status with respect to higher management standards can act as an early warning sign for biological sustainability will only become apparent as the time series develops.

Figure 2.5. Status with respect to higher management standards of fish stocks assessed, 2019 and 2021



2.3. Stock management of the most valuable species

2.3.1. The majority of stocks are covered by total allowable catch limits and other quotas

Fisheries management is the most important human-driven process impacting fisheries stocks (aside from fishing itself) and data on how fish stocks are managed are, therefore, important to the three pillars of fisheries sustainability. Fundamentally, fisheries management attempts to control the impact of fishing on stocks to ensure their long-term viability and the sustainability of the industry and communities that rely upon them. Management regimes are generally a collection of tools that aim to limit either the way fish are caught (input controls) or the level and type of catch (output controls).

Input controls regulate fleet and gear characteristics (e.g. vessel size and power, gear type and configuration), along with how that can be applied (with spatial or temporal restrictions). Output controls usually take the form of quotas, typically through total allowable catch (TAC) limits, which cap the total quantity of an individual stock that can be harvested. Individual or community quotas are sometimes used to augment TACs and they define the conditions under which catch shares can be sold or exchanged (or not). Output controls also include regulations on minimum fish sizes, which regulate the type of catch rather than the overall level of catch.

Increasingly, governments are looking towards ecosystem-based fisheries management (EBFM) as a way of ensuring both the sustainability of fisheries and the continued delivery of other ocean ecosystem services. EBFM is a holistic approach that considers fisheries resources in the context of the wider ecosystem, making the maintenance of that ecosystem and its services the primary function of the

management approaches (Pikitch et al., 2004[27]).[6] This is in contrast to traditional fisheries management, which generally considers fish stocks individually, with the level of harvest for each as the target of management actions. Effective EBFM plans require the integration of many different management actions, some of which are not traditionally used to manage fisheries (Levin et al., 2018[28]). However, EBFM can be difficult to implement in practice given the high data requirements, particularly for areas where data may be lacking (e.g. detailed marine habitat maps). This chapter, therefore, looks specifically at the tools used to manage stocks as a first step in documenting fisheries management practices.

To better understand how countries use different tools to manage their fish stocks, the OECD sent out a questionnaire to collate data on how countries and economies manage their most valuable harvested stocks. The data focus on traditional fisheries management tools as a first step in documenting fisheries management and as input in any future assessment of how EBFM is implemented at the country level.

Box 2.3. OECD stock management data

As part of the *OECD Review of Fisheries,* the OECD now regularly collects data on how countries and economies manage their most valuable harvested stocks. The data set covers each country's five most valuable species (as per 2018 data), and data are reported at the stock level (i.e. if different stocks of one species are managed differently the information is reported for each stock of that species individually). In 2021, 29 countries and economies reported data.

The OECD countries included in the data set are: Australia, Canada, Chile, Colombia, Denmark, Estonia, Finland, France, Germany, Greece, Italy, Japan, Korea, Latvia, Lithuania, the Netherlands, Norway, New Zealand, Poland, Slovenia, Spain, Sweden, the Republic of Türkiye, the United Kingdom and the United States.

The emerging economies included in the data set are: Argentina, Brazil, China, Peru and Chinese Taipei.

For each stock, detailed information is provided on the different tools used in management, covering both:

- *Input controls*, which regulate fleet and gear characteristics (e.g. vessel size and power, gear type and configuration), along with where and when fishing can take place (e.g. with spatial or temporal restrictions)
- *Output controls*, which set harvesting limits either at the level of a fishery, with total allowable catch (TAC) limits that cap the total quantity of an individual stock that can be harvested, or at the level of individuals or communities, with specific quotas (e.g. individual transferable quotas, individual quotas or community quotas). Specific quotas usually define the conditions under which quotas can be sold and exchanged (or not). Output controls also include regulations on minimum fish sizes, which regulate the type of catch rather than the overall level of catch.

The data are then used to compile summary statistics such as the frequency of use of different management tools across the stocks in the data set; the proportion of landings – in volume and value – covered by different tools; and the co-occurrence of different tools at the stock level. These statistics are available on the OECD statistical portal.

The data set covers each country's five most valuable species (as per 2018 data). On average, the top five species by value represented 59% of the value of all landings by the reporting countries and economies. In 81% of cases, the top five species represented more than 40% of the total landings, reaching more than 90% in Argentina, Finland and Poland. Therefore, the top five species can be considered representative of how countries generally approach fisheries management.

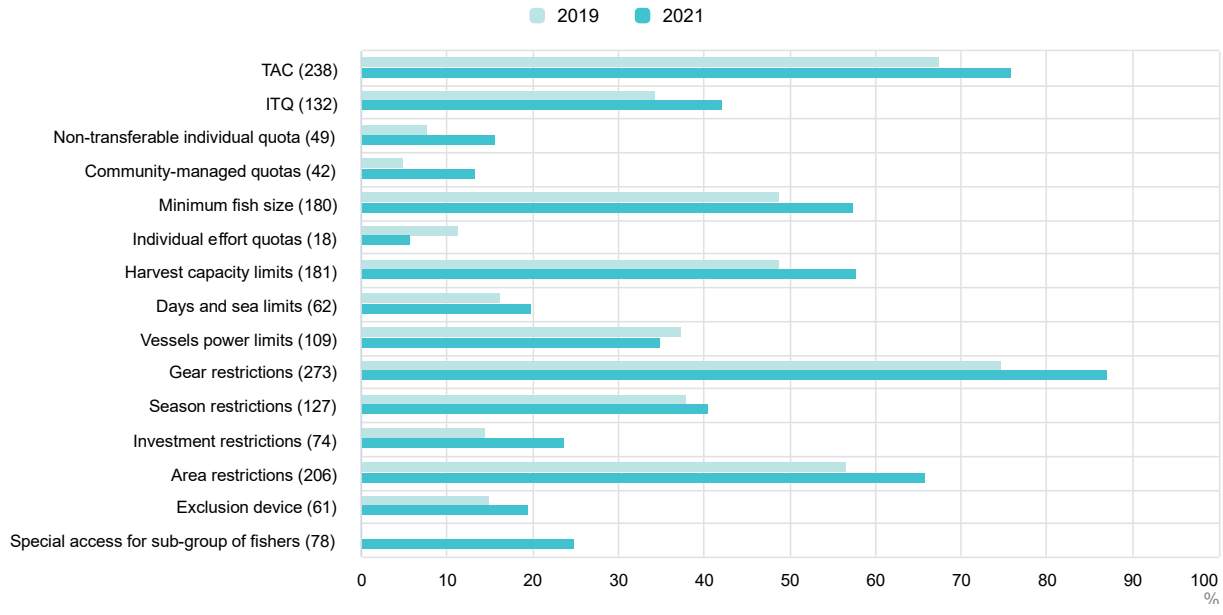
This is the second time these data have been collected. For the 2020 edition of the *OECD Review of Fisheries*, data were collected on the management tools used for the top five most valuable species in 2016. Due to natural variation in the value of landings, the top five species in 2016 may have been different from those in 2018; to maintain a consistent time series, data were collected for both the same species as for the 2020 edition and for any new species that entered the top five species by value in 2018. Consequently, some countries have submitted data on more than five species.

The data were also collected at a stock level, meaning that if a country exploits more than one stock of the species, data are reported on the tools used to manage each stock for each of the species in question. The data set, therefore, contains information on 313 stocks of 107 species from 29 countries and economies.

2.3.2. The majority of landings from the most valuable species came from stocks covered by total allowable catch limits

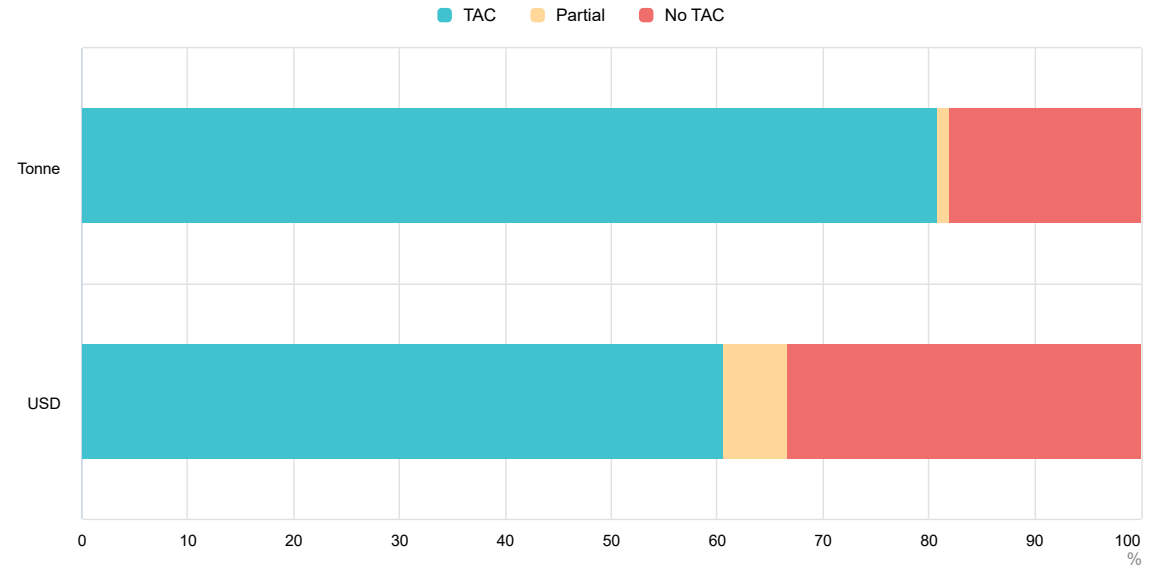
In 2021, the most frequently used management tools were gear restrictions, which were used in the management of 87% (273) of stocks, while TACs were the second-most commonly applied tool and were used in 76% (238) of stocks (Figure 2.6). This pattern is very similar to what was seen in 2019, which is expected given the large overlap in the two data sets. In 2020, species covered entirely by TACs accounted for USD 9.2 billion in landings, or 61% of the value of landing for all the species in the data set (Figure 2.7). A further USD 900 million (6%) was from species where some, but not all, of the stocks are covered by TACs (partial coverage), while USD 5.1 billion (33%) came from species where stocks are not covered by TACs.[7] Species covered entirely by TACs accounted for 12.6 million tonnes of fish, 81% of all landings from the most commercially important species, while species partially covered by TACs provided a further 0.2 million tonnes (or 1% of landings by volume) and species not covered by TACs provided 2.8 million tonnes (or 18%). At the country level, 27% of countries reported using TACs in all of the stocks reported to the OECD, while over half the countries reported using TACs in more than 80% of the reported stocks.

Figure 2.6. Use of management tools, 2019 and 2021



Notes: TAC: total allowable catch; ITQ: individual transferable quota. The number of stocks using the tool is given in brackets.

Figure 2.7. Use of total allowable catch limits in the management of the most commercially valuable species, 2021



Note: TAC: total allowable catch. Landings values were not available for Japan for 2020 therefore data from 2019 were used.
Source: OECD (2022[29]), OECD (2022), Marine landings, http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_LAND.

Aside from TACs, other forms of quotas, such as individual quotas (IQs) or individual transferable quotas (ITQs), are also used to manage fisheries and incentivise economic efficiency and improved resource stewardship. ITQs were used in 42% of stocks and IQs in 16%, while only 7% of stocks (22 in total) used both IQs and ITQs simultaneously. Therefore, just over half the reported stocks used either ITQs or IQs. Community-managed quotas (CMQs) are also used for output control. They differ from IQs and ITQs as they place the quota in the control of a group of fishers rather than allocating the rights individually. CMQs were used in 13% of stocks and TACs were present in almost all of them. In just over half of the stocks using CMQs, ITQs were also used. CMQs were more likely to be used to manage benthic and demersal species than pelagic fishes (Annex Table 2.A.1 and Annex Table 2.A.2).

2.3.3. Input controls are used in nearly all stocks in the database with gear restrictions and area restrictions the most frequently used

Of the 318 stocks included in the database, just 2% (6) do not use input controls. Of these, four stocks did not use any management tools at all. A combination of three different quotas is used in the remaining two stocks. Therefore, there are constraints in almost all stocks on how and where fish are caught. The most frequently used input controls are gear restrictions, which are used in 87% (273) of the stocks, making them the most frequently applied of all the management tools in the database (Figure 2.6). Area restrictions were the second-most frequently applied input control and were used in 66% (206) of stocks, while harvest capacity limits were found in 58% (181) of stocks.

The frequent use of gear restrictions to manage fisheries of all types is expected. For most fisheries, several different types of gear can be used. However, different types of gear vary both in their effectiveness for catching target species as well as in the extent to which they trap non-target species and impact the environment. This is true for both active and passive gear; gillnets, for example, are a passive gear that can be used to efficiently harvest certain species, but have been implicated in marine mammal and sea bird bycatch (Regular et al., 2013[30]; Read, Drinker and Northridge, 2006[31]). Trawl nets, an active gear, can efficiently target benthic species, but can degrade benthic habitats (Eastwood et al., 2007[32]).

Therefore, fisheries managers require gear controls to balance the trade-offs between environmental sustainability and profitability in many fisheries, hence their popularity as a management tool.

Area-based restrictions to fishing, such as limitations on allowed fishing practices in the context of marine protected areas (MPAs), are a traditional fisheries management tool that has gained increasing prominence under EBFM (Halpern, Lester and McLeod, 2010[33]). Area-based restrictions can have significant positive effects on marine ecosystems and are often relatively straightforward to implement, which is likely a factor in their frequent use (Box 2.4). However, designing an effective system of area restrictions can be technically challenging and expensive to enforce (Gill et al., 2017[34]). Further, the data do not include information on the use of EBFM and more information is needed to understand how governments are using this more holistic approach to fisheries management.

Box 2.4. Area-based restrictions in fisheries management

There are several different types of area-based restrictions, including marine no-take zones, fish stock recovery areas (which can be designated under the European Union's common fisheries policy), marine protected areas (MPAs) and other effective area-based measures. MPAs are perhaps the most widespread area restrictions and have expanded rapidly since 2005 (UNEP-WCMC and IUCN, 2021[35]) driven primarily by Aichi Target 11, which calls for 10% of territorial waters to be covered by protected areas. Countries are currently negotiating a new deal at the Convention on Biological Diversity and there are calls for a target of 30% in any new agreement. Given their increasing numbers, it is important to understand how area-based restrictions, and in particular MPAs, impact fisheries and what role they can play in both traditional fisheries management and ecosystem-based fisheries management (EBFM).

From a biodiversity perspective, there is significant evidence highlighting the effectiveness of MPAs at increasing fish biomass, species diversity and restoring ecosystem processes (Sala et al., 2018[36]; Aburto-Oropeza et al., 2011[37]; Sala and Giakoumi, 2017[38]). Evidence also suggests that larger and older MPAs that are more strongly protected are more effective (Edgar et al., 2014[39]). Ecosystem-level benefits, such as spillover effects and increased biomass, are the most well-studied benefits for fisheries (Mangi et al., 2022[40]). However, MPAs are part of complex socio-ecological systems that have broad consequences for the local economy and community (Rees et al., 2018[41]; Gaines et al., 2010[42]), which are relatively understudied (Rees et al., 2021[43]) (Rees et al., 2021[43]).

In general, MPAs lead to an initial decline in fisheries revenue if fishers are excluded from regions where they previously harvested. This decline is often followed by a slow increase in revenues as the ecosystem benefits such as spillover effects develop, leading to increased catch per unit effort in surrounding fisheries (Mangi et al., 2022[40]). The formation of an MPA is also often accompanied by increasing opportunities for revenue from non-fishing related activities, such as tourism (Pascual et al., 2016[44]). Empirical work suggests that a well-designed reserve network can increase fisheries profit (White et al., 2008[45]). However, the development of additional revenue streams and the recovery of fisheries revenue can take several years to manifest, potentially leaving local communities worse off in the short term (Mangi et al., 2022[40]). Further, in some cases, revenues may not recover, and additional revenue streams may not be able to make up for this shortfall, leading to economic losses over the longer term. These losses can be significant, such as in the case of the Phoenix Island Protected area in Kiribati, which is alleged to have cost the government USD 145 million in lost revenue from fisheries between 2015 and 2021 and is now potentially being opened to commercial fishing (Carreon, 2021[46]).

Importantly, the people bearing the costs of an MPA may not be those reaping the benefits from it (Rees et al., 2021[43]) (Rees et al., 2021[43]). For example, the spillover effects may be in different species, which some fishers cannot exploit due to a lack of the right gear or quotas, and fishers may not be able

to take advantage of new revenue streams, such as from tourism. So even in cases where the benefits are greater than the costs, and the community as a whole is better off, it is still possible for fishers to suffer adverse consequences. When integrating MPAs into fisheries management, which is common under EBFM, it is important to understand the socio-economic system in which they operate to prevent adverse economic impacts on particular groups.

2.3.4. Multiple input controls are often used to manage stocks, in particular for benthic species

On average, stocks have 3.6 input controls in place; however, this number obscures some important trends in how input controls are used in combination with quotas and each other. Stocks without TACs use 3.9 input controls on average, more than stocks with TACs, which use 3.5, likely because additional measures are required to control fishers in the absence of overall catch controls. Stocks with no quota or TAC at all used on average 4 input controls, supporting this conclusion. However, in contrast to what was observed in the *OECD Review of Fisheries 2020*, stocks that use TACs with additional quotas actually used marginally more input controls (3.7) than those that used TACs without additional quotas (3.5).

Table 2.1. Use of input controls by quota type

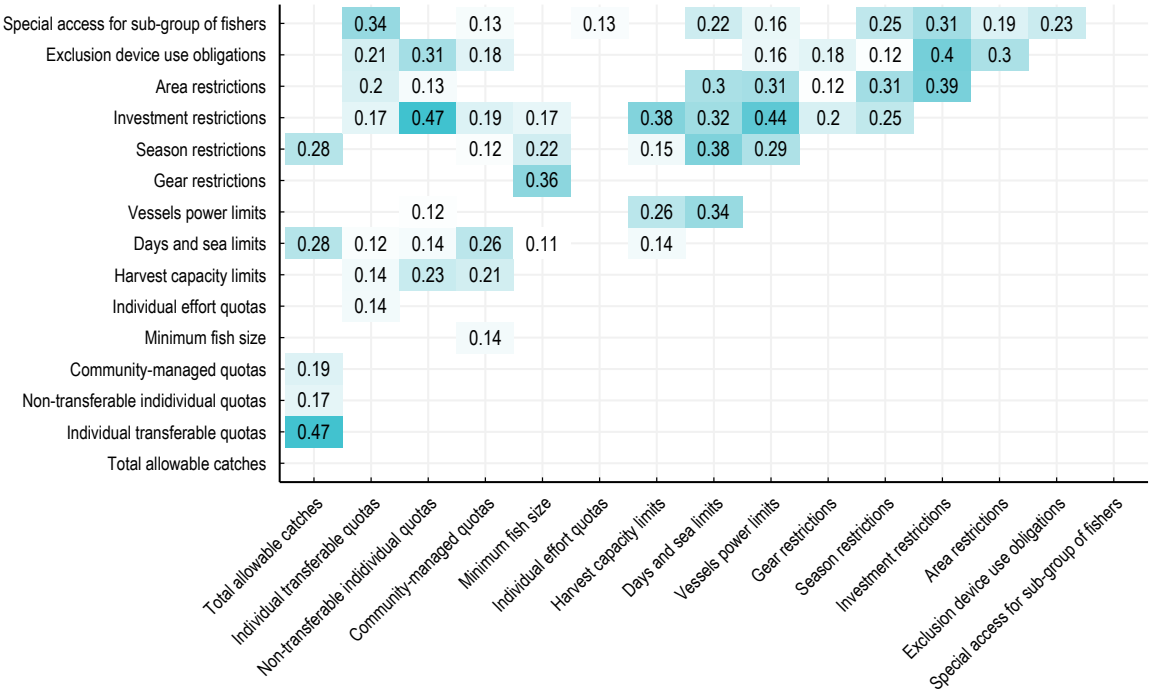
	Number of input controls
Total allowable catch	3.5
Individual tradable quota	3.7
Individual non-transferable quota	4.8
Community-managed quota	4.3

Output controls were used in conjunction with input controls in almost all stocks; however, the use of input controls varied across the different types of quotas (Table 2.1). Stocks that use IQs and CMQs used considerably more input controls on average than other stocks, 4.8 and 4.3, respectively. Stocks using ITQs used 3.7 input controls on average by comparison, only slightly above the average for all stocks. It is not clear why stocks with IQs and CMQs use a higher than average number of input controls. More research and data are needed to understand if there is indeed some causal relationship or if it is simply an artefact of a relatively small sample size; only 49 stocks use IQ and 42 use CMQs.

Stocks of benthic species (109 stocks) use on average 4.4 input controls, which is higher than stocks of demersal species (2.8 input controls on average in 63 stocks) and pelagic species (3.0 input controls on average over 118 stocks). This likely reflects the challenges of managing benthic stocks compared to pelagic or demersal stocks, including the protection of benthic habitats, which are important for both fish stocks and a healthy ocean in general. Benthic stocks were more likely than average to have vessel power restrictions, season restrictions, investment restrictions and harvest capacity limits.

Fisheries managers use a combination of tools to manage fisheries. Understanding which combinations of tools are effective is essential for good fisheries management. The first step is to examine the co-occurrence of management tools to explore which combinations tend to occur together. The blue boxes in Figure 2.8 indicate a statistically significant association between two management tools and the number is the Cramer's V statistic, a measure of the strength of that association. There are significant associations between TACs and other forms of quota (ITQs, IQs and CMQs), with TACs having the strongest association with ITQs. However, ITQs, IQs and CMQs are not significantly associated with each other, which indicates that they do not occur together regularly. This is likely because integrating multiple different quotas systems is challenging and can lead to overly complex management regimes, which might reduce compliance (Healey and Hennessey, 1998[47]).

Figure 2.8. Statistical associations between different management tools, 2021



Notes: Shaded boxes indicate a statistically significant (at $p < 0.05$) association between two management tools based on a Chi squared test. The numbers in the boxes are the Cramer's V statistic, which is a measure of the effect size of the association between the management tools. A medium association will have a Cramer's V of 0.3-0.5 and a small association of 0.1-0.3.

In contrast to quotas, input controls share a high number of significant associations. This confirms the patterns described above indicating that multiple input controls tend to be used on the same stocks to control various aspects of fishers' activity. The three strongest associations between input controls are between investment restrictions and vessel power limits, exclusion device obligation and area restrictions. These associations highlight how packages of input controls generally try to simultaneously limit where, how and how much fishing is taking place. However, the reason for the associations is not clear in some cases. For example, the strongest association is between IQs and investment restrictions, which is not easily explained. More research is needed to understand what is driving particular combinations of management tools and how this can impact the efficacy of fisheries management regimes.

2.4. Combining stock status and management data

Understanding how management tools impact fisheries outcomes is very important for ensuring the long-term sustainability and productivity of fisheries resources. However, making links between management tools and stock status is complicated, as there is a time lag between management action and any impact on stock health and, as explained above, stock status is impacted by many factors besides management tools, such as climate change. Any analysis must avoid assigning causality erroneously. The long-term goal of this data collection is, nevertheless, to create a time series of data that will allow an analysis of how management tools impact stock status.

However, building this time series is a challenge in itself. The way stocks are labelled by management authorities and entities in charge of stock assessments varies across countries, and sometimes across

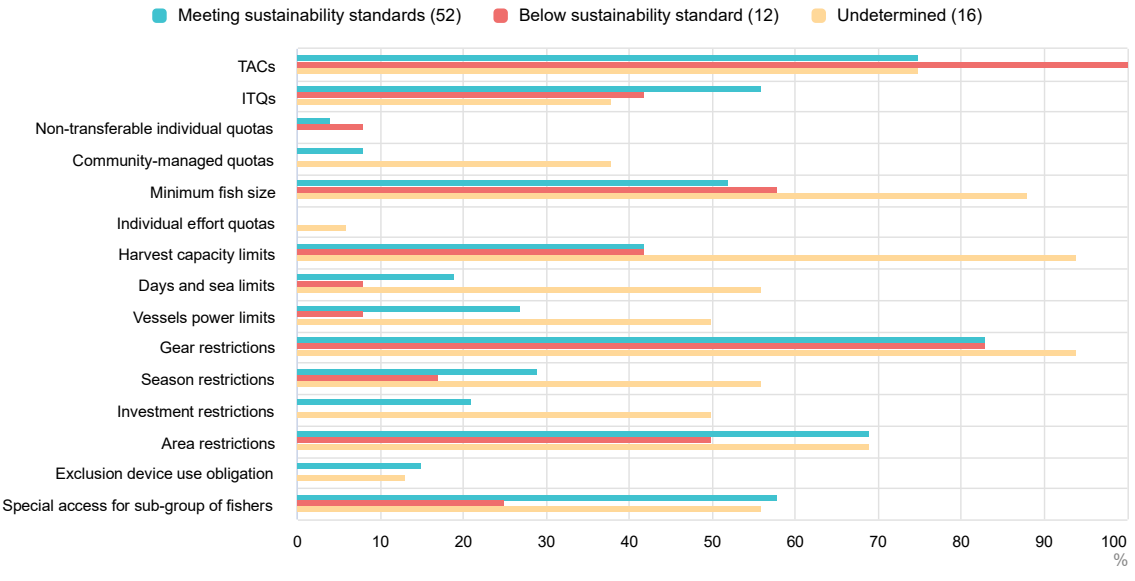
national bodies or across time. For example, the International Commission for the Exploration of the Seas assesses stocks harvested by countries in the North Atlantic Ocean, including several European Union Member States. In doing so, however, it uses stock names which do not align with those used by the European Commission in the allocation of quotas. As such, it is not always easy, or even possible, to reconcile information on stock status with information on stock management. It is also sometimes difficult to find information about the volume and value of landings of a particular stock.

Using consistent names for stocks, particularly those shared between countries, would allow more stocks to be included in this data set, and generally help illuminate the effectiveness of fisheries management. Countries should consider adopting good-practice standards for reporting data at the stock level, particularly in the case of shared stocks. These standards could mandate the use of consistent names or codes for shared stocks, the use of ASFIS (Aquatic Sciences and Fisheries Information System) codes for harvested species (where available), and publicly available notices of any changes to naming conventions for species and stocks.

For just over a quarter of the stocks (80) reported to the management survey, information on the status of the stock in 2021 was also identified in the stock status data set. In 73 of these stocks, the status in 2019 was also available. What follows is a description of these data and should be interpreted with the above caveats in mind.

The majority (65%) of the stocks with both management and status data available were in good health, 15% fell below sustainability standards and 20% had an undetermined status, which is largely in line with the wider data set. There are differences in how management tools are used across these categories (Figure 2.9Figure 2.2), but strong inferences are not possible given the relatively low sample size and the short time series. For example, while 100% of stocks falling below sustainability standards have a TAC, it is not possible to know if the TAC was instigated before the health decline or after, as part of a rebuilding plan. Further, only 12 stocks in the data set fell below sustainability standards, making it difficult to know if this is a pattern or an artefact. Therefore, linking management tool use to stock status outcomes is not currently possible and care should be taken when interpreting these numbers.

Figure 2.9. Occurrence of management tools by biological sustainability status of the stock, 2021



Note: TACs: total allowable catches; ITQs: individual transferable quotas.

There are, however, some interesting general trends. Stocks that fell below sustainability standards have the fewest management in tools on average (4.4), followed by stocks that were in good health (5.6) and stocks with an undetermined status (7.8). Input controls are used more frequently to manage stocks with an undetermined status than stocks that were either meeting or not meeting sustainability standards. On average, stocks with an undetermined status have an average of 4.9 different input controls, while stocks either meeting or not meeting standards use 3.3 and 2.3 different input controls, respectively. Notably, controls that limit fishing effort and capacity (harvest capacity limits, days at sea limits, vessel power limits, investment restrictions and season restrictions) were all more common in stocks with an undetermined status than in stocks where the status has been determined.

The increased use of input controls for stocks with an undetermined status is likely due to features of those stocks which favour input controls and pose challenges to effective assessment. Indeed, benthic species are overrepresented among stocks with an undetermined status. Across all 80 stocks, benthic species account for 45% of stocks but represent 63% of stocks with an undetermined status and include species such as the Norway lobster, the great Atlantic scallop, the Queen crab and the American lobster. Therefore, it may be features of the species itself (e.g. difficult to assess) driving both the increased use of input controls and the undetermined status.

2.5. The challenge of ghost fishing gear

Managing fisheries is complicated by exogenous factors which can directly impact the health of stocks. Ghost fishing gear (hereafter ghost gear), which refers to fishing gear that remains in the sea after having been lost, abandoned or discarded, is one such factor.[8]

The unintended capture of marine biota by fishing gear after it has been abandoned, lost or discarded at sea can indeed have important consequences for fisheries.[9] These include a reduced abundance of target species, which can reduce fishers' CPUE and thus their profitability and have adverse impacts on local and global food security.[10] In fisheries where the impact of ghost gear on target species mortality is significant, management can be directly affected by the phenomenon.[11] Failing to account for the impact of ghost gear would indeed bias management targets and compromise the achievement of sustainability objectives.

Beyond the impacts on fisheries, ghost gear can have significant impacts on the marine environment. Ghost gear is believed to cause the vast majority of entanglement cases, which is particularly damaging for large marine fauna.[12] For this reason, the damage potential of ghost gear is believed to be higher than its share of ocean plastic by volume. Further, through abrasion and smothering of the seabed, ghost gear also adversely impacts corals and other benthic organisms (MacFadyen, Huntington and Cappell, 2009[48]; GESAMP, 2021[49]).

Largely comprised of plastic material, ghost gear also generates many of the environmental challenges caused by marine plastic litter, including deterioration into microplastics and subsequent bio-accumulation in marine organisms.[13] Floating marine debris from ghost gear can also transport encrusting organisms such as bacteria or algae, leading to the introduction of alien species harmful to a new ecosystem. The debris also act as vectors of microbial communities potentially harmful to ecosystems and human health (Gilman et al., 2021[50]; OECD, 2021[51]).

Given the difficulty of observing the quantity of ghost gear, lack of evidence on the magnitude of unintended catches through ghost fishing and thus difficulty in estimating its mortality impact, fisheries management should not only try to account for it, but also strive to reduce its occurrence as much as possible. In 2021, the OECD was commissioned to produce a report on how G7 members were addressing the issue of ghost gear and how they could consider adopting best practices to do so more effectively. What follows is a

condensed and updated version of the report produced in this context: “Towards G7 action to combat ghost fishing gear” (OECD, 2021[6]).

2.5.1. The causes of ghost gear are varied and measuring its magnitude and impact challenging

Fishing gear can be abandoned, lost or discarded at sea for a number of reasons, driven by the natural environment or by human actions. Adverse weather conditions such as storms, strong currents or winds can carry gear away, remove visual locators, or make it difficult and dangerous for fishers to retrieve gear. Interactions between fishing gear and wildlife, other gear, vessels, rocks, corals and man-made structures lying beneath the surface can also cause its loss (Richardson et al., 2021[52]; GESAMP, 2021[49]). Entanglement of mobile gear such as trawling nets with static gear located in the same area is a common reason for loss (MacFadyen, Huntington and Cappell, 2009[48]). Gear can also be lost due to misuse, such as deploying too many nets or when gear is left at sea for too long. In addition, gear is sometimes intentionally discarded or abandoned at sea when fishers consider it more practical and economical than disposing of gear onshore. Notably, this can happen when port-side reception facilities for end-of-life gear are lacking. Finally, gear can be discarded to hide illegal, unreported and unregulated fishing practices.

It is difficult to estimate the volume of ghost gear in the oceans since it is difficult to detect and comes from a wide variety of sources. Research quantifying ghost gear is often specific to particular types of gear and geographic areas. Evidence suggests that a significant proportion of some types of gear is lost, however estimates vary. A meta-analysis of papers looking at the magnitude of ghost gear production concluded that, on average, 5.7% of nets, 8.6% of traps and 29% of lines in use are lost each year (Richardson, Hardesty and Wilcox, 2019[53]).[14] A subsequent study found an average 1.82% of fishing gear is lost annually across all gears (Richardson et al., 2022[54]). Even if gear is lost at lower rates that previously thought, it is significant. For example, a 3.3% annual loss in longlines equates to nearly 740 000 km of fishing line (Richardson et al., 2022[54]).

Studies on the prevalence of ghost gear also suggest that it can constitute a significant source of marine debris. For example, an estimated 70% of marine debris by mass in the five main ocean gyres is fishing related (UNEP, 2016[55]). Another study estimated that fishing gear makes up between 75 and 86% of the floating plastics in the North Pacific Garbage Patch (Lebreton et al., 2022[56]). At local levels, fishing gear was found to account for about half of the marine debris collected in retrieval programmes for the outer shoreline of British Columbia (Markel and Smith, 2020[57]) and was the main source of plastic litter found in beach litter surveys undertaken in the Maritime Area of the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Commission, n.d.[58]).

Bridging the gap between global-level estimations of ghost gear and local-level studies is challenging. There is no agreed methodology for measuring ghost gear, which poses challenges when aggregating and comparing regional estimates. In addition, the frequency of gear loss, discard and abandonment at sea remains largely undocumented in many areas of the world (GESAMP, 2021[49]). As a result, global estimates vary significantly. Most recently, the global volume of ghost gear was estimated to be 1.5% of all oceanic macro-plastics at the low end (300 000 t) (OECD, 2022[59]) and 9-10% of all ocean plastics at the high end (Eunomia, 2016[60]).

In addition, the OECD (2022[59]) estimates that plastic leakage from marine activities (mostly from fishing) will more than double globally to reach 600 000 t in 2060 – 17% of which would originate from OECD countries. More research on the quantity of ghost fishing gear is urgently needed: understanding where and how ghost gear is produced is key to more targeted action. This research requires more and better data on fishing effort and location, the quantities and types of gear deployed, rates of loss (and replacement), and the composition of gear (especially the types of plastics used), particularly in the parts of the world where data are scant (GESAMP, 2021[49]). Research could also draw on better data on the

actual presence of plastics in the sea and refined parameters on the share of total plastics originating from fishing.[15]

2.5.2. Good practices to address ghost gear

The international community is already taking action to address the issue of ghost gear, which is regularly discussed in the context of international and multilateral initiatives to reduce ocean plastic pollution. For example, it was raised in the context of the WTO Informal Dialogue on Plastics Pollution and Environmentally Sustainable Plastics Trade (IDP). Launched in November 2020 by a group of WTO members, the IDP seeks to address the rising environmental, health and economic cost of plastics pollution with trade-related solutions (WTO, 2021[61]).[16] In the near future, the issue could also be addressed in the context of negotiations for an international legally binding instrument on plastic pollution, including in the marine environment, under the United Nations Environment Assembly.[17]

The Global Ghost Gear Initiative was created in 2015 as a multi-stakeholder initiative bringing together the fishing industry, academia, governments, intergovernmental organisations and non-governmental organisations with the specific purpose of addressing the problems associated with ghost gear worldwide. It targets prevention, mitigation, retrieval and recycling actions, information dissemination, and capacity building around best practices to avoid creating ghost gear and minimise its detrimental impact.[18]

In 2021, the OECD prepared the report "Towards G7 action to combat ghost fishing gear" to support the United Kingdom's presidency of the G7 (OECD, 2021[6]). The objective was to take stock of policy actions undertaken by G7 members to address ghost gear and, building on available evidence, to identify the scope for scaling-up and sharing best policies among G7 members and beyond. The report concludes that a comprehensive policy response is required to address ghost gear and should combine a range of government and industry actions, as well as collaboration among stakeholders at local, regional and international levels. The G7 Environment Ministers Communiqué mentioned the need for a comprehensive policy response.[19]

The following section briefly summarises the policy conclusions from the OECD report and updates the review of good practices to address the issue of ghost fishing gear conducted at that time, focusing on the OECD countries and partner economies covered in this report.

Gear marking

The marking of fishing gear can both help to prevent gear loss and discard and reduce the adverse impacts of ghost gear by facilitating the location and retrieval of lost gear. In 2019, the FAO adopted *Voluntary Guidelines on the Marking of Fishing Gear* (FAO, 2019[62]). The guidelines encourage FAO member states and regional fisheries bodies to collaborate developing and implementing pragmatic and harmonised marking systems that identify the owner and position of fishing gear, and link the gear to the person or entity responsible for fishing operations. Other actions of gear marking include a recent decision by the International Maritime Organization to implement mandatory gear marking through Annex V of the MARPOL Convention country-level mandatory gear marking systems (OECD, 2021[6]).

Improved gear and vessel design

Improving fishing gear design can help prevent loss and mitigate the effects of ghost gear. Three particularly promising areas for gear improvement include: 1) affordable and efficient marking and tracking technologies (FAO, 2019[62]); 2) escape cords and panels that can free trapped fish and reduce the ghost fishing capacity (particularly for traps); and 3) excluder devices such as the use of weak ropes or hooks, tie-downs and nets with a lower profile, rope-less fishing or entrance barriers (FAO, 2021[63]). Better gear design can also help address issues related to gear recyclability, by facilitating the separation of different plastic components. By increasing prospects for valorisation of used gear in a circular economy approach,

increased recyclability can reduce incentives to abandon gear at sea. Vessel design can be improved too, for example by ensuring adequate space on-board to stow gear and emergency retrieval tools. Gear and vessel design requirements, incentives to adopt better gear designs and support for research for gear innovation can all help harness the potential of gear improvements to reduce ghost gear.

Reporting and retrieval

Reporting and retrieval help address unavoidable gear loss, for example due to extreme weather conditions. When gear is lost, immediate retrieval (when safe to do so) is the best solution to avoid detrimental impacts but it requires training and adequate equipment. If immediate recovery is not possible, loss reporting can help subsequent relocation and recovery and avoid entanglement with other vessels. Annex V of the MARPOL Convention makes reporting discarded, abandoned or lost fishing gear mandatory. The importance of reporting and retrieval is also stressed in the FAO *Voluntary Guidelines on the Marking of Fishing Gear* (IMO, 2017[64]; FAO, 2019[62]).

Retrieval should be incentivised and regulations are needed to ensure that fishers are not punished for carrying retrieved gear lost by others that is unauthorised. Pilot and end-of-season retrieval programmes, preferably conducted in collaboration with fishing communities and associations, are also effective at reducing the impact of ghost gear and increasing awareness of the issue.

Disposal facilities

Providing adequate disposal facilities at ports can help reduce purposeful discarding of damaged fishing gear at sea by offering fishers an avenue for disposing of end-of-life gear. Disposal facilities can also improve the collection of end-of-life gear and facilitate the preparation of gear for reuse or recycling. Under MARPOL, parties should ensure that adequate reception facilities are available at ports for disposing of garbage without causing undue delay (IMO, 2017[64]).[20] However, evidence suggests that adequate port reception facilities are often lacking (MacFadyen, Huntington and Cappell, 2009[48]; Richardson et al., 2021[52]). Extended producer responsibility for fishing gear manufacturers could also facilitate disposal by shifting some of the costs of waste management from small ports and fishing operators to gear manufacturers (OECD, 2021[6]).

Spatial and temporal management

Marine spatial and temporal management measures can help prevent gear conflict, especially between mobile and static gear. These measures assign delimited geographical areas or periods of time to different marine activities or to produce and share information on the locations and timings of different activities among users of marine space and resources. In many cases, marine spatial planning started as voluntary agreements between fishers, such as in crab fishery in British Columbia (Canada) or Washington State (United States). It is now a priority for national action in many countries (OECD, 2021[6]).

Trade facilitation

Trade can enable the efficient allocation of end-of-life material such as fishing gear by facilitating the movement of material to markets with a comparative advantage in waste processing. For example, fishing gear collected in Iceland and Norway is typically shipped to continental Europe for recycling and other environmentally sound waste management (van Nijen, 2021[65]). However, challenges arise when separating the different components of fishing gear (Yamaguchi, 2018[66]).

Trade policy can facilitate the trade of less harmful plastics and substitutes and disincentivise (or even forbid) trade in the most harmful plastics, potentially creating incentives for producers and consumers to choose less harmful plastics and substitutes. New trade requirements aim to reduce trade in plastics that are difficult to recycle and to improve the quality of traded plastic waste. Such requirements have been

implemented by traditional plastics importers (notably China), the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, and the OECD Decision of the Council on the Control of Transboundary Movements of Wastes Destined for Recovery Options.

Navigating different and evolving trade policy and regulation systems can also create challenges. Reducing friction in trade regimes while maintaining the stringency of environmental standards would encourage environmentally beneficial trade in plastics (OECD, 2022[67]). Harmonisation or joint development of trade policy, regulation and product standards should be encouraged where possible. Finally, information and awareness raising of end-of-life challenges and how they relate to trade policy can help address end-of-life issues.

Education and awareness raising

Awareness raising of the adverse impacts of ghost gear can encourage behavioural change in fishers and consumers and create pressure for fisheries stakeholders to invest in avoiding gear loss. Training can also help gear recovery.

Table 2.2. Good practices to address ghost gear implemented across OECD countries and partner economies

Type of policy measure	Selected policy examples in countries and economies covered in the *OECD Review of Fisheries 2022*
Marking of fishing gear	• Australia: The Ghost Nets Initiative introduced new marking technologies for fishing gear in northern Australia. • Canada, EU Member States and the United Kingdom: Regulation makes it mandatory for ownership details to appear on gear. • New Zealand: Regulation makes it mandatory for longlines, set nets, other static fishing gear and pots to have surface floats that are marked with the fishing vessel's registration number. • United States: Washington State regulation makes it mandatory to report ownership details on gear.
Vessel design	• EU Member States: Fees for port waste management can be reduced for vessels designed, equipped or operated to minimise waste.
Disposal facilities	• The MARPOL Convention is supposed to ensure adequate provisions of facilities at ports for the reception of garbage without causing undue delay. • EU Member States: EU Directive on Port Reception Facilities to ensure that appropriate waste reception is in place, including for ghost gear, and has been implemented for each port. • Italy: legge Salvamare (2022) the disposal of retrieved ghost fishing gear is free of charge. • Korea: The Management of Marine Debris and Contaminated Marine Sediment Act calls for the installation of marine debris collection stations.
Spatial or temporal planning	• Canada: Pacific North Coast Integrated Management Area. • EU Member States: EU Common Fisheries Policy. • Japan: The marine cadastre includes gear conflict awareness. • United Kingdom: National marine plans. • United States: Four states have marine spatial plans.
Gear design	• United States: Biodegradable escaping panels or cords in Florida and Washington State. • Korea: Government support is available to buy biodegradable fishing gear and eco-friendly buoys (Article 86 of the Fisheries Act).
Education and awareness	• EU Member States: Marine LitterWatch mobile app offers tools for data collection and sharing. • Italy: "Plastci Free GC" initiative raises awareness of the plastic issue in schools and among the general public and created an app to report plastics hotspots. • Japan: National Action Plan for Marine Plastic Litter awareness raising. • United States: The Marine Debris Program (National Oceanic and Atmospheric Administration) supports outreach and behaviour change projects.
Reporting and retrieval of ghost gear	• The MARPOL Convention requires reporting lost gear. • Australia: The Ghost Nets Initiative, a federal government initiative, runs retrieval programmes in northern Australia. • Canada: Regulation makes it mandatory to report lost gear within 24 hours. The Ghost Gear Fund supports retrieval projects. • Costa Rica: The Costa Rica Institute of Fisheries and Aquaculture Agreement 115 includes reporting requirements.

Type of policy measure	Selected policy examples in countries and economies covered in the *OECD Review of Fisheries 2022*
	• EU Member States: Vessels must have retrieval gear and there is a 24-hour reporting requirement. Article 40 of the European Maritime Fisheries Fund supports the collection of waste by fishermen from the sea such as the removal of lost fishing gear and marine litter. • Italy: "Operazione reti fantasma", Italian coast guards retrieve ghost fishing gear. • Japan: Subsidised patrol vessels collect lost gear. • Norway: The Marine Living Resource Act states that anyone that loses gear or cuts it adrift has a duty to search for the gear and anyone that salvages gear that has drifted away, been lost or abandoned, including dories and other equipment, shall report this to the owner as soon as possible. The Norwegian Directorate of Fisheries has been conducting annual clean-up expeditions of discarded and abandoned fishery equipment for almost 40 years. • United Kingdom: Regulation requires retrieval and notification of lost gear. • United States: The Newly Lost Net Reporting, Response, and Retrieval Program in the Puget Sound requires 24-hour gear loss reporting.
Extended producer responsibility	• EU Member States: to introduce before 2025 extended producer responsibility schemes for fishing gear and fishing gear components made with plastic. According to the EU Single Plastic Use Directive, Article 8 (2019), Member States shall ensure that extended producer responsibility schemes are established for fishing gear containing plastic placed on the market of the Member State and shall monitor fishing gear containing plastic placed on the market of the Member State as well as waste fishing gear containing plastic collected and shall report to the Commission in accordance. Further, Member States shall report the data on waste fishing gear collected (Decision 2021-958 laying down the format for reporting data and information on fishing gear placed on the market and waste fishing gear collected in Member States). • Italy: legge Salvamare (2022) promotes the circular economy for ghost fishing gear. • United Kingdom: reviewing and consulting on domestic measures for end-of-life fishing and aquaculture gear.

Note: These examples are not exhaustive.
Source: Authors' assessment based on OECD (2021[6]); Global Ghost Gear Initiative (2022[68]); and Ocean Outcomes (2020[69]).

2.6. Conclusion

Around two-thirds of assessed fish stocks are in good health, but their health is declining, while nearly one in five stocks are not meeting their sustainability standards. Further, in some countries, the majority of assessed stocks do not meet sustainability standards. Rebuilding overfished stocks will bring several benefits, namely increased profitability for the sector and improved environmental sustainability. It should be a priority for governments looking to improve outcomes for the communities which rely on the fishing sector.

Furthermore, just under half the stocks in good health were meeting higher management standards such as MEY or MSY. Similarly, improving stock health to meet these higher management targets will benefit both the profitability of the sector and the environment, but likely also reduce emissions from the sector by increasing fishing efficiency. Managing stocks at optimal levels represents a low-technology method of reducing emissions from the sector, which will become increasingly important as governments look towards achieving net-zero targets in the coming decades.

The task facing fisheries managers is difficult. Ensuring the sector's economic, environmental and social sustainability requires management systems that can effectively constrain fishing activity while allowing fishers to operate profitably. There is no perfect management system, and the way fisheries respond to management action can be complex and unpredictable. Therefore, fisheries management needs to be able to adapt to changing circumstances to ensure the sustainability of resources over time. Accurate and timely data on the status of resources and the management actions in place is fundamental to adaptive fisheries management. The data linking management tools and stock health presented in this chapter are a first step to understanding how one impacts the other.

However, continuing efforts are needed to ensure the data can provide valuable insights to fisheries managers going forward. For example, the status of around one in five stocks was undetermined, although this number is much higher in some countries, and in many cases these stocks are commercially important.

In addition, in some countries, very few stocks are assessed, so little is known about the health of the resources upon which coastal communities rely. Without a good understanding of their status, fishers are likely missing out on potential profits either through underfishing or overfishing. Developing methods and capacity to assess these stocks would, therefore, create a range of benefits for fishers and governments. Moreover, the new WTO Agreement on Fisheries Subsidies prohibits governments from subsidising the fishing of overfished stocks and calls for caution when subsidising the fishing of stocks with unknown status. Thus, clarifying the status of undetermined and unassessed stocks is also important for compliance with this agreement.

Finally, fisheries management is further complicated by external factors such as climate change, ghost gear and other human activities in the marine environment, which impact fish stocks in multiple ways. Understanding how such factors impact fish stocks is crucial for effective management. However, there are significant information gaps, particularly around the local-level impacts of these factors on fisheries. Accurate and timely data on these impacts would allow the better targeting of resources to enhancing fisheries management in areas which suffer the greatest impacts.

Annex 2.A. Additional management data tables

Annex Table 2.A.1. Number of stocks using management tools split by species type

	Pelagic	Benthic	Demersal	Other	Total
Total allowable catch	95	80	50	13	238
Individual transferable quotas	56	45	26	5	132
Non-transferable individual quotas	18	20	7	4	49
Community-managed quotas	8	23	11	0	42
Minimum fish size	64	63	48	5	180
Individual effort quotas	5	8	1	4	18
Harvest capacity limits	63	76	31	11	181
Days and sea limits	13	37	9	3	62
Vessels power limits	31	55	18	5	109
Gear restrictions	91	104	61	17	273
Season restrictions	50	53	15	9	127
Investment restrictions	15	49	7	3	74
Area restrictions	71	74	49	12	206
Exclusion device use obligation	7	34	16	4	61
Special access for sub-group of fishers	16	44	14	4	78

Annex Table 2.A.2. Number of stocks in the stock management database by species type

Pelagic	119
Benthic	109
Demersal	63
Other	22

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Notes

[1] SDG 14.4 states: “By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics.” Aichi Target 6 states: “By 2020, all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.”

[2] In advocating a precautionary approach to fisheries management, the FAO Code of Conduct for Responsible Fisheries (FAO, 1995[75]) recommends: “[…] on the basis of the best scientific evidence available, *inter alia*, determin[ing]: a) stock-specific target reference points, and, at the same time, the action to be taken if they are exceeded; and b) stock-specific limit reference points, and, at the same time, the action to be taken if they are exceeded; when a limit reference point is approached, measures should be taken to ensure that it will not be exceeded.”

[3] https://www.fish.gov.au.

[4] https://www.st.nmfs.noaa.gov/stocksmart?app=homepage.

[5] The FAO data set differs from the OECD data in that it does not have an undetermined category. This is because the FAO data are based on number of reference stocks, where information is collected by the FAO itself and decisions regarding the status are taken by the FAO on the basis of available data, even if the data are suboptimal (for the detailed methodology, see Ye et al. (2012[78])). Stocks in good health in the OECD data set are the equivalent of underfished and maximally sustainably fished stocks in the FAO data. However, overfished stocks (35.4%) in the FAO data do not perfectly correspond to undetermined stocks and stocks falling below sustainability standards in the OECD data (36%), as this would imply all undetermined stocks are overfished, which is unlikely. However, undetermined stocks are probably a mix of both healthy stocks and stocks not meeting sustainability standards, suggesting the proportions of both are underestimated in the current data.

[6] Pikitich et al. (2004[27]) define the goals of EBFM as: “(i) avoid degradation of ecosystems, as measured by indicators of environmental quality and system status; (ii) minimise the risk of irreversible change to natural assemblages of species and ecosystem processes; (iii) obtain and maintain long-term socioeconomic benefits without compromising the ecosystem; and (iv) generate knowledge of ecosystem processes sufficient to understand the likely consequences of human actions.”

[7] Data on landings value were not available for Japan for 2020. Data for 2019 were used instead.

[8] Ghost gear is sometimes also referred to as abandoned, lost or otherwise discarded fishing gear. It also occurs in lakes and rivers, but this report only considers marine-based ghost gear.

[9] Fishing gear loss also comes at significant direct costs for the industry – with the direct cost of replacing the lost gear and the opportunity costs of losing the fish that had been caught and of losing fishing opportunities until the gear is replaced.

[10] Gear loss also comes at significant direct costs for the industry, such as the cost of replacing the lost gear, the loss of the fish that had been caught and the opportunity cost of not being able to fish until the gear is replaced. Ghost gear also implies costs for other sectors of the blue economy – notwithstanding the cost to society of deteriorated ocean ecosystems. For example, the shipping sector is affected by the risk of entanglement with vessel propellers while coastal tourism is affected by the impacts of litter on the aesthetic value of natural areas. Ghost fishing gear has even been reported to have contributed to the loss of human lives when it contributed to vessel sinking (Cho, 2005[72]).

[11] For instance, a study conducted in the Salish Sea estimates that 4.5% of the value of the Dungeness crab harvest is lost annually to ghost fishing (Antonelis et al., 2011[77]).

[12] A review of evidence on encounters between marine animals and marine plastic debris conducted by Gall and Thompson (2015[70]) suggests that 79% of entanglement cases documented resulted in the injury or death of the animals, while only 4% of plastic ingestion cases had such a detrimental impact. The same study estimated that over two-thirds of entanglement incidents were caused by fishing gear, such as plastic ropes and netting. Another impact study of the most commonly found forms of marine plastics debris found that fishing gear would have four times more impact on marine mammals, turtles and seabirds through entanglement than all other forms of marine debris combined (Wilcox et al., 2016[71]).

[13] Field and laboratory studies have detected ingestion of microplastics by commercially fished species (OECD, 2021[51]). Microplastics can have both physical and chemical toxicity on marine organisms and humans. Chemical impacts for humans may include endocrine disruptions, carcinogenicity and effects on reproductive health (OECD, 2021[6]). Other potential effects observed on marine biota include altered feeding behaviour, liver toxicity, tumour promotion and reduced survival (GESAMP, 2016[73]). The physical toxicity of ingested microplastics on humans remains largely unknown and more research is needed, but some research already suggests that systemic exposure to microplastics ingestion may lead to localised effects on the immune system, inflammation of the gut and intestine irritation (OECD, 2021[51]).

[14] The reviewed literature included 68 papers spanning 32 countries and territories across the Atlantic, Indian, Pacific and Southern Oceans and the Baltic, Caribbean and Mediterranean Seas. Publications were generally more biased to the United States and Europe, and toward pot and net fisheries, with limited literature for line fisheries.

[15] For example, Kuczenski (2021[74]) recently made use of automated identification system data from Global Fishing Watch, previous estimates of gear losses by type (Richardson, Hardesty and Wilcox, 2019[53]) and predictive modelling to estimate the amount of ghost gear entering the ocean to about 48 000 t annually. However, this figure derives from an estimation focusing on industrial trawl, long line and purse seine fisheries only. The study, in particular, does not consider ghost gear from gillnets, fish aggregating devices, or traps and pots, all of which make up the top three most likely gear classes to be lost according to the Global Ghost Gear Initiative's Best Practice Framework for the Management of Fishing Gear. The study also ignores smaller commercial and artisanal fisheries.

[16] The IDP currently has 16 co-sponsors and is open to all WTO members. The aim of the group is to complement discussions in the WTO Committee on Trade and Environment and other fora. Key topics being discussed include improving transparency; monitoring trade trends; promoting best practices; strengthening policy coherence; identifying the scope for collective approaches; assessing capacity and technical assistance needs; and co-operating with other international processes and efforts (WTO, 2021[61]).

[17] See Resolution 14 adopted by the United Nations Environment Assembly at its fifth session on 2 March 2022: "End plastic pollution: Towards an international legally binding instrument".

[18] The Global Ghost Gear Initiative has developed a best practice framework for the management of fishing gear (Global Ghost Gear Initiative, 2022[68]). Examples of retrieval, collecting and recycling projects are described in Global Ghost Gear Initiative (2018[76]).

[19] See the Climate and Environment Ministers' Communiqué.

[20] The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention covering the prevention of pollution of the marine environment by ships from operational or accidental causes. MARPOL includes regulations aimed at preventing and minimising pollution from ships – both accidental pollution and that from routine operations – and currently includes six technical annexes. Adoption: 1973 (Convention), 1978 (1978 Protocol), 1997 (Protocol – Annex VI); entry into force: 2 October 1983 (Annexes I and II).

3 Government support to fisheries

This chapter provides an overview of how 40 countries and economies support their fisheries and how this support has evolved in recent years making use of the OECD Fisheries Support Estimate, a unique database which measures, describes, and classifies fisheries support policies consistently and transparently. It then discusses the impact of government support to fisheries, focusing on how it can affect the health of fish stocks. It proposes a risk-based framework that can help governments assess the risks of encouraging unsustainable fishing that their support policy mix may present. The chapter then discusses how governments can avoid supporting illegal, unreported, and unregulated fishing. It closes with an exploratory discussion of non-specific support policies that benefit the fisheries sector, alongside a range of other economic sectors.

Key messages and recommendations

Over the period 2018-20, the 40 countries and economies covered by the OECD Fisheries Support Estimate (FSE) database, which together accounted for 90% of world landings over the period, provided average annual support of USD 10.4 billion to the fisheries sector. This support equated to about 11% of the average value of landings over the period, down from about 14% in 2012-14.

In OECD countries, 42% of the support provided over the period 2018-20 was targeted at ensuring productive and sustainable fisheries through spending on management, monitoring, control and surveillance (MMCS). Having increased over time, spending on MMCS is now the largest type of support in OECD countries. At the same time, 12% of fisheries support in the OECD was granted through policies that present a high risk of encouraging unsustainable fishing in the absence of effective fisheries management, mostly as support to fuel and vessels. Another 33% of support was granted through policies that can present a moderate, yet non-negligible, risk of encouraging unsustainable fishing, notably through support to infrastructure and support to income (which respectively accounted for 19% and 12% of total support). In the emerging economies studied in this chapter, the majority (53%) of support provided in the period came from policies that present a high risk of encouraging unsustainable fishing in the absence of effective fisheries management – primarily as support to fuel.

Countries should carefully review the policies that can present risks of encouraging unsustainable fishing and determine if recipients of such support operate in sustainably managed fisheries. Where this is not the case, countries should consider better targeting these policies, for example by attaching eligibility conditions, or using alternative forms of support. Countries may also want to move away from policies which can present risks of harming fish stocks more generally, as a precautionary approach, given the difficulty, and cost, of regularly monitoring whether individual recipients of support are operating in sustainably managed fisheries.

Eliminating support that can present a high risk of encouraging unsustainable fishing will also have beneficial impacts on the resilience and equity of the fisheries sector, as these types of policies can have inequitable impacts on small-scale fishers and are generally not effective at raising fishers' incomes. Money can be repurposed for sustainable fisheries management, enforcement and research into the health of fish stocks and the impact of climate change. Where needed, direct income support can help ensure fishers' livelihoods in particular circumstances.

In June 2022, members of the World Trade Organization (WTO) agreed on a series of disciplines to eliminate some of the most potentially harmful types of subsidies: those that benefit illegal, unreported and unregulated (IUU) fishing; those that benefit the fishing of overfished stocks; and those that benefit fishing in the unregulated high seas. Governments should accept the WTO Agreement on Fisheries Subsidies so that it can enter into force and continue negotiating at the WTO to agree on disciplines to eliminate other potentially harmful subsidies, such as those that encourage overcapacity and overfishing.

To minimise the risk of supporting IUU fishing, governments should make support conditional on vessels being flagged to the supporting country and authorised to fish in its waters. They should also use appropriate processes to exclude from support potential recipients linked to IUU fishing and fishing-related activities in support of IUU fishing and publish information on all support recipients.

Like many sectors, fisheries typically benefit from support provided through policies that benefit a range of sectors simultaneously rather than fisheries exclusively; this concerns, in particular, energy-related support. To understand how to best target public spending to achieve objectives governments have for their fisheries, better information is needed about all the policies that benefit the sector and how they impact its performance and sustainability.

3.1. Advancing fisheries support reform agendas

The fisheries sector makes a key contribution to global food security and the ocean economy (see Chapter 1). Government support can enhance this contribution when it helps ensure the health of fish stocks and ecosystems, increase fish stock productivity, and build resilience in the fisheries sector. But government support can also result in undesirable outcomes when it encourages the build-up of excess fishing capacity; overfishing; and IUU fishing. This is more likely to happen when management does not effectively limit fishing to sustainable levels (OECD, 2020[1]; Martini and Innes, 2018[2]).

When government support encourages unsustainable fishing, it ultimately compromises the fishers' livelihoods – harming the productivity, and the very existence, of the resource they depend on while potentially making them more dependent on support in the process. In such cases, support is also generally not effective at raising fishers' incomes and can have unintended negative impacts on the competitiveness of small-scale fishers (Martini and Innes, 2018[2]).

In June 2022, members of the WTO agreed on a series of disciplines that prohibit some of the most harmful types of subsidies: those that benefit IUU fishing; those that benefit the fishing of overfished stocks; and those that benefit fishing in the unregulated high seas (see Chapter 1). They also committed to continue negotiating to agree on disciplines to eliminate subsidies that encourage overcapacity and overfishing. Governments now face the challenge of implementing the WTO Agreement on Fisheries Subsidies.

Reforming fisheries support to ensure that it delivers on the objectives governments have for their fisheries is made all the more necessary by the numerous challenges global fisheries currently face: adapting to climate change and its impacts on fish stock abundance and migration while contributing to global emissions reductions; adapting to increasing energy prices and disruptions to value chains; and, in many places, attracting a new generation of fishers to the industry. Many other sectors face similar challenges, raising critical questions for government budgets on how best to support the changes required in an environmentally sustainable and equitable way.

To develop concrete fisheries support reform agendas, governments and stakeholders in the fisheries sector first need comprehensive information on support. Providing such data is a long-standing objective of the OECD Committee of Fisheries. Central to this is the evidence provided by the OECD *Fisheries Support Estimate* (FSE) database, which describes, measures and classifies fisheries support policies consistently and transparently. This chapter starts by presenting the most up-to-date data on government support to fisheries for 40 countries and economies which together account for 90% of global landings. It outlines the level and composition of fisheries support and its evolution over about a decade.

To identify any need for reform, and prioritise action, governments also need to understand the impacts of different support policies. Assessing the impacts of individual policies is, however, challenging, as it demands information and data that are not readily available: the recipients of particular policies and their socio-economic situation; the health of the fish stocks they target; and how these stocks are managed.

To guide reform, this chapter identifies the possible risks different support policies can pose to fishery resources and ecosystems in the absence of effective management, building on how different forms of government support create different incentives in fisheries and have a different potential to influence socio-economic performance and environmental sustainability. As demonstrated in Chapter 2, effective management is not yet the norm in many regions, and, in every region, some fisheries could be better managed. This risk-based framework can thus help governments identify the policies that can present a risk of encouraging unsustainable fishing and consider improving their targeting or using alternative support policies when they cannot ensure that all recipients of such support operate in sustainably managed fisheries.

This chapter consists of four main sections. Section 3.2 presents and discusses current levels and trends in government support to fisheries, as reported in the recently updated FSE database. Section 3.3

summarises what is known about the potential impact of fisheries support on fish stock health into a matrix classifying support policies according to the risk that they may encourage unsustainable fishing in the absence of effective management. The section also presents data on support to fisheries, as recorded in the FSE database, seen through that matrix. Section 3.4 discusses how to practically eliminate government support to IUU fishing. Section 3.5 concludes with an exploratory discussion of non-specific support policies that benefit the fisheries sector, alongside a range of other economic sectors.

3.2. Levels and trends in government support to fisheries

The OECD FSE database (Box 3.1) attempts to capture the total monetary value of government support to the fishing industry by providing an inventory of all the policies that generate a transfer from taxpayers to fishers. The database records information on the attributes of policies along with the annual value to the industry in both USD and the national currency of the reporting country. The FSE records support in two main categories of policies, each of which is subdivided further based on factors that include implementation criteria and policy intent. Support to services for the sector (SSS) comprises government spending that benefits the sector as a whole, or entire segments. Direct support to individuals and companies in the fisheries sector (DSI), on the other hand, covers all spending that is directed to individual beneficiaries. In addition, the FSE database records payments made by the fisheries sector (PMS); that is, fees paid by service users, such as for port access or management, and taxes or fees on resource use and associated profits. These payments reduce the extent to which taxpayers finance support to fisheries and are thus deducted from total support (SSS + DSI) to compute total net support (SSS + DSI – PMS).

The discussion in this chapter covers the period 2012-20 and is undertaken in USD. To avoid the undue influence of short-term fluctuations, three-year rolling averages are used when discussing the data, and the periods 2012-14, 2015-17 and 2018-20 are used as reference periods when the level of detail is too high to present or discuss the entire time series.

This section starts by looking at trends in total support (and net support) to provide some context on overall levels and trends in government intervention in fisheries (Section 3.2.1). However, it should be noted upfront that the total values of support recorded in the FSE database are made up of many different support policies which vary in nature and potential socio-economic or environmental outcomes (as will be exposed in Section 3.3). Thus, when comparing levels of support, it is informative to distinguish between the types of policies being considered. It is also important to contextualise the levels of support with the value of landings (per USD), fleet size (per gross tonne [gt]) and employment (per fisher) as appropriate. The levels and trends for each sub-category of support are discussed in detail in Sections 3.2.2 for SSS and 3.2.3 for DSI.

Box 3.1.The OECD *Fisheries Support Estimate* database

Based on information submitted by national authorities, the OECD *Fisheries Support Estimate* (FSE) database measures, describes and classifies fisheries support policies consistently and transparently to facilitate their evaluation against defined objectives.

The database records support to fisheries in two main categories of policies, each of which is subdivided further based on factors that include implementation criteria and policy intent:

1. *Support for services to the sector (SSS)* comprises support to infrastructure; management, monitoring, control and surveillance (MMCS); research and development (R&D); education and training; marketing and promotion; fishing communities; access to foreign waters; and other services to the sector.

2. *Direct support to individuals and companies in the fisheries sector (DSI)* comprises support to income; insurance; fixed inputs (in particular vessels and gear); fuel;[1] other variable inputs; capacity reduction; and other direct support.

In addition, the FSE database records payments made by the fisheries sector (PMS); that is, fees paid by service users, such as for port access or management, and taxes or fees on resource use and associated profits, which reduce the extent to which taxpayers finance support to fisheries.

3. Total FSE corresponds to the sum of SSS and DSI, while total net FSE corresponds to total FSE minus PMS.

The FSE database covers 30 OECD countries (referred to in what follows as "the OECD countries") as well as ten key non-OECD economies with significant marine fisheries (referred to in what follows as "the emerging economies"). Together, the 40 countries and economies included in the FSE database represented 90% of global capture fisheries production by volume in the period 2018-20.

The OECD countries in the FSE database are: Australia, Belgium, Canada, Chile, Colombia, Costa Rica, Denmark, Estonia, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Korea, Latvia, Lithuania, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovenia, Spain, Sweden, the Republic of Türkiye, the United Kingdom and the United States. These countries accounted for 34% of global capture fisheries production by volume in the period under study.

The *emerging economies in the FSE database* are: Argentina, Brazil, the People's Republic of China (hereafter "China"), India, Indonesia, Malaysia, Peru, the Philippines, Chinese Taipei and Viet Nam. These countries accounted for 55% of global capture fisheries production by volume in 2018-20.

Notable changes since the 2020 edition are that Costa Rica is now an OECD country, the United Kingdom has left the European Union, and the database now includes India.

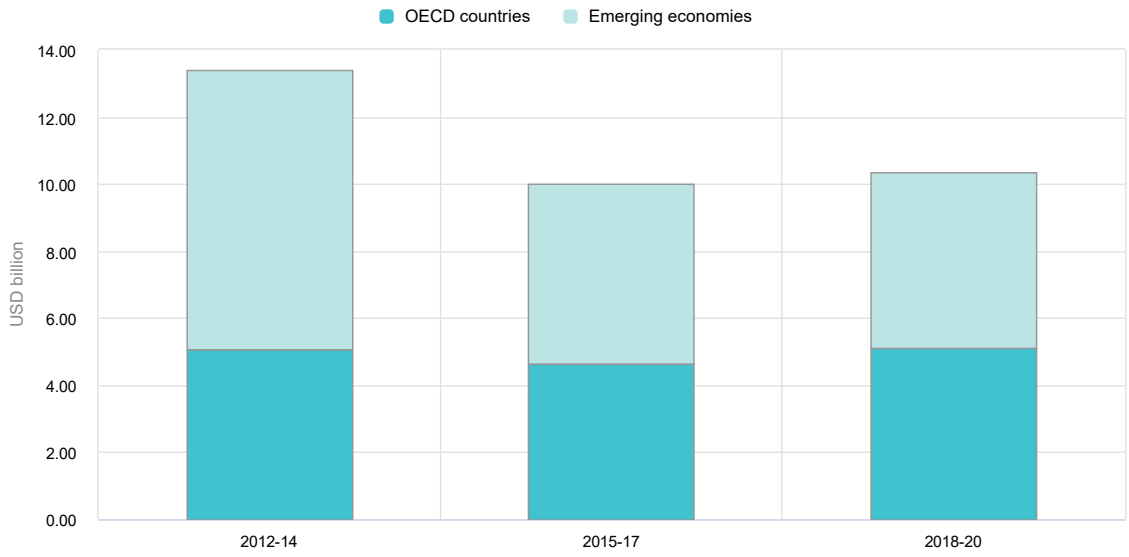
The FSE data and indicators are available on the OECD statistical portal.

1. In the FSE database, support to fuel is reported under two separate headings depending on the mechanism: fuel tax concessions are reported under "tax exemptions" while direct transfers to reduce the cost of fuel are reported under "transfers based on input use". Since impacts are similar, they are jointly considered as support to fuel in this chapter.

3.2.1. Support to fisheries has declined, mainly due to a reduction in the emerging economies

Total support to fisheries over 2018-20 for the 40 countries and economies that reported their support to fisheries to the FSE database equalled a gross annual average of USD 10.4 billion (Figure 3.1). Total support has fallen by 23% since 2012-14 (when it reached USD 13.4 billion) but has increased slightly in recent years (from a low of USD 9.1 billion in 2016-18). Total support equated to 10.7% of landings value in 2018-20, down by 3.2 percentage points from 13.9% in 2012-14.[1] This represented, on average, USD 421 of support per fisher in 2018-20, down from USD 518 in 2012-14 (Table 3.1).

Figure 3.1. Total support to fisheries in recent years, 2012-2020



Source: OECD (2022[3]), Fisheries Support Estimate (FSE), http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_FSE.

Table 3.1. Total support to the fisheries sector: Levels and trends at a glance

	USD billion			% landings value			USD per fisher			USD per gross tonne			Main support type
	2012-14	2018-20	Trend	2012-14	2018-20	Trend	2012-14	2018-20	Trend	2012-14	2018-20	Trend	2018-20
All countries and economies	13.4	10.4		13.9%	10.7%		518	421		729	549		MMCS
OECD countries	5.1	5.1		12.7%	14.0%		4760	5163		901	880		MMCS
Emerging economies	8.3	5.3		15.0%	8.2%		335	222		656	415		Fuel

Notes: MMCS: management, monitoring, control and surveillance. Trend lines show the three-year rolling average between 2012-14 and 2018-20. The y-axis scale differs by trend line so that the pattern of change may be seen.
Sources: OECD (2022[3]; 2022[4]; 2022[5]; 2022[6]).

When PMS are accounted for, the net total FSE amounted to USD 10.1 billion in 2018-20. Net total FSE has also fallen, by 23%, since 2012-14 (down from USD 13.1 billion in 2012-14) but has increased by 15% in recent years (from a low of USD 8.8 billion in 2016-18).

OECD countries reporting to the FSE delivered support totalling USD 5.11 billion per year, on average in 2018-20 (net FSE USD 4.87 billion), a negligible increase on the USD 5.08 billion reported for 2012-14 (net FSE USD 4.86 billion) (Figure 3.1). Total support as a proportion of landings value was 14.0% in 2018-20, up more than 1 percentage point from 12.7% in 2012-14, mostly as a result of a decline in the value of landings (by 8.7%) between the base and most recent periods. In the interim periods, both total FSE and net total FSE declined until 2015-17 (to a total FSE of USD 4.5 billion, and net total FSE of USD 4.3 billion) before trending upwards since. In the OECD countries, total FSE equated to USD 5 163 per fisher in 2018-20, up from USD 4 760 in 2012-14 (Table 3.1).

Non-OECD emerging economies reporting to the FSE, provided a combined total of USD 4 billion per year in support, on average, over 2018-20 (net FSE USD 5.3 billion) (Figure 3.1). This is a reduction of almost 40% compared to the USD 8.3 billion reported for the same group of countries for 2012-14 (net FSE

USD 8.3 billion). Low levels of PMS in these economies result in little difference between total FSE and net total FSE. For the emerging economies for which the value of landings was also available, total FSE equated to 8.2% of the average value of landings in 2018-20, on average, a substantial decrease from 15.0% in 2012-14.[2] The decline is a consequence of both the reduction in total FSE and the value of landings increasing by 18.7%. In the emerging economies, total FSE equated to USD 222 per fisher in 2018-20, a relatively large reduction from USD 335 per fisher in 2012-14 (Table 3.1).

Six countries, or groups of countries, accounted for 86% of all support reported in the FSE in 2018-20 (China – 38%, Japan – 13%, the United States – 10%, Canada – 8% and Brazil – 6%), while EU Member States together accounted for just under 9%.[3] The relative contribution of China has fallen over time, from just under half of all reported support in 2012-14. India, Norway and Poland individually accounted for 2-3% of total reported support while Denmark, Italy, Korea and Sweden accounted for 1-2% each. The remaining countries and economies in the database each accounted for less than 1%.

Absolute levels of support and their trends vary considerably across individual countries, but one pattern is relatively clear: countries providing the greatest levels of support to their fisheries also tend to have some of the largest fisheries sectors.[4] Of the top six support reporters, all are also in the top seven countries and economies reporting to the FSE database in terms of global catch volume, fleet capacity or employment. When seen relative to different measures of sector size, the top providers of support over 2018-20 are different (Annex Table 3.A.1). As a share of the value of landings, support was the highest in Poland, followed by Slovenia and Sweden. On a per-fisher basis, support was the highest in Sweden, followed by Denmark and Poland, while the highest levels of support per gross tonne of fleet capacity were seen in Poland, followed by Sweden and Brazil.

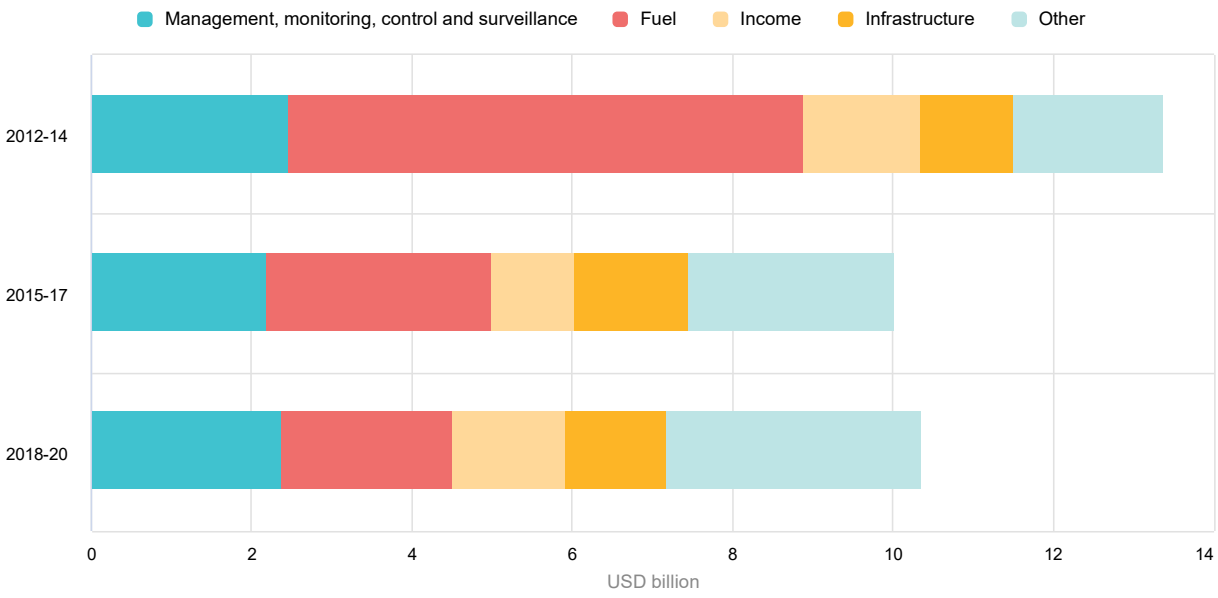
Before turning to a detailed analysis of levels and trends in sub-categories of support, an overview is provided of the evolution in the policy mix over the reference periods across all countries and economies (Figure 3.2) and of the current policy mix at the level of OECD countries and emerging economies (Figure 3.3) and at the country level (Figure 3.4).

One initial observation is that support to fuel is no longer the single largest form of support in the database, having been overtaken by increased levels of spending on MMCS. This is due to a decrease in fuel spending in emerging economies and increased spending on MMCS in OECD countries. However, as shown below, fuel support has increased in absolute terms in OECD countries in recent years and remains the single largest type of support provided by the emerging economies (Figure 3.3). It is also important to note that fisheries typically benefit from other types of energy support, not reported to the FSE, because they are provided through non-specific policies; that is, policies that benefit a range of economic sectors such as forestry, shipping and off-road vehicle use (Section 3.5).

On average, the policy mix is quite different between the OECD countries and the emerging economies under study (Figure 3.3). In the OECD, on average, 42% of support is spending on MMCS, followed by spending on infrastructure (19%), income support (12%) and support to fuel (8%). The relative importance of these four types of support was the opposite in emerging economies, where, on average, fuel support accounted for 33% of total support, followed by income support (15%), spending on infrastructure (5%) and MMCS (4%). However, within these groups, policy mixes at the country level are quite different as well (Figure 3.4).

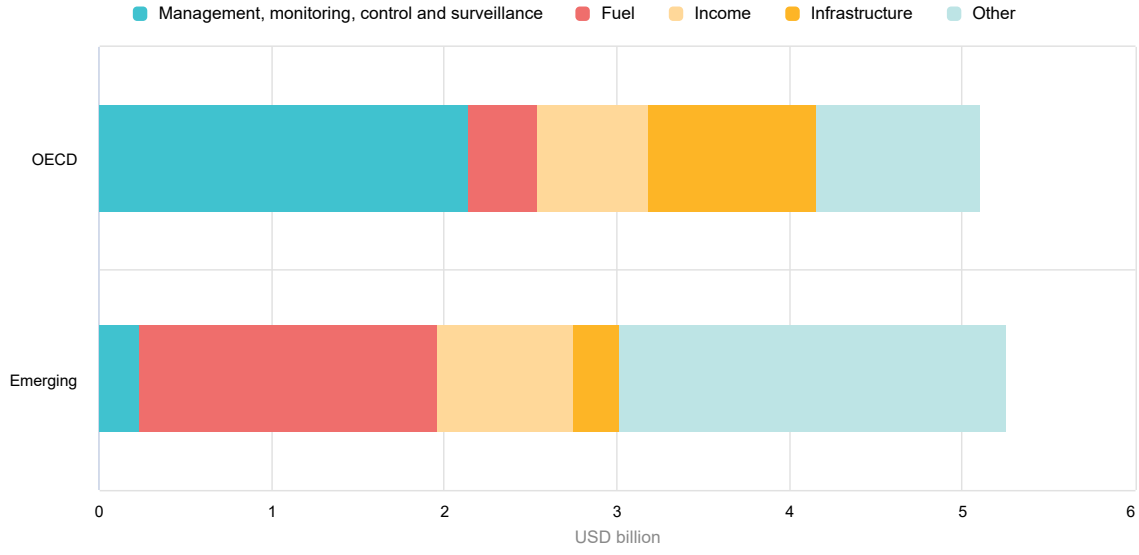
A final initial observation is that, despite having fallen in absolute terms, the overall magnitude of support provided by China means it continues to have an influence on levels and trends in overall support numbers (and on average levels and trends at the level of emerging economies).

Figure 3.2. FSE support policy mix in recent years, all countries and economies, 2012-20



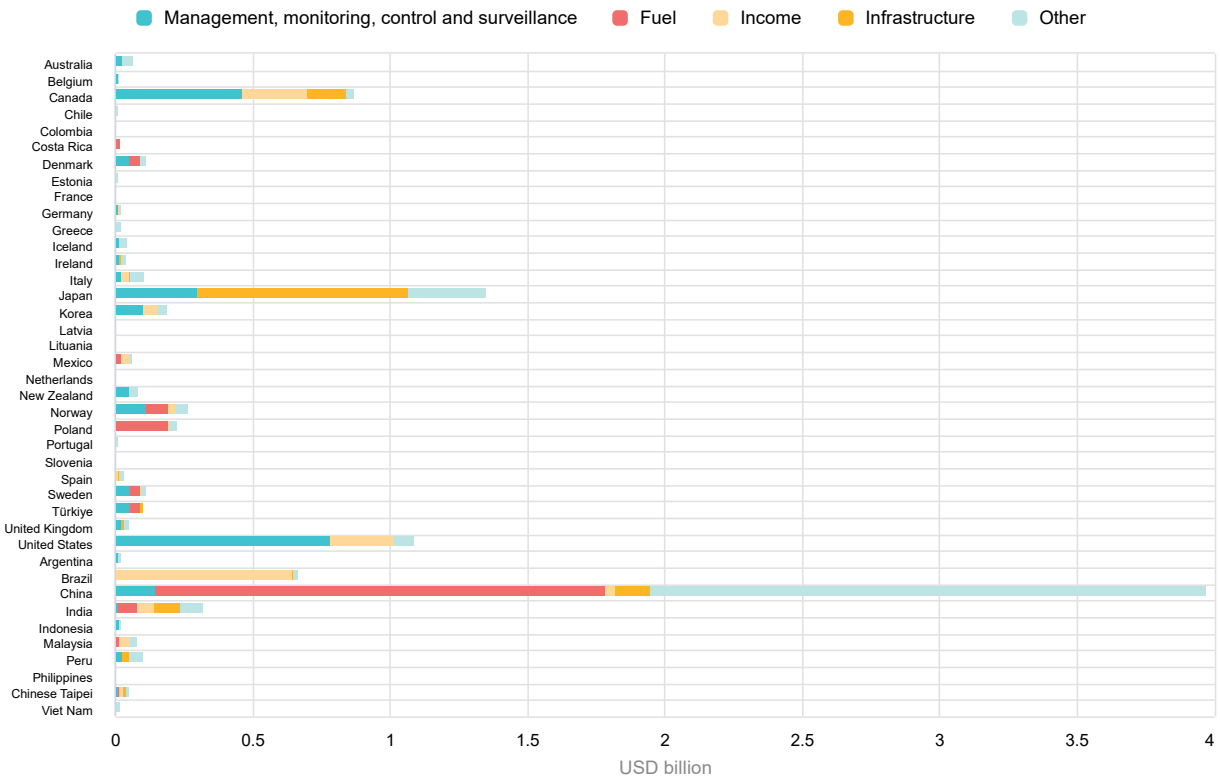
Source: OECD (2022[3]), Fisheries Support Estimate (FSE), http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_FSE.

Figure 3.3. FSE support policy mix in OECD countries and emerging economies, 2018-20



Source: OECD (2022[3]), Fisheries Support Estimate (FSE), http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_FSE.

Figure 3.4. FSE support policy mix in individual countries and economies, 2018-20



Source: OECD (2022[3]), Fisheries Support Estimate (FSE), http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_FSE.

3.2.2. Support for services to the fisheries sector is substantially higher in the OECD countries and declining further in some of the emerging economies

Over 2018-20, on average, SSS totalled USD 4.6 billion per year, across all countries and economies (with a net cost of USD 4.34 billion when deducting PMS). Across the OECD, SSS totalled USD 3.9 billion per year (with a net cost of USD 3.7 billion), while it was USD 0.68 billion per year in emerging economies (with a net cost of 0.67 billion) (Table 3.2).

Table 3.2. Support for services to the fisheries sector: Levels and trends at a glance

	USD billion			% of total FSE			USD per fisher			Main support type
	2012-14	2018-20	Trend	2012-14	2018-20	Trend	2012-14	2018-20	Trend	2018-20
All countries and economies	8.6	5.8		64.3%	55.9%		333	235		Fuel
OECD countries	1.2	1.2		22.9%	23.8%		1089	1228		Income
Emerging economies	7.4	4.6		89.7%	87.2%		301	194		Fuel

Notes: FSE: Fisheries Support Estimate (database); MMCS: management, monitoring, control and surveillance. The y-axis scale differs by trend line so that the pattern of change may be seen.
Sources: OECD (2022[3]; 2022[5]; 2022[6]).

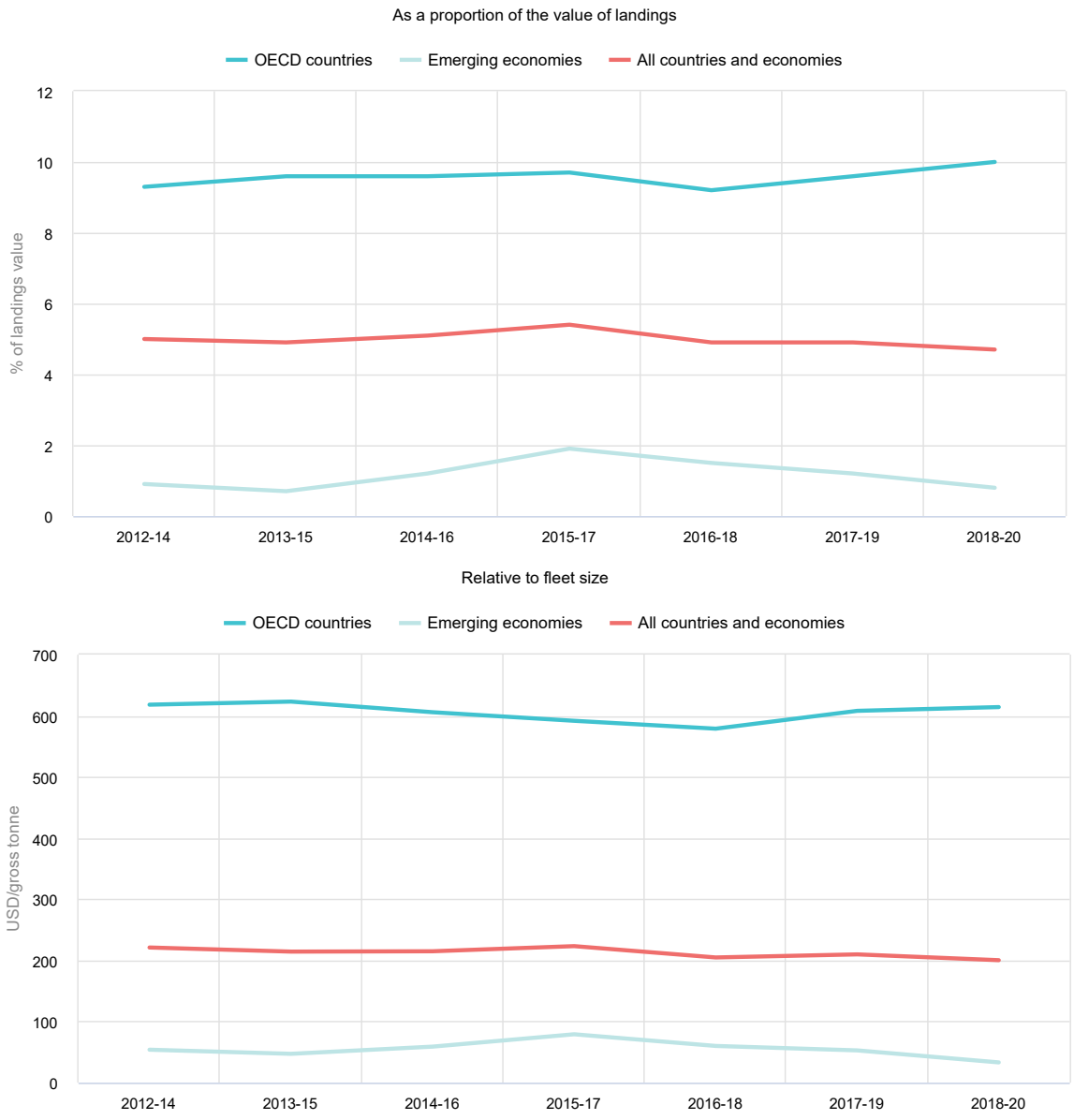
Net SSS (that is SSS minus PMS) remained high as a proportion of net total support in OECD countries in 2018-20 (at 75%, down from 76% in 2012-14 – and even more so when compared to the high of 80% in 2015-17). These fluctuations were mainly the result of changes in the level of DSI rather than in SSS. The trend in net SSS (increase and subsequent decrease) for all countries and economies in the FSE database is driven by the changes seen in the emerging economies, where net SSS increased to a high of USD 1.20 billion in 2015-17 before falling to a new low of USD 0.67 billion in 2018-20.[5]

The observed changes in SSS (and net SSS) in the emerging economies are largely a consequence of changes to support policies in China, where reported spending on SSS increased from USD 0.35 billion to USD 0.78 billion between 2012-14 and 2015-17, before falling to USD 0.30 billion in 2018-20. On the contrary, spending on SSS increased in more than half of the emerging economies between 2012-14 and 2018-20, but the magnitude of spending associated with China's policies means that even relatively small proportional changes tend to dominate any aggregate trend it is a part of. Less than half of the emerging economies in the FSE report PMS. However, PMS is significant in Argentina, compensating for 41% of SSS spending.

A useful way of looking at support is by considering the intensity at which it is provided. The intensity of support can be calculated in relation to different measures of sector size, such as the value of landings and capacity.[6] Net SSS relative to the value of landings in 2018-20 was the highest in OECD countries (where SSS equated to 10% of the value of landings) and an order of magnitude lower in the group of emerging economies (where it was only 0.8%). On average, across all countries and economies, net SSS relative to the value of landings was 4.7% in 2018-20. The pattern of increase and then decline imposed by changes in China's SSS, along with the value of landings continuing to increase over time for the group of emerging economies, can be seen in both this group and when all countries and economies are considered together (Figure 3.5, upper panel).[7] The intensity of net SSS relative to the value of landings has been consistently higher in OECD countries and is currently at its highest level due to an increase in net SSS and a concurrent decline in the value of landings.[8]

The typically higher levels of SSS and relatively smaller fleets in the OECD countries result in the level of spending on services to the sector per gross tonne (gt) of fleet being consistently and substantially higher than in the emerging economies. While across all countries and economies an annual average of USD 200/gt was spent on net SSS in 2018-20, it reached USD 614/ gt in the OECD countries.[9] It was only USD 33/gt in the emerging economies (Figure 3.5, lower panel).[10]

Figure 3.5. Net support for services to the fisheries sector in recent years, 2012-20



Note: Landings value data were unavailable for Brazil, India, Malaysia, Peru, the Philippines and Viet Nam, so the FSE for these countries was excluded from the upper panel.

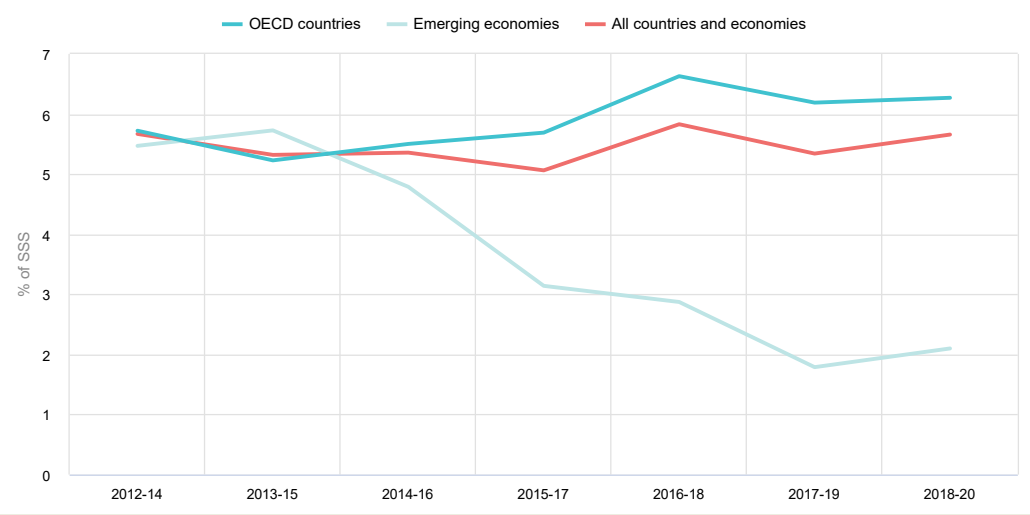
Sources: OECD (2022[3]), Fisheries Support Estimate (FSE), http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_FSE; (OECD, 2022[4]), Marine landings, http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_LAND; (OECD, 2022[6]), Fishing fleet, https://stats.oecd.org/Index.aspx?DataSetCode=FISH_FLEET.

Box 3.2. The fisheries sector generally only modestly contributes to funding services to itself

Generally, some services to the fisheries sector are best provided by governments, such as monitoring, control and surveillance, while others are best provided in partnership with industry, such as management. Payments made by the fisheries sector (PMS) thus can ensure users pay for the services they are using; reduce the extent to which taxpayers fund the fishing sector; and create pressure for the cost-effective provision of these services (Kauffman and Geen, 1997[7]). The sector's ability to fund a reasonable proportion of the management costs also provides some indication of its economic performance.

In 2018-20, only 6% of support to services for the sector (SSS) was covered by cost recovery in the OECD countries and 2% in the emerging economies (Figure 3.6). The absolute value of PMS has increased slightly across the OECD and fallen in the emerging economies, but is relatively low in both cases. Further, in the emerging economies, PMS fell despite a substantial increase in SSS up to 2015-17, suggesting that any direct cost-recovery link between PMS and SSS is weak.

Figure 3.6. Payments made by the fisheries sector as a proportion of the support for services to the sector in recent years, 2012-20



Source: OECD (2022[3]), Fisheries Support Estimate (FSE), http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_FSE.

The situation is different in a few countries (see Annex Table 3.A.2). In Iceland, PMS not only covered all spending on SSS in each period, but also fully offset, and exceeded, the public money spent on all support to fisheries (i.e. PMS exceeded total FSE). In the Netherlands, increasing PMS combined with falling levels of SSS resulted in services to the sector being entirely funded by public funds in 2012-14 and more than fully offset in 2018-20.

The generally low value of PMS is also apparent when assessed as a proportion of the value of landings. Across the OECD, PMS accounted for 0.7% of the value of the landings in 2018-20, whereas in the emerging economies it was 0.02%. Iceland is once again the frontrunner, with SSS accounting for just under 9% of the value of landings in 2018-20 (having increased from 6.5% in 2012-14). Other countries where PMS as a proportion of landings value was of note in 2018-20 were New Zealand (4.4%), Costa Rica (4.3%), Australia (2%), the Netherlands and Norway (both 1.4%), and Canada and Estonia (both 1.3%). Overall, these numbers suggest paying greater attention to the user-pays principle.

PMS is, and has been, one of the less frequently reported types of programmes in the FSE database, with only 40% (12 OECD countries and 4 emerging economies) of countries reporting any PMS at all in 2018-20. The European Union is a relative outlier in this context, with only 25% (4) of its Member States reporting PMS in 2018-20. While some countries do not require any PMS, issues regarding the completeness of PMS reporting and the potential representativeness of the data are important to keep in mind when interpreting these numbers. In addition, alternative approaches to funding services to the sector, such as where the industry directly bears some or all of the cost of services (including those required by governments), may limit the extent to which the proportion of the costs of SSS paid for by the sector is reflected in the FSE, making it difficult to draw strong conclusions from these data alone.

Spending on management, monitoring, control and surveillance has become the greatest form of support in the OECD countries, while it is low and declining in the emerging economies

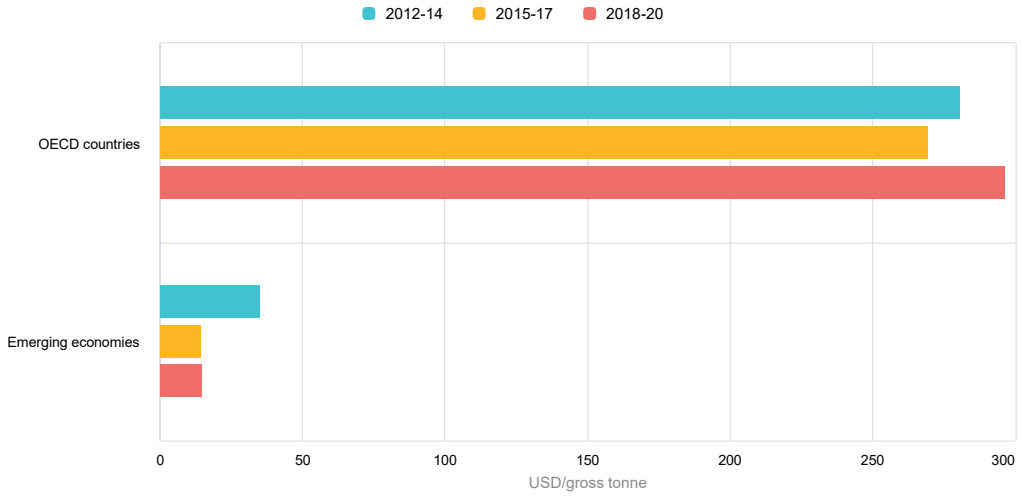
Across all countries and economies, spending on MMCS totalled USD 2.4 billion annually over 2018-20. Spending on MMCS has been relatively stable, having fallen only slightly compared to 2012-14 (USD 2.5 billion). MMCS predominantly, and increasingly so, originates from the OECD countries, which accounted for 90% of all spending on MMCS reported in the FSE database (up from 82% in 2012-14). MMCS has consistently been the single largest form of support reported across the OECD in all periods and is more than twice as much as the next largest form of support (support to infrastructure). Spending on MMCS across the OECD rose from USD 2.03 billion to USD 2.14 billion between 2012-14 and 2018-20, having increased in two-thirds of the OECD countries. The largest proportional increases in support to MMCS were in Italy, the United Kingdom, Belgium, Spain and Costa Rica, where MMCS at least doubled between 2012-14 and 2018-20. However, all these countries had relatively low levels of spending on MMCS to begin with (for example, in Italy MMCS increased from USD 1 million to USD 25 million). Substantial reductions in MMCS have also been reported at the country level: Australia (-68%), the Netherlands (-65%) and Mexico (-49%), while Ireland, Japan, Norway and Türkiye all reported reductions of around 30%. On average, MMCS accounted for 41.9% of total OECD support in 2018-20.

In comparison, the absolute level of spending on MMCS was relatively low in the group of emerging economies in 2018-20, at USD 0.23 billion and almost halved over the period considered (from USD 0.44 billion in 2012-14). This was driven primarily by reported spending on MMCS falling by 53% in China and by 98% in Brazil. Support for MMCS as a proportion of total support fell slightly to 5.9% in 2018-20 compared to 5.4% in 2012-14, as total emerging economy FSE also fell over the period.[11]

The differences in spending on MMCS are even more apparent when considered in the context of fleet size (Figure 3.7) – due to the gross tonnage of the emerging economy fleets being more than double that of the OECD countries. In 2018-20, the OECD countries spent USD 297/gt on MMCS while the emerging economies spent USD 15/gt. Spending has increased slightly compared to 2012-14 in the OECD countries (from USD 281/gt) but more than halved in the emerging economies (from USD 35/gt).

In addition to reflecting relatively lower levels of support to MMCS, and thus capacity in this area, the low proportional contribution of MMCS to total FSE in emerging economies may also at least partly reflect potential reporting challenges. While differences in support to MMCS (both relative and absolute) between countries and groups of countries are influenced by differences in policy objectives and local context, comprehensively identifying the levels of support provided for MMCS can be difficult in some cases as multiple authorities may be involved in implementing the associated activities. It can also be the case that in some settings, components of MMCS are not captured in the FSE as they are funded directly by the industry (Box 3.2).

Figure 3.7. Intensity of spending on management, monitoring, control and surveillance relative to fleet size in recent years, 2012-20



Notes: For OECD countries, the United States is not included as no data were available on fleet size. The figures for the emerging economies are based on data for Argentina, Brazil, China, and Chinese Taipei.
Sources: OECD (2022[3]), Fisheries Support Estimate (FSE), http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_FSE; (OECD, 2022[6]), Fishing fleet, http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_FLEET.

A further factor to consider when interpreting support to MMCS is that while these activities are necessary for achieving sustainability goals, determining whether observed levels of support are optimal – or even sufficient – is context-specific and requires additional information, such as the status of stocks associated with the fishery receiving the support. Despite this, the low absolute and relative levels of reported support for MMCS in some cases may warrant further investigation into the underlying causes.

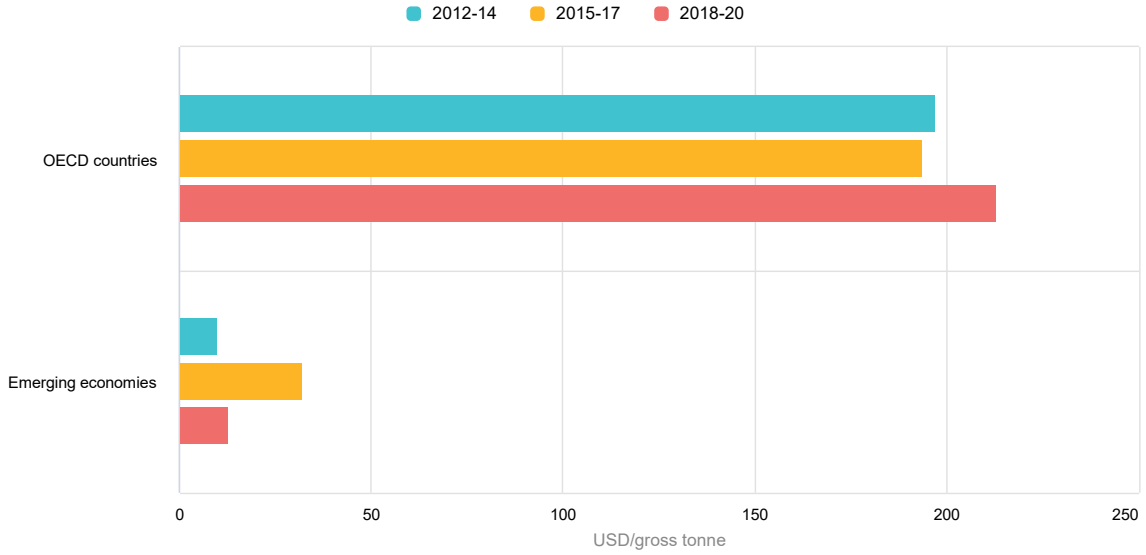
Support to infrastructure varies significantly across countries and economies

Support to infrastructure, which includes funding to construct or access facilities such as ports, was USD 1.25 billion in 2018-20 across all countries and economies. Most of this form of support was reported by OECD countries (at USD 0.97 billion, compared to USD 0.27 billion for the emerging economies). Relative to fleet size, spending on infrastructure was substantially higher in 2018-20 in the OECD countries (USD 213/gt) than in the emerging economies (USD 13/gt) (Figure 3.8).

Across all countries and economies, between 2012-14 and 2018-20, support to infrastructure increased in absolute terms (from USD 1.08 billion), relative importance (from 24.1% to 26.8% of SSS) and per gross tonne of fleet capacity (from USD 66/gt to USD 70/gt), reflecting absolute increases in both the OECD countries and the emerging economies.

However, trends at the individual country level are much more varied. Support to infrastructure fell in almost three-quarters of the OECD countries, especially Poland (from USD 38 million to USD 2 million), but larger increases in Japan (USD 688 million to USD 769 million) and Canada (USD 98 million to USD 142 million) over the period more than offset the reductions. Spending on support to infrastructure also fell substantially in Brazil (from USD 78 million to USD 5 million) and Viet Nam (from USD 29 million to USD 7 million) but increased in most of the other emerging economies, and especially China (from USD 33 million to USD 128 million).

Figure 3.8. Intensity of spending on infrastructure relative to fleet size in recent years, 2012-20



Notes: For OECD countries, the United States is not included as no data were available on fleet size. The figures for the emerging economies are based on data for Argentina, Brazil, China, and Chinese Taipei.
Sources: OECD (2022[3]), Fisheries Support Estimate (FSE), http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_FSE; (OECD, 2022[6]), Fishing fleet, http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_FLEET.

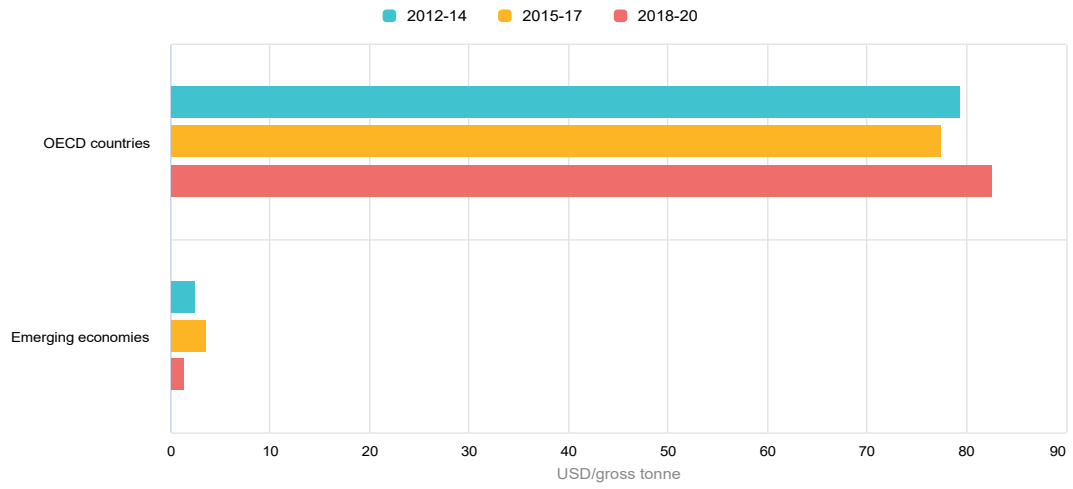
Support to research and development is used mostly by the OECD countries

In 2018-20, support for R&D averaged USD 0.49 billion per year across all countries and economies, representing 12% of SSS, and has changed little in both absolute and relative terms since 2012-14 (USD 0.51 billion, 11% of SSS). Most support to R&D is reported by the OECD countries, where it was USD 0.45 billion in 2018-20 and 12% of SSS. Absolute spending is lower for the emerging economies (USD 0.04 billion in 2018-20), as is the relative proportion of SSS it accounts for (6%). The level of spending on R&D has changed little over time in the OECD. It increased slightly in the emerging economies between 2012-14 and 2015-17 before falling back to slightly below its original level by 2018-20.

At the country level, several OECD countries (notably Iceland, Australia and New Zealand), along with Argentina and Malaysia, reported relatively high and stable proportions of SSS going to R&D.

Relative to fleet size, the patterns are similar to those observed for infrastructure: considerably higher spending per gross tonne by the OECD countries in 2018-20 (USD 83/gt) than by the emerging economies (USD 1/gt), and an increase in spending by the OECD countries (from USD 79/gt in 2012-14) but a decrease in spending by the emerging economies (from USD 2/gt in 2012-14) (Figure 3.9).

Figure 3.9. Intensity of spending on research and development relative to fleet size in recent years, 2012-20



Notes: For OECD countries, the United States is not included as no data were available on fleet size. The figures for the emerging economies are based on data for Argentina, Brazil, China and Chinese Taipei.
Sources: OECD (2022[3]), Fisheries Support Estimate (FSE), http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_FSE; (OECD, 2022[6]), Fishing fleet, http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_FLEET.

Support to fishing communities continues to be a major component of support for some of the OECD countries

Support to fishing communities averaged USD 124.3 million per year in the 2018-20 period, across all countries and economies in the FSE database. The level of this support has fluctuated since 2012-14, when it was USD 151.9 million per year. Support to fishing communities is almost exclusively reported by the OECD countries, where it was USD 112.8 million per year in 2018-20, down by 24% compared to 2012-14 (when it was USD 148.8 million per year). Its relative importance in terms of its contribution to spending on SSS was low for both the OECD countries (3% of SSS) and the emerging economies (less than 2% of SSS) in 2018-20. At the individual country level, the relative importance of support to fishing communities is also low in most cases, but there are some notable exceptions where spending as a proportion of total FSE was high in 2018-20: Estonia (47%), Colombia (44%), Slovenia (29%) and Spain (24%).

Despite an improvement, the lack of transparency around payments for access to foreign waters persists

Currently, the FSE database only records payments for access to foreign waters for the European Union (EU) (as a group) and for China. For the European Union, payments for access to foreign waters averaged USD 152 million per year in 2018-20, a slight reduction compared to the USD 157 million reported for 2012-14.[12] These payments include both financial compensation for access to resources in the exclusive economic zone (EEZ) of third countries (which accounted for about three-quarters of the payments on average) and a financial contribution to promote the sustainable management of fisheries in these countries, for example though the reinforcement of control and surveillance capacities, and support to local fishing communities. As a proportion of total EU FSE, payments for access to foreign waters rose from 14% in 2012-14 to 17% in 2018-20. China only reported such support for the most recent period considered (2018-20), where it averaged USD 30.5 million per annum. These payments equated to less than 1% of China's total FSE in 2018-20.

Government supported payments for access to foreign waters are known to exist in other countries, highlighting the need for greater transparency on payments for access to foreign waters. Effective evidence-based policy advice depends on data being comprehensive and correct. Incomplete reporting of time series results in data gaps and an incomplete and potentially unbalanced understanding of government support to fisheries.

3.2.3. Following a period of decline, direct support to individuals and companies is increasing again

DSI averaged USD 5.8 billion per year in the period 2018-20 for all countries and economies (Figure 3.10 upper panel), down by 33% compared to 2012-14 (USD 8.6 billion). This equated to 5.7% of the value of landings in 2018-20, down from 8.6% in 2012-14 (Figure 3.10 lower panel; see also Table 3.3).

Most direct support is provided by the emerging economies (79% of all DSI reported to the FSE in 2018-20), in contrast to the situation seen for SSS, where the OECD countries account for the greatest levels of spending. The overall reduction in DSI results from a substantial reduction in this form of support by the emerging economies.

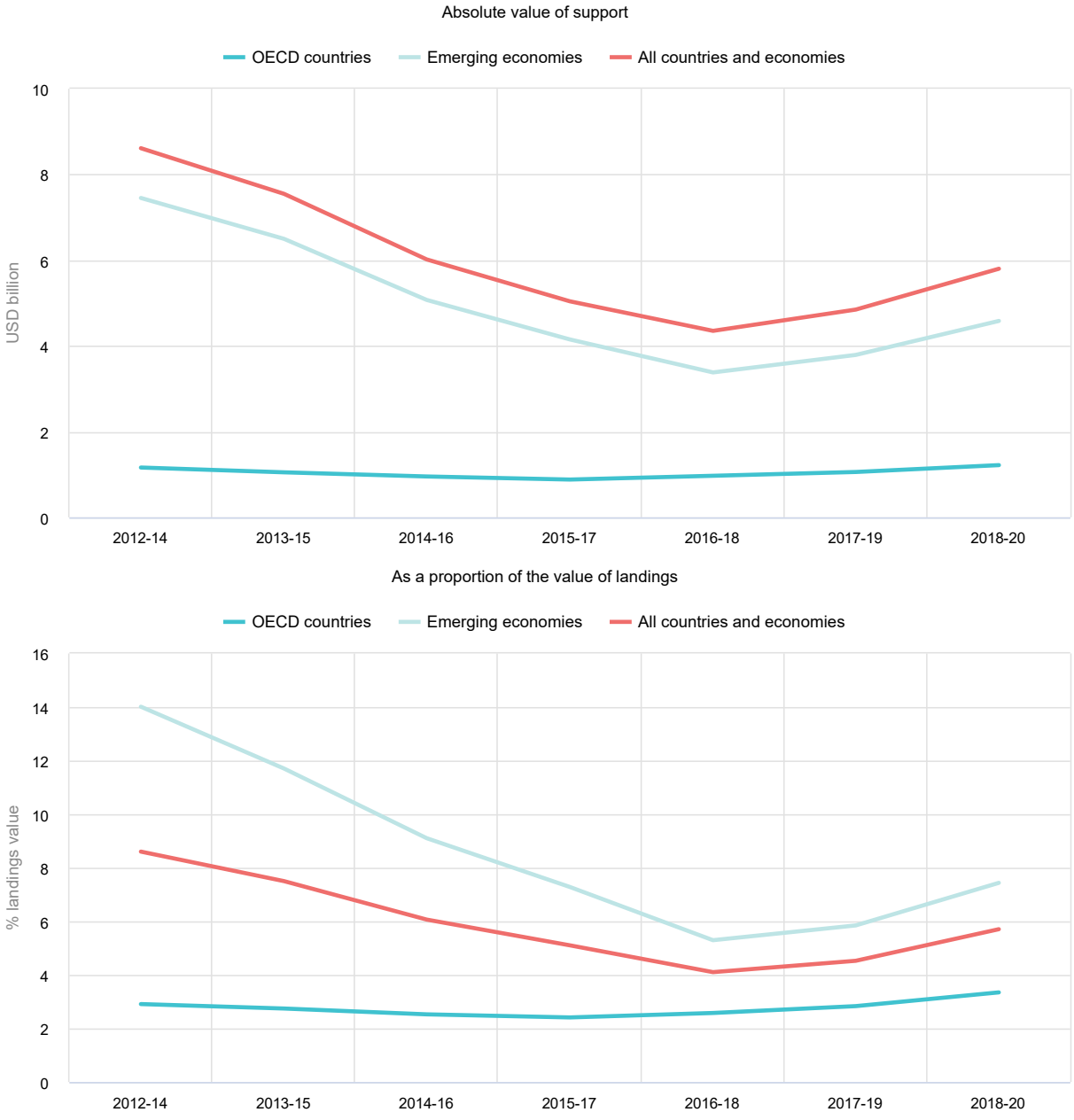
For the OECD countries, DSI totalled an average of USD 1.22 billion per year in 2018-20, an increase from the USD 0.88 billion reported in 2015-17, following a fall from USD 1.16 billion in 2012-14 (Figure 3.10 upper panel). The slight increase in DSI combined with the continued fall in the value of landings has resulted in OECD direct support equating to 3.3% of the value of landings in 2018-20, up from 2.9% in 2012-14 but still less than half the level seen in the emerging economies.

The pattern of increase in DSI relative to the value of landings is also seen at the country level, where it rose in just over half of the OECD countries over the period under consideration. Direct support was also high relative to the value of landings in a few countries in 2018-20 (for example, 459% in Poland, 30% in Sweden and 24% in Slovenia).

The emerging economy DSI was USD 4.6 billion per year in 2018-20, a 38% reduction compared to the USD 7.4 billion reported for 2012-14. This equates to 7.4% of the value of landings in 2018-20, which is considerably below the 14.0% seen in 2012-14 and resulted from reduced spending on DSI and a 19% increase in the value of landings. The influence of individual countries is again strong: in China, DSI accounted for just over 11% of the value of landings in 2018-20 whereas it was around 1% or less in the remaining emerging economies for which the value of landings is available.

Absolute spending on DSI has fallen substantially in most of the emerging economies, particularly China, Brazil, Malaysia and Indonesia, but spending on DSI has increased in India (where payments to fuel and income have both risen). Reductions in support to fuel are the primary cause of the more general fall in DSI in the emerging economies and the OECD. Of the five emerging economies reporting support to fuel (Brazil, China, India, Malaysia and Chinese Taipei), this type of support has fallen by at least 70% in Brazil, China and Malaysia (and in 2018-20 accounted for less than 25% of DSI in all of these economies except for China, where it was 45%). In India, support to fuel accounted for 42% of DSI in 2018-20. In Malaysia, support to fuel has been replaced by support to income as the primary DSI policy and in Brazil support to income accounts for more than 99% of DSI. In absolute terms, the movement away from support to fuel in China dominates both the levels and trends at the level of emerging economies. Support to fuel in China alone accounted for 74% of all the emerging economy DSI in 2012-14, falling to 36% in 2018-20 as support to fuel was reduced (from USD 5.5 billion to USD 1.6 billion). Other direct support increased notably over the same period in China (from USD 158 510 to USD 799 442 051), but this growth was smaller than the reduction in support to fuel; hence China's DSI fell by 37%.

Figure 3.10. Direct support to individuals and companies in the fisheries sector in recent years, 2012-20



Source: OECD (2022[3]), Fisheries Support Estimate (FSE), http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_FSE; (OECD, 2022[4]), Marine landings, http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_LAND.

Table 3.3. Direct support to individuals and companies: Levels and trends at a glance

	USD billion			% of total FSE			USD per gross tonne			Main support type
	2012-14	2018-20	Trend	2012-14	2018-20	Trend	2012-14	2018-20	Trend	2018-20
All countries and economies	4.8	4.6		35.7%	44.1%		235	215		MMCS
OECD countries	3.9	3.9		77.1%	76.2%		663	664		MMCS
Emerging economies	0.85	0.68		10.3%	12.8%		54	34		MMCS

Notes: FSE: Fisheries Support Estimate. In all instances, values are annual averages for the period 2018-20.
Sources: OECD (2022[3]), Fisheries Support Estimate (FSE), http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_FSE; (OECD, 2022[5]), Employment in fisheries, aquaculture and processing, https://stats.oecd.org/Index.aspx?datasetcode=FISH_EMPL.

DSI is often provided via policies that aim to help fishing businesses operate (more) profitably, with the general objective of directly maintaining or increasing fishers' incomes (and in doing so, potentially indirectly contributing to associated sectors or communities). Across all countries and economies in this study, the intensity of DSI was USD 235 per fisher in 2018-20, a reduction from USD 333 per fisher in 2012-14 driven by absolute spending on DSI falling by a substantially greater proportion than employment over this period.

In the OECD, USD 1 228 of support was provided per fisher in 2018-20, an increase from the USD 1 089 in 2012-14 (but following a dip to USD 868 in 2015-17) (Table 3.3). The relatively low levels of employment in the OECD result in the average level of support per fisher being almost an order of magnitude higher in the OECD countries than in the emerging economies (OECD employment in fisheries representing only about 5% of total employment in fisheries in all countries and economies considered in 2018-20).[13] In the emerging economies, DSI per fisher was USD 194 in 2018-20 (having fallen from USD 301 in 2012-14).

At the level of individual countries, the intensity of support was far above the average in some OECD countries, with Denmark, Poland and Sweden standing out, with DSI USD 23 000 or more per fisher in 2018-20. DSI in the EU countries considered was, on average, almost three times the OECD average over the same period (USD 3 338 per fisher).

Most direct support still goes to lowering the cost of inputs

A variety of policy types sit within the classification of DSI. Policies such as support for fuel, for other variable inputs (including payments to reduce the cost of ice or bait) and for fixed inputs (like payments for vessel construction and modernisation or the purchase of gear) aim to increase profitability by directly reducing the cost of inputs. Support for decommissioning schemes or payments for early retirement aims to reduce capacity in the fishery by providing compensation. Other policies such as income support or special insurance systems, which typically aim to provide a financial safety net, are partially decoupled from fishing activities.

Across all countries and economies, support directed at lowering the cost of inputs totalled USD 3.1 billion in 2018-20, accounting for 54% of reported DSI (Figure 3.11) and 30% of total support. Both total reported support to inputs and the proportion of DSI this accounts for fell over the period considered (from USD 6.8 billion, 80% of DSI in 2012-14) but policies of this type still represent the greatest area of spending within DSI.

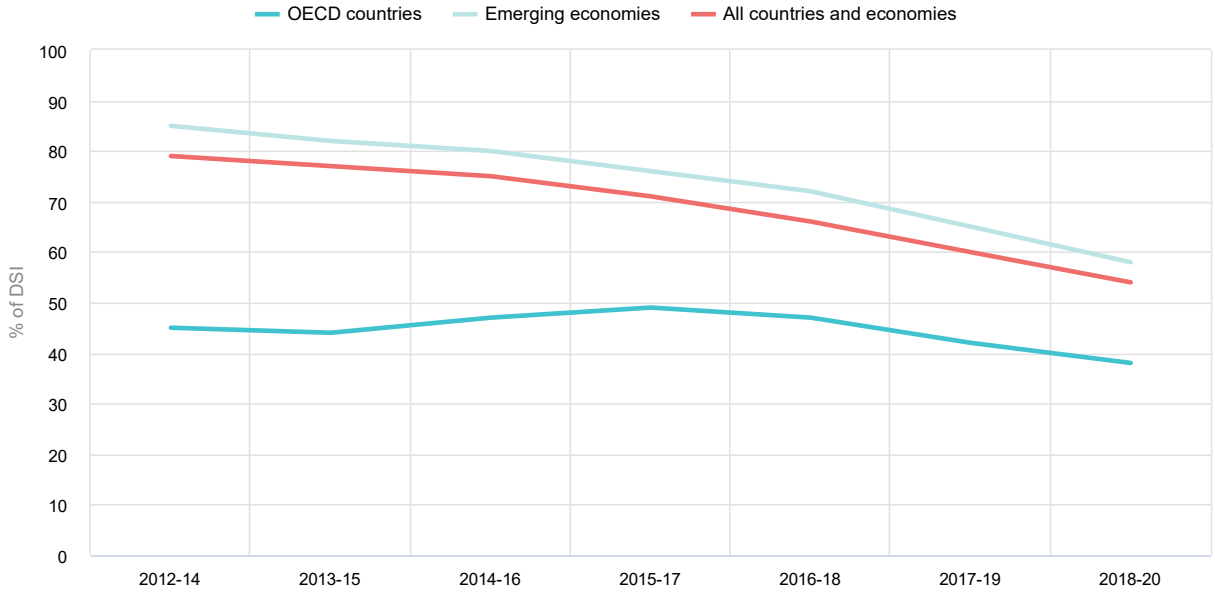
In the OECD, policies lowering the cost of inputs were also the main form of DSI until recently, but by 2018-20, partially decoupled payments, specifically income support, had increased in significance (53% of DSI, or USD 0.64 billion) compared to support to inputs (38% of DSI, or USD 0.46 billion).

Policies lowering the cost of inputs remain the main source of DSI in the emerging economies but have fallen sharply both in level and as a proportion of DSI. The reduction in spending on these policies is the single most significant absolute change in any group of support recorded in the FSE database, having fallen by almost two-thirds between 2012-14 and 2018-20 from USD 6.3 billion (85% of DSI) to USD 2.7 billion (58% of DSI) (Figure 3.11). The reduction is indicative of a general decrease in the extent to which governments in the emerging economies (Brazil, China, Indonesia, Malaysia and Chinese Taipei) reportedly use these forms of support and, more precisely, a trend of reduced spending on support to fuel in particular (in all emerging economies except for India).

While there has been a general decline in support to inputs, especially fuel, across all of the emerging economies, the magnitude of support policies in China (and changes to these) tends to result in them dominating the levels and trends of any aggregate of which they are a part. To illustrate this point, in 2018-20, support to inputs in China represented 96% of all the emerging economy support to inputs and China's support to fuel alone accounted for 52% of the value of policies lowering the cost of inputs in all countries and economies in the FSE database (down from 80% in 2012-14).

The intensity of spending on support to inputs is considerably higher in the OECD countries (USD 465 per fisher) than in the emerging economies (USD 113 per fisher). Again, this highlights the typically far lower levels of employment in the OECD country fisheries.

Figure 3.11. Proportion of direct support to individuals and companies in the fisheries sector that lowers the cost of inputs in recent years, 2012-20



Notes: DSI: direct support to individuals and companies. Support to fuel is sometimes non-specific to fisheries, when the same policy also applies to other sectors such as agriculture. On this basis, several countries and economies reporting to the FSE database do not include support to fuel in their reporting, which affects the relative total support to inputs.
Source: OECD (2022[3]), Fisheries Support Estimate (FSE), http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_FSE.

Support to fuel continues to be the single largest form of direct support in the emerging economies but has recently been surpassed by support to income in the OECD countries

Across all countries and economies, policies that reduce the cost of fuel made up the biggest component of DSI in 2018-20 (37% of DSI, USD 2.1 billion). These policies accounted for 21% of net total support in this group, second only in magnitude to support for MMCS (USD 2.4 billion in 2018-20). Moreover, in many countries, fisheries benefit from fuel support policies that benefit a range of sectors simultaneously rather than fisheries exclusively (for example agriculture, forestry, and shipping and navigation). As such, these policies, which are considered to be non-specific, are generally not reported to the FSE database (see the discussion on non-specific support to fisheries in Section 3.5).

Support to fuel was lower in the OECD in 2018-20 (USD 0.40 billion) than in 2012-14 (USD 0.44 billion) but increased by USD 0.03 billion in the most recent period (between 2015-17 and 2018-20). By 2018-20, support to fuel was no longer the largest reported form of DSI for this group, having been superseded by support to income (USD 0.64 billion). In 2018-20, support to fuel accounted for 33% of OECD DSI and 8% of net total support.

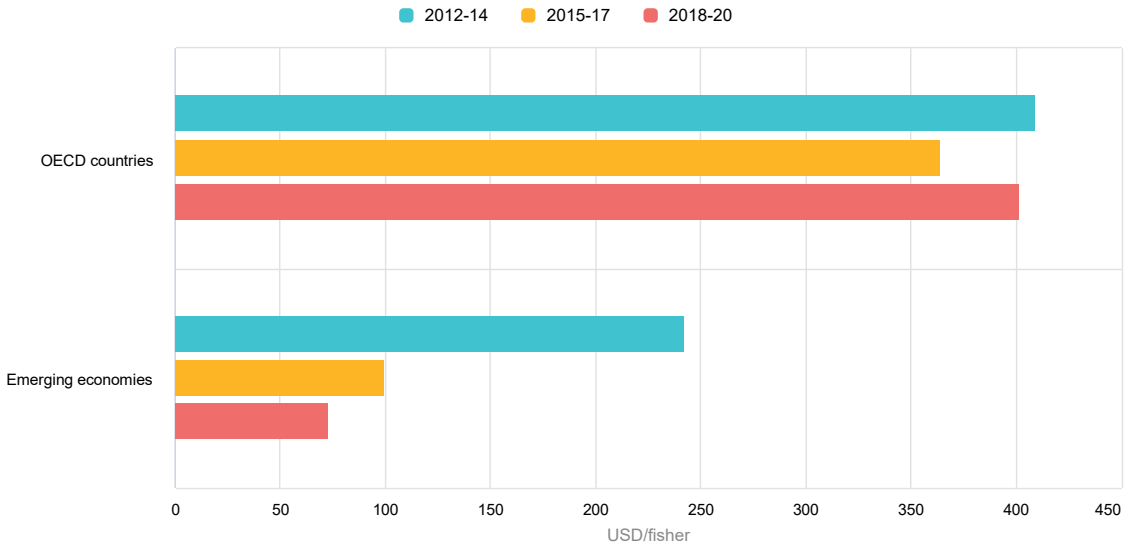
The recent increase in support to fuel in the OECD was driven by increases in EU countries (from USD 0.21 billion in 2015-17 to USD 0.26 billion in 2018-20), which more than offset reductions elsewhere in the OECD (e.g. Mexico and Türkiye). The relative magnitude of EU support to fuel has increased both as a proportion of DSI (from 49% in 2012-14 to 67% in 2018-20) and net total support (from 21% in 2012-14 to 30% in 2018-20).

In the emerging economies, reported support to fuel fell by 71% between 2012-14 and 2018-20 (from USD 6.0 billion to USD 1.7 billion), making its contribution to DSI fall as well (from 81% in 2012-14 to 38% in 2018-20). Despite the reductions, it continued to be the single largest support policy of any kind in the emerging economies in 2018-20, when it accounted for 33% of net total support.

Spending on support to fuel was 1.1% of the value of landings across the OECD in 2018-20. The intensity of support has been relatively stable over time (1.1% in 2012-14 and 1.0% in 2015-17). In the emerging economies, support to fuel represented 3.3% of the value of landings in 2018-20, having fallen progressively and substantially from 13.1% in 2012-14. In more than two-thirds of the nine OECD countries that report providing fuel support, support accounted for over 3% of the value of landings, and substantially so in some countries. For the EU countries considered, support to fuel equated to 3.9% of the value of landings in 2018-20, an increase compared to the 3.0% reported for 2012-14.

As spending on support to fuel has fallen, so has the intensity at which support to fuel is provided by all reporting countries and economies on a per-fisher basis. The per-fisher intensity of fuel support remains substantially higher in the OECD countries (Figure 3.12), which spent USD 401 per fisher in 2018-20 (USD 409 per fisher in 2012-14). In the emerging economies this amount was USD 73 per fisher in 2018-20 (USD 242 per fisher in 2012-14). Relative to fleet capacity, the OECD countries spent USD 87/gt in 2018-20 (USD 92/gt in 2012-14) and the emerging economies USD 145/gt in 2018-20 (USD 490/gt in 2012-14).

Figure 3.12. Intensity of support to fuel relative to the number of jobs in the sector in recent years, 2012-20



Sources: OECD (2022[3]), Fisheries Support Estimate (FSE), http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_FSE; (OECD, 2022[5]), Employment in fisheries, aquaculture and processing, http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_EMPL.

While this declining trend was also observed with respect to fleet for the group of EU countries, where support was USD 1 615/gt in 2018-20 compared to USD 4 308/gt in 2012-14, the intensity of support per fisher has increased over time, to USD 2 246 per fisher in 2018-20, up from USD 1 935 per fisher in 2012-14. This is more than five times the intensity seen for the OECD group as a whole. Of particular note is the intensity of support to fuel per fisher in Poland (USD 43 693), Denmark (USD 23 931) and Sweden (USD 21 317), countries identified above as having high levels of DSI per fisher.

Finally, extreme care should be taken in interpreting differences across countries or groups of countries given the unequal nature of reporting for support to fuel; only 14 of the 40 countries reported support to fuel in 2018-20.

Support to income remains important in a selection of countries

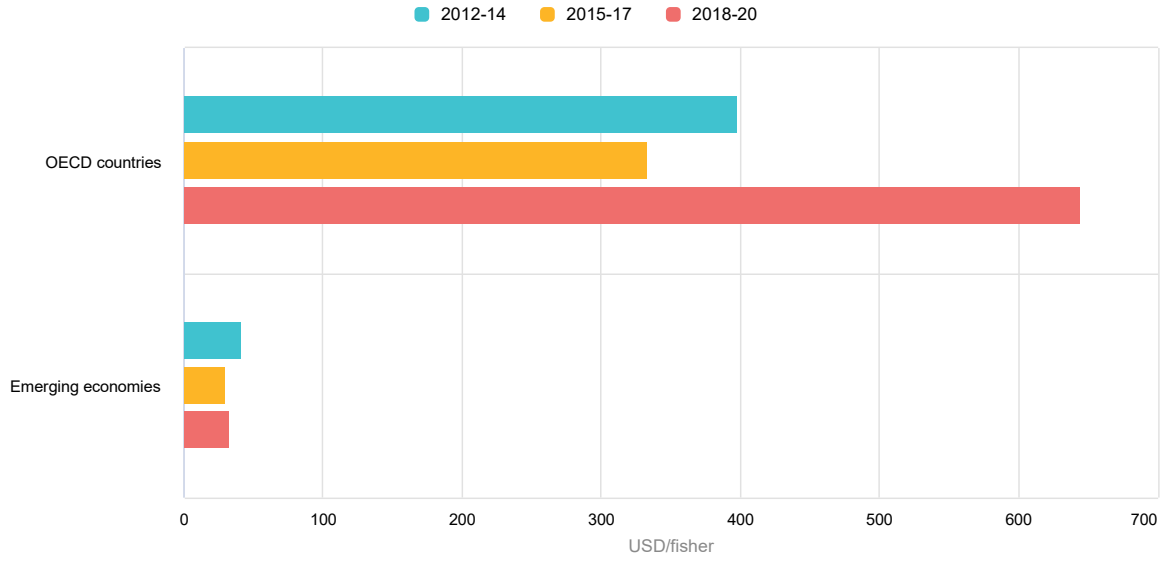
Across all countries and economies, partially decoupled payments (which include income support and special insurance systems) represented an average of 27% of spending on DSI per year in 2018-20 (USD 1.5 billion). This was an increase in relative terms, from 17% in 2012-14 (USD 1.5 billion), and predominantly the result of falling total DSI.

Partially decoupled payments have increased in the OECD and represented the majority (53%) of spending on DSI in 2018-20 (USD 0.64 billion), up from 37% (USD 0.43 billion) in 2012-14. However, at the country level, a third of the OECD countries did not report any decoupled support in 2018-20. Another third reported it accounting for less than 35% of their DSI. Decoupled payments were the predominant form of DSI in the remaining third: the United States (99%), Canada (93%), Germany (80%), Korea (50%) and Mexico (58%); in all cases, the decoupled support went entirely to income.

The increase in support to income reported for the OECD is relatively large, up 50%, to USD 0.64 billion in 2018-20 from USD 0.43 billion in 2012-14. Levels of support to income fell in more OECD countries than in countries in which it increased, but the increase was substantial in some, including the United States, Mexico, Italy and Korea. This was especially true for the United States, which increased spending on income support more than eightfold, from USD 26.6 million to USD 228.3 million between 2012-14 and

2018-20. OECD countries, on average, granted USD 645 of income support per fisher in 2018-20, almost double the amount granted in 2015-17 (Figure 3.13).

Figure 3.13. Intensity of direct support to income relative to the number of jobs in the sector in recent years, 2012-20



Sources: OECD (2022[3]), Fisheries Support Estimate (FSE), http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_FSE; (OECD, 2022[5]), Employment in fisheries, aquaculture and processing, http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_EMPL.

In the emerging economies, partially decoupled payments have fallen in absolute terms (from USD 1.0 billion in 2012-14 to USD 0.9 billion in 2018-20) but their relative contribution to DSI increased over the same period (from 14% to 20%). There is considerable variation at the country level, where it accounts for high proportions of DSI in some cases: Brazil and Indonesia (100%), Viet Nam (92%), Chinese Taipei (77%), and Malaysia (52%), and substantially less in others: China (4%) and the Philippines, Peru and Argentina (0%). Relative to employment, income support was substantially lower in the emerging economies than in the OECD countries, with USD 33 of income support granted per fisher, on average, in 2018-20, slightly down from the amounts granted in the earlier periods (Figure 3.13).

The remaining group of direct support policies includes those that aim to reduce fishing capacity. This type of support includes decommissioning schemes and payments for early retirement. Across all countries and economies, this type of support was a relatively small component of overall spending on DSI in 2018-20 (4.5%, USD 0.3 billion) but had increased from 2012-14 (2.9%, USD 0.2 billion).

In the OECD countries, payments aiming to reduce capacity have been falling, from 16.5% of DSI in 2012-14 (USD 0.2 billion) to 6.8% of DSI in 2018-20 (USD 0.1 billion). While only a minority of countries report this type of policy, in those that do it often accounts for major proportions of the country's DSI (100% in Australia, 93% in Greece, 41% in both Italy and Korea, and 35% in Spain). In some cases this is because the country has little other DSI.

In the emerging economies, support aimed at capacity reduction increased between 2012-14 (0.8% of DSI, USD 0.1 billion) and 2018-20 (3.9% of DSI, USD 0.2 billion). Only China and Chinese Taipei report this form of support. While it fell in Chinese Taipei (from USD 2.8 million in 2012-14 to USD 1.6 million in 2018-20), it increased substantially in China (from USD 54.4 million in 2012-14 to USD 178.3 million in 2018-20). However, China's support to capacity reduction fell in 2018-20 (from USD 193.0 million in 2015-17), potentially indicating a change in trend.

3.3. The sustainability impact of support to fisheries

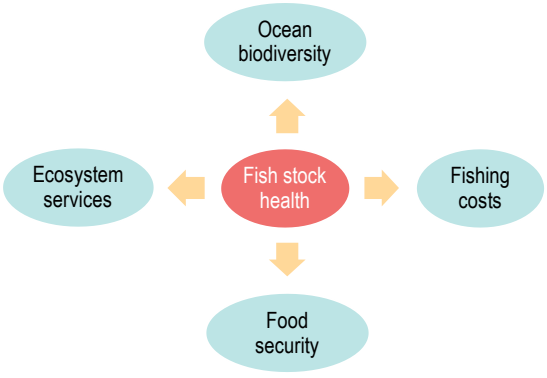
3.3.1. Ensuring the health of fish stocks is key to achieving socio-economic objectives

Typically, governments support their fisheries sectors in an attempt to achieve a range of objectives, including: maintaining coastal employment; improving fishers' welfare; promoting the competitiveness of fisheries; encouraging production when it is seen as important to food security; and ensuring the sustainability of the sector – notably by sustainably managing fish stocks and facilitating adaptation to climate change. Increasingly, support also aims to help reduce the sector's greenhouse gas (GHG) emissions.

However, government support can sometimes result in unintended outcomes. In particular, it may distort the economic environment within which fishers operate (e.g. by reducing marginal costs or increasing the marginal benefits of fishing). These distortions may result in a build-up of excess fishing capacity; overfishing; and incentives to engage in IUU fishing, all of which are detrimental to the health of fish stocks and ecosystems.

Any negative impacts on fish stock health caused by government support will, in turn, impact other policy objectives in the medium to long term (Figure 3.14). Ultimately, policies that harm stocks are economically detrimental to those they aim to help. Lower stock abundance reduces the volume of fish that can be sustainably harvested (e.g. the maximum sustainable yield) while increasing harvesting costs, thereby affecting the productivity and resilience of the sector. In addition, support to fisheries can be counterproductive to equity objectives. For example, support that lowers the cost of fuel may disproportionally benefit fuel-intensive fishing operations, thereby reducing the competitiveness of smaller scale fishers and making them worse off (Martini and Innes, 2018[2]).

Figure 3.14. The impacts of government support to fisheries on fish stock health trickle down to other policy objectives



Ensuring that support to fisheries does not undermine the health of fish stocks is thus key to achieving socio-economic objectives. It is also key to the sustainability of the ocean economy at large. Policies that encourage unsustainable fishing are also detrimental to society and the environment more generally as they result in suboptimal contributions to food security, greater impacts on non-target species and ecosystems, and higher GHG emissions (Hilborn et al., 2020[8]).[14] Section 3.3.2 summarises what is known about the impact of fisheries support on fish stock health then Section 3.3.3 proposes a framework that can help policy makers identify the policies that can present a risk of encouraging unsustainable fishing under particular conditions.

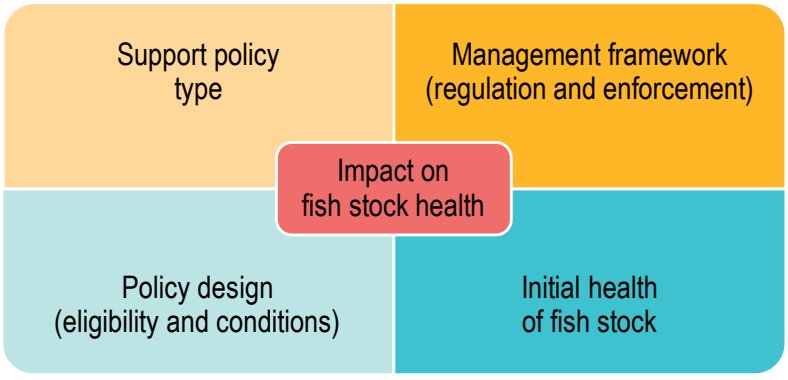
3.3.2. The impact of support to fisheries on fish stock health critically depends on management and the type of support policy

OECD work, including the FishPEM model (Martini and Innes, 2018[2]) and analysis that builds on the theoretical and empirical literature (notably OECD (2006[9])), has comprehensively addressed the links between capacity, overfishing and the depletion of resources; the effects of different types of support; and how alternative management frameworks can potentially mitigate these impacts. The wider body of theoretical and empirical literature is also rich and relatively well-established (see, for example, APEC (2020[10]); Arthur et al. (2019[11]); Costello et al. (2020[12]); Da-Rocha et al. (2017[13]); Duy and Flaaten (2016[14]); Merayo, Waldo and Nielsen (2017[15]); Munro and Sumaila (2002[16]); Sakai (2017[17]); Sumaila, Dyck and Cheung (2013[18]); Sumaila et al. (2016[19]); UNEP (2004[20]); Yagi, Senda and Ariji (2008[21]).

According to this literature, categorising individual support policies as either strictly "positive" or "negative" along a matrix of socio-economic and environmental objectives is complex. Indeed, modelling work by the OECD has shown that the relative effects of support can vary significantly, depending on a combination of mitigating factors (Martini and Innes, 2018[2]) (Figure 3.15).[15] These include:

- the management framework within which fisheries that benefit from support operate (including regulation and enforcement) and the extent to which it is effective at controlling catch, effort and capacity
- the health of fish stocks targeted by support recipients
- the policy design, including eligibility (i.e. who can receive support) and the conditions under which support can be received (e.g. for how long)
- the type of support policy.

Figure 3.15. Factors that influence the relative impact of support on fish stock health



Fisheries management

Fishers generally fish to the point where their total revenue equals their total costs (including salaries). The mitigating potential of fisheries management can be illustrated by considering a situation whereby catch and effort are not controlled by management. Where this occurs, if support alters the revenue/cost balance by either increasing revenues or reducing costs – e.g. by reducing the cost of investment in new fishing equipment (such as vessels and gear) or reducing the cost of variable inputs (such as fuel) – this will result in the level of fishing effort increasing until revenues once again equal costs. Management can mitigate this impact by constraining total capacity, effort or, ideally, catch.[16]

In theory, where fisheries management and enforcement effectively limit fishing to sustainable levels, there would be no risk of support harming fish stocks, as the fishing effort would not be allowed to go beyond

the levels that sustainably maximise catches. As the efficacy of fisheries management and enforcement declines, however, the risk that certain types of support result in harm to fish stocks increases.

Even when the management framework effectively imposes limits on the total volume of fish that can be caught or landed, support can still create incentives for overcapacity and overfishing to the extent that management may mitigate but not entirely eliminate the impact of support on fishing costs (Clark, Munro and Sumaila, 2005[22]; Martini and Innes, 2018[2]).[17] In such cases, support may increase incentives for IUU fishing. Excess capacity may also result in pressure on the management decision-making process, leading to decisions that do not align with sustainability commitments resulting in, for example, quotas that exceed scientific advice (Carpenter and Heisse, 2019[23]).

The initial health of fish stocks

The health of a fish stock at the time support is implemented is a second significant factor influencing the relative impact support can have on fish stock health. Underfished stocks have the potential to produce higher levels of catch and value as effort increases to the point of maximum sustainable yield (MSY) or maximum economic yield (MEY). As long as the stocks remain underfished, support that increases capacity will not result in overfishing. There is no such potential for fully or overfished stocks. In such cases, if effort increases as a result of the support, the sustainable yield will fall below (or further below) the optimum, away from MSY and MEY, and produce suboptimal economic and social outcomes in the short to medium term.

This factor only matters in the short to medium term. If support results in sustained increases in fishing effort, the longer term impacts of support will be the same irrespective of the initial health of the resources. The extent to which detrimental impacts on the resources and the fishery's economic and social performance can occur will depend on how close to fully fished a stock was initially and the magnitude of the support-induced fishing response (Hilborn et al., 2020[8]).

Policy design

Policy design (i.e. the specific conditions under which support is granted) is the third factor that can influence the relative impact of government support on fish stock sustainability. These conditions may specify who is eligible to receive support (e.g. specific segments of a fleet, typically the small-scale segment, or a specific fishery) and under what conditions, including for how long. Such conditions will influence the extent to which support may impact capacity, effort and sustainability – as well as the distributional impacts of support (Schuhbauer et al., 2017[24]; Harper and Sumaila, 2019[25]; Schuhbauer et al., 2020[26]). For example, if policy design restricts eligibility for support to vessels operating in effectively managed fisheries, or fisheries that only target underfished stocks, the risk of encouraging unsustainable fishing will be minimal, at least in the short to medium term.

The type of support policy

The last factor that influences the relative impact of support on fish stock health is the type of support policy and how directly it affects operational costs and revenues, and hence the profitability of fishing. This is discussed in detail below.

3.3.3. A risk-based analysis of the potential impact of fisheries support on fish stock health

Determining the likely impact of a single support policy on the health of fish stocks requires granular information on all the factors that influence its relative impact; that is, information on the fisheries that benefit from support, how they are managed, the fish stocks they harvest, the health of those fish stocks and the type of support received, including the associated conditions. However, linking information on

support policies to individual fisheries and harvested stocks is challenging using information typically available at the country level (notably because the status of many fish stocks remains unassessed, as outlined in Chapter 2).

In the absence of such granular information, this chapter proposes assessing the risks of encouraging unsustainable fishing that different support policies can present *in the absence of effective management, when stocks are not underfished and the design of support does not restrict eligibility significantly.* clusters fisheries support policies into four categories: high risk, moderate risk, uncertain risk and no risk, based on the findings of previous OECD analyses and the extensive body of research in this area (see above). Each category of support is discussed in detail below.

In addition, the arrows at the bottom of Figure 3.16 indicate how the policy context can mitigate the risks of encouraging unsustainable fishing – i.e. fisheries management, the initial health of the fish stocks harvested by the support recipients and policy design. The high, moderate and uncertain risk categories tend towards lower risk if management is effective, stocks are underfished or policy design is restrictive in a way that targets support to effectively managed or underfished fisheries.

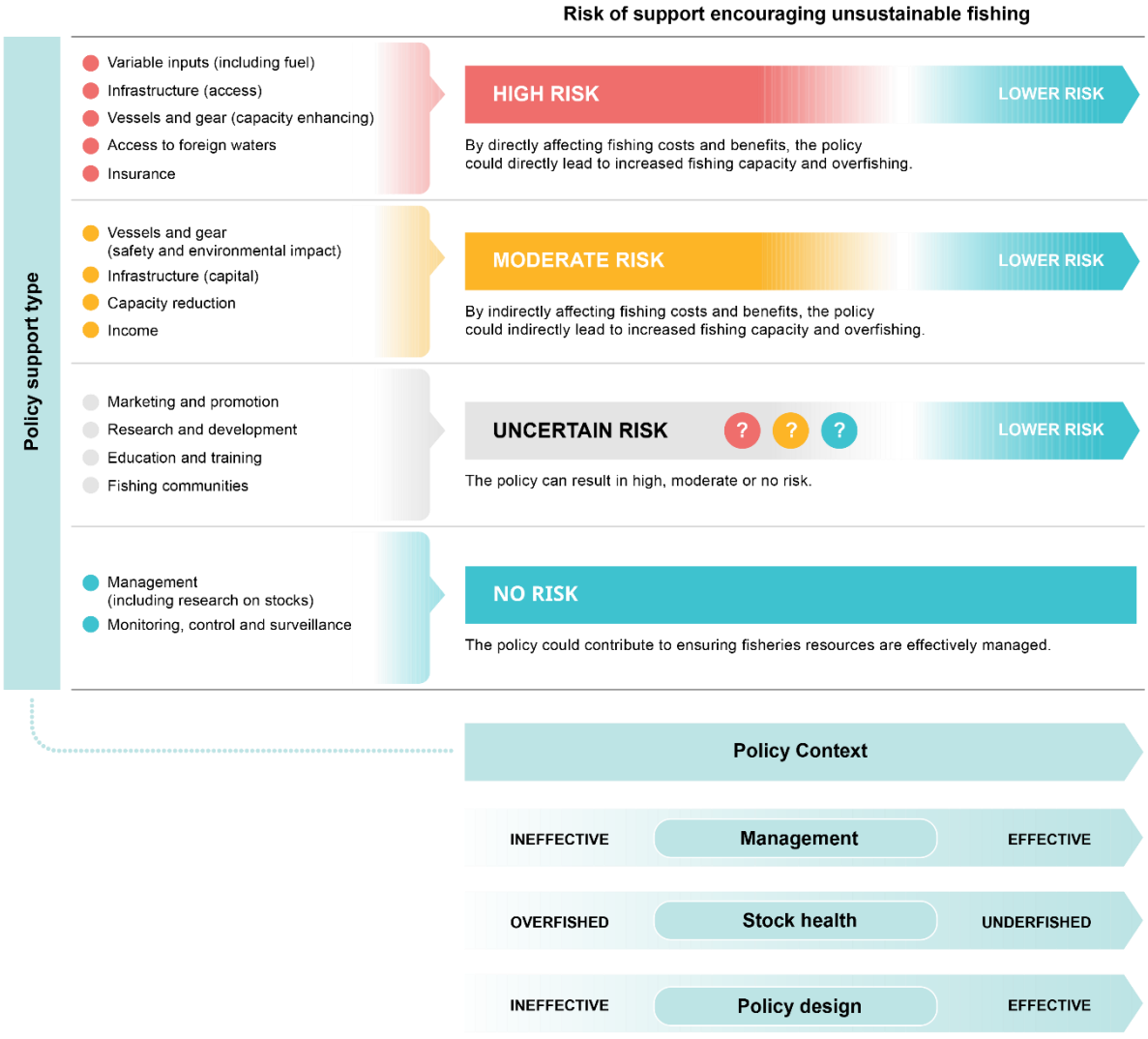
In practice, however, the FSE data suggest that the caveat related to policy design currently rarely applies: support policies are generally designed in a way that makes them available to fisheries indiscriminately. This suggests there is scope for countries to reduce the risks posed by some types of support policies by applying specific conditions so that only fishers operating in effectively managed and sustainable fisheries are eligible. Similarly, the caveat related to the status of fish stocks also rarely applies: the Food and Agriculture Organization (FAO) estimates that in 2019, only 7.2% of stocks were underfished globally (FAO, 2022[27]).

The caveat related to fisheries management, on the other hand, is an important one: its effectiveness indeed varies significantly across countries, time and fish stocks – not only as a result of management efforts, but also because of external factors such as the impacts of climate change on ocean ecosystems and fish abundance and location. Evidence presented in Chapter 2 shows that many fisheries operate somewhere between effective management and enforcement and no management at all: about a fifth of total landings volume and over two-fifths of total landings value from the key species harvested by the countries and economies studied in this report came from stocks for which catch was not fully controlled. The discussion below focuses on this last caveat, referring to the risks of encouraging unsustainable fishing in the absence of effective management.

Applying the classification presented in Figure 3.16 to a support policy mix can provide a pragmatic basis upon which to consider whether support policies at the national level can present risks of encouraging unsustainable fishing.[18] On this basis, governments can examine the individual support policies that can present such risks and investigate whether recipients of such support operate in effectively managed fisheries. Where this is not the case, governments should consider better targeting these policies or using alternative forms of support. Countries may also want to move away from policies which can present risks of harming fish stocks more generally, as a precautionary approach, given the difficulty, and cost, of regularly assessing whether individual recipients of support are operating in sustainably managed fisheries. Careful examination will be necessary for final self-determination of the level of risk a particular policy presents, as a policy can fall into different risk categories depending on the policy-specific conditions and circumstances.

The first category brings together those policies that can present a high risk of encouraging unsustainable fishing in the absence of effective fisheries management (hereafter “high-risk” policies). These policies directly reduce operational costs or increase revenues from fishing, thus directly increasing profitability. Therefore, they create financial incentives (and make it viable) for the levels of capacity and fishing to increase when management and enforcement are ineffective at constraining catches to sustainable levels (e.g. MSY or MEY) and deterring IUU fishing (Martini and Innes, 2018[2]). In such cases, where targeted fish stocks are at least fully fished in the first place, this results in overexploitation.

Figure 3.16. Risks of encouraging unsustainable fishing associated with different support policy types, depending on fisheries management, fish stock health and policy design



These policies include direct support to variable inputs and tax concessions, notably: support to fuel, access to infrastructure or other variable inputs; fuel tax concessions; subsidised vessel insurance; and subsidised access to port infrastructure. By reducing operating costs, such policies allow for greater use of inputs, making it possible for vessels to fish more intensively and at longer distances. The impact of such support increases with the share of the costs supported and tends to be stronger when what is supported is responsive to changes in price and substitutable. As such, policies that support purchased inputs, such as fuel, or costs related to running the fishing operation, such as the use of port services, pose the highest risk of provoking overfishing and the depletion of fish stocks (OECD, 2021[28]; OECD, 2020[1]; Martini and Innes, 2018[2]; Martini, 2022[29]).

Support to fixed costs also falls under the “high-risk” category, notably support for the construction or capacity-enhancing modernisation of vessels and gear. When management is ineffective, such support increases (or maintains) levels of capacity above what is required to sustainably exploit the resource. With excess capacity, too many boats are chasing too few fish, as there is an incentive to use this capital so

long as operating costs (which may also be supported) can be covered (potentially exacerbated by the need to service loans).[19] Support for vessel construction and modernisation is recognised to have contributed to problems of excess capacity in many of the world's fisheries (see, for example, Westlund (2004[30]); Gréboval and Munro (1999[31]); Cunningham and Gréboval (2001[32])). Finally, the longevity and fixed-cost nature of vessels mean that the effects of policies supporting vessel construction and purchase can persist for some time after the support itself ends.

High risk of encouraging unsustainable fishing in the absence of effective fisheries management

High-risk policies can also be found in support to the sector more generally. Access agreements that provide additional fishing opportunities allow fleets to access foreign waters without bearing the full cost of access. As such, they promote fishing beyond the level of harvesting that would take place if the foreign fleets had to bear the full cost of access. This risks encouraging fishing in excess of what is sustainable within the waters of the funding country in the absence of effective management. Countries that sell access to their resources sometimes do so because they lack the capacity to exploit the fish stocks, which may be underfished at the time of the agreement. In many cases, however, these countries lack the ability to assess the status of the stocks and to manage and monitor fishing activities effectively. Some access agreements also provide for additional payments intended to support sustainable fisheries management in the country providing access to its resources. These payments can improve fisheries management and limit the risk of encouraging unsustainable fishing if used effectively.[20]

Moderate risk of encouraging unsustainable fishing in the absence of effective fisheries management

The second category groups together policies that have indirect and potentially less distorting impacts on the economic incentives facing the sector. As a result, they present a more moderate risk of encouraging unsustainable fishing in the absence of effective management but still have the potential to increase fishing effort and capacity in ways that could harm fish stocks. Again, both direct support to individual fishers and companies and some types of support to the sector, in general, are found in this category.

Support to vessels and gear that improves on-board safety or reduces the environmental impact of fishing is theoretically benign with respect to the risk of encouraging unsustainable fishing. However, while these policies may have some positive environmental impacts, such as reducing bycatch or GHG emissions, they can also increase fishing efficiency and reduce costs (e.g. through lower fuel consumption) (Steele et al., 2002[33]), which, if unconstrained by management, can result in greater pressure on resources and overfishing.[21]

Support to build new infrastructure reduces the costs the industry may otherwise have had to bear. As such, it can send mixed signals about the sustainability and profitability of fishing activities, help support excess capacity, and potentially attract further investment in a fishing area.

Decommissioning schemes have generally been applied to fisheries facing overcapacity and overfishing to reduce capacity and pressure on stocks. Yet, evidence indicates that capacity is generally not reduced in the long term. In the absence of significant and effective management reform addressing the underlying reasons for existing overcapacity, support tends to leak back into the fishery, injecting new capital and ultimately further increasing capacity and effort (Weninger and McConnell, 2000[34]; Beddington and Rettig, 1984[35]; OECD, 1997[36]; Holland, Gudmundsson and Gates, 1999[37]; Curtis and Squires, 2007[38]; OECD, 2006[9]). This is the case when the industry anticipates these forms of support. When industry is convinced governments will fund the retirement of excess capacity, it can incentivise investment in new vessels, leading to greater overcapacity than would otherwise occur, creating a moral hazard (Clark, Munro and Sumaila, 2005[22]). In practice, the lack of information or ineffective design can also result in insufficient capacity being removed (OECD, 2006[9]).

Programmes such as income support can help small-scale fishers cope with market uncertainty and exceptional events, yet they can also reduce the wages firms need to pay fishers, which reduces the costs of fishing. This can promote labour-intensive operations, inhibit adjustment and maintain excess capacity in a fishery. By helping to maintain a level of excess capacity, such policies can slow or prevent fish stocks from recovering. By encouraging fishers to remain in the industry, unemployment insurance (a form of income support) is believed to have been a major hindrance to the long-term adjustment and commercial viability of certain Atlantic fisheries (Schrank, 1998[39]).[22] These programmes have also undermined quota management systems by increasing effort and contributing to incentives to lobby for expanding fishing efforts (Poole, 2000[40]).

Uncertain risk of encouraging unsustainable fishing in the absence of effective fisheries management

The implications of some forms of support are not clear as they can be designed and applied in various ways with very different impacts, and therefore are context-dependent.[23] These types of support, with the potential to either reduce or increase capacity and effort, resulting in positive or negative impacts on fish stock health, are classified under the "uncertain risk" category. Increasing transparency on policy design for support policies in this category would help better anticipate the risks they may pose in terms of fish resources health and inform any need for reform.

Education and training can potentially reduce fishing pressure if it provides new skills for fishers and creates opportunities outside the sector. It can also reduce fishing pressure if it promotes the uptake of more sustainable fishing practices (Roberson and Wilcox, 2022[41]). However, if it increases fishers' efficiency, there is a risk of it contributing to increases in effort.

The impact of support to fishing communities is potentially mixed for similar reasons; if it reduces a community's dependence on fishing or improves engagement with management, it may help improve the health of fish stocks. However, if its application (or the expectation of its use) perpetuates a situation of excess capacity and overfishing, then it is potentially detrimental to those same stocks.

In the same vein, support to marketing and promotion may increase the value of fisheries products or the demand for them, hence increasing profits and creating incentives to increase effort. However, marketing and promotion can have positive impacts if they target sustainability. For example, creating appropriate standards or labels may increase the demand for sustainably fished products, potentially resulting in incentives to fish more sustainably.

Finally, R&D objectives and associated outcomes can differ significantly. Cost-reducing or benefit-enhancing R&D, such as improved gear technology and selectivity, can result in developments that reduce fishing costs and improve fishers' productivity, which can incentivise increases in the level of fishing effort and capacity growth. However, research that contributes to better resource management, such as research on the health of stocks, could have positive impacts on fish stock health.[24]

No risk of encouraging unsustainable fishing

The only types of support that do not present any risk of encouraging unsustainable fishing are those that contribute to ensuring that fisheries' resources are appropriately managed and regulations are enforced. Where effectively implemented, they are instrumental in improving stock status (Hilborn et al., 2020[8]) by providing a better understanding of the state of fisheries resources, better aligning capacity and effort with the resources available, monitoring and controlling fishing activities, and ensuring that catches are controlled. Management, including research on fish stock health, and enforcement are essential components for effective and sustainable fisheries management, and need to be provided, or at least overseen, by some level of government.

3.3.4. Support that presents a high risk of encouraging unsustainable fishing in the absence of effective management has fallen as a proportion of all reported support

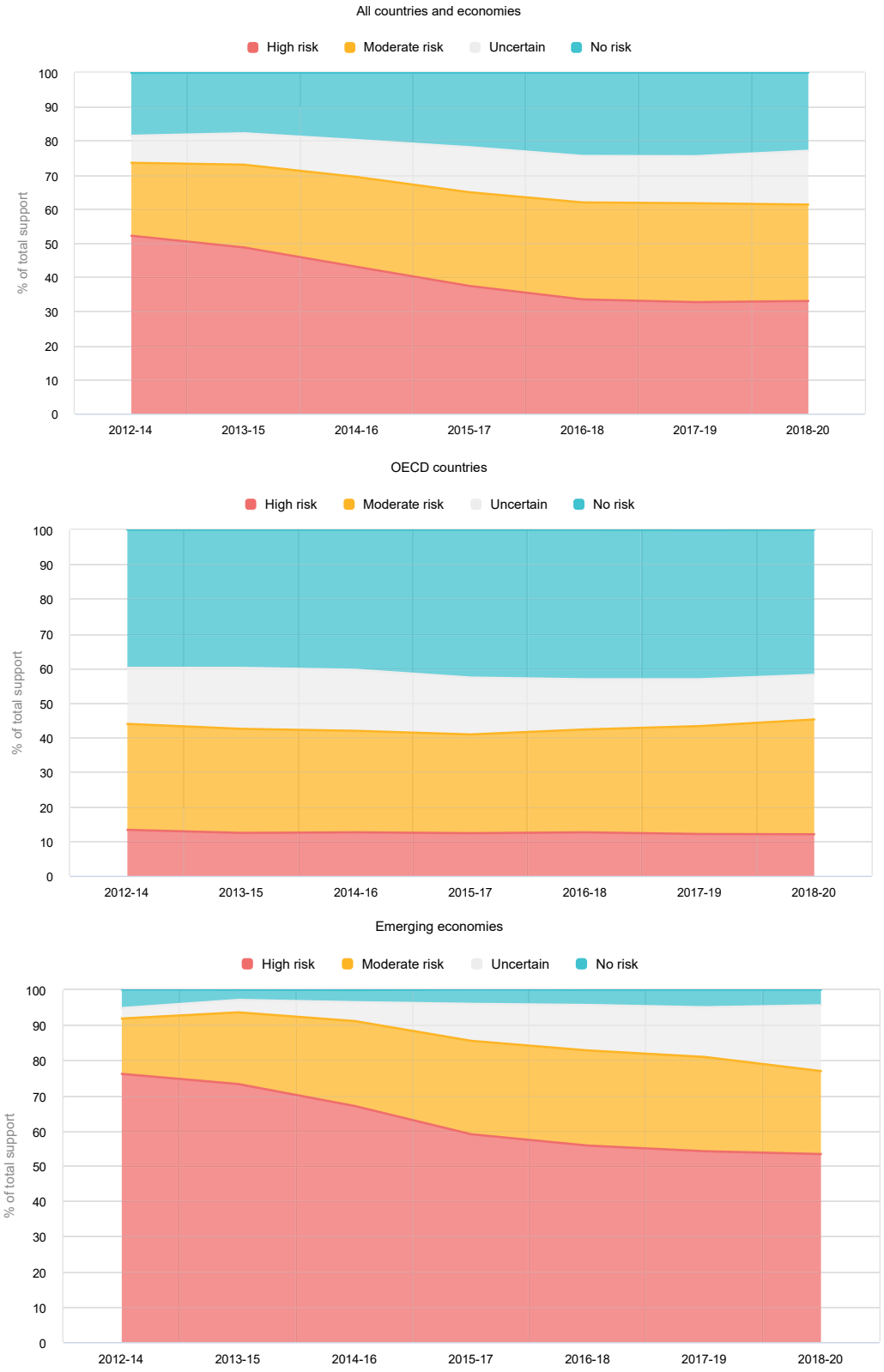
Figure 3.17 presents the FSE data clustered according to the risks that they may encourage unsustainable fishing in the absence of effective management, as outlined in Figure 3.16.[25] When all countries and economies in the FSE database are considered, 33% (USD 3.4 billion) of the total FSE in 2018-20 went to support policies that present a high risk of encouraging unsustainable fishing in the absence of effective management. This is a notable decline compared to 2012-14, when support in this category of support represented just over 52% of the total FSE (USD 7.0 billion). Encouragingly, this decline has not been accompanied by an equivalent growth in policies that can present a more moderate risk of encouraging unsustainable fishing. These policies accounted for 28% in 2018-20, up from 21% in 2012-14, a small increase in real terms (from USD 2.86 billion in 2012-14 to USD 2.94 billion in 2018-20).

The proportion of support considered to present no risk of encouraging unsustainable fishing also, encouragingly, increased, to 23% (USD 2.4 billion) of the total FSE in 2018-20, up from 18% (USD 2.5 billion) in 2012-14. This was driven by an overall decrease in total FSE. In absolute terms, spending on these policies fell slightly. The greatest proportional (and real) increase in any category of support was in policies presenting an uncertain level of risk. These policies accounted for 16% of the total FSE, up from 8% in 2012-14 (USD 1.6 billion and USD 1.1 billion, respectively). Further work is needed to better understand the nature of policies in this category.

Across the OECD, the support mix was relatively stable in both absolute and proportional terms over the period considered. In 2018-20, the greatest proportion of support went to policies categorised as presenting no risk of encouraging unsustainable fishing (42% of total FSE, USD 2.1 billion). This was consistently the case over the review period, with a slight increase in both absolute and proportional terms in recent years (from 40% of total FSE, USD 2.0 billion, in 2012-14). Support that presents a moderate risk of encouraging unsustainable fishing in the absence of effective management was the second-largest category in the OECD, at 33% in 2018-20 (USD 1.7 billion), and also changed little (31%, USD 1.6 billion, in 2012-14). Support that can present a high risk of encouraging unsustainable fishing accounted for a relatively low 12% of total support (USD 0.6 billion) in 2018-20, and, again, was relatively stable (13% of FSE, USD 0.7 billion, in 2012-14).

The situation is different in the emerging economies: in 2018-20, most support was allocated to policies with a high risk of encouraging unsustainable fishing in the absence of effective management (53%, USD 2.8 billion). Their proportional contribution to total support, and absolute spending on these policies, has, however, declined over time (from 76% of total FSE, USD 6.3 billion, in 2012-14). The reduction in this category of support is encouraging, particularly given that the emerging economies also typically have less capacity to ensure effective management and enforcement. In that context, however, the high levels of support from policies that can present a high risk of encouraging unsustainable fishing are a concern for resource sustainability. Policies that can present a moderate risk of encouraging unsustainable fishing are the next largest category in the emerging economies, accounting for 24% of total FSE (USD 1.2 billion) in 2018-20. Absolute spending through such policies has fallen since 2012-14 (from 16% of FSE, USD 1.3 billion, in 2012-14). Of further concern is the relatively low and declining proportion of support categorised as presenting no risk and the increase in policies presenting an uncertain level of risk.[26] Spending on MMCS accounted for only 4% of total support in 2018-20 (USD 0.2 billion), down from 5% in 2012-14 (USD 0.4 billion).

Figure 3.17. Support to fisheries by risk of encouraging unsustainable fishing that different policies may present in the absence of effective management in recent years, 2012-20

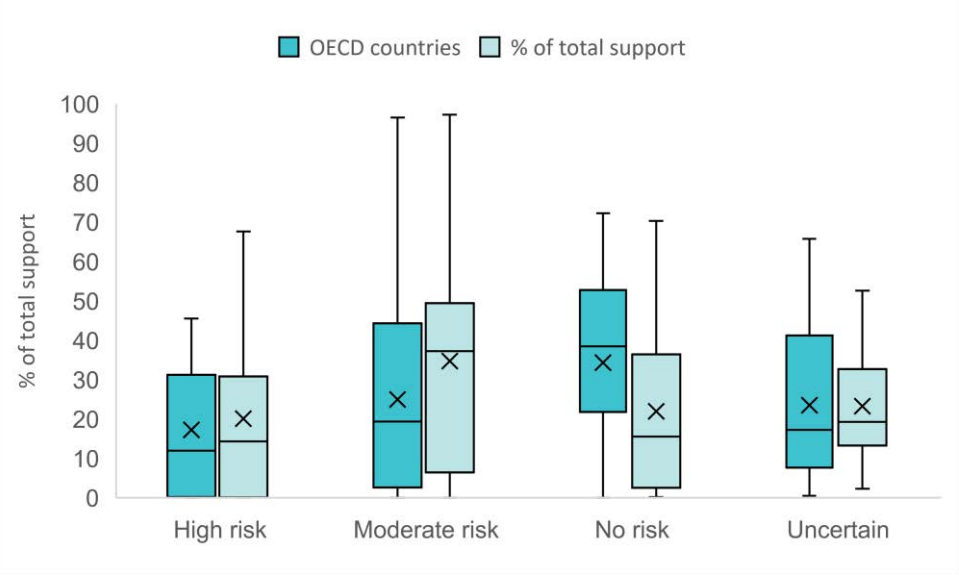


Note: A lack of detailed information on policies has resulted in all spending on infrastructure being assigned to the "moderate risk" category and all support to vessels and gear being assigned to the "high-risk" risk category (see Endnote 51).
Source: OECD (2022[3]), Fisheries Support Estimate (FSE), http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_FSE.

When support is considered at the level of individual countries, the proportions of support by risk category, that is, their "risk profiles", vary considerably within the groups (Figure 3.18). When comparing the middle half of countries (i.e. the interquartile range), as indicated by the boxes in Figure 3.18, the proportion of support that presents a high or moderate risk of encouraging unsustainable fishing in the absence of effective management is relatively similar in both the OECD countries and the emerging economies. However, the median (indicated by the horizontal line within each box) is lower for OECD countries in both cases, and substantially so for policies that can present a moderate risk. The median proportion of support going to policies that present no risk is also notably higher for OECD countries.

In terms of trends, the most notable change across the OECD countries is that country-level proportions of support that are allocated to "no risk" policies steadily increased between 2012-14 and 2018-20 and the level of variation between countries has diminished (Annex Figure 3.A.1). In the emerging economies, the median proportion of support that presents a high risk of encouraging unsustainable fishing in the absence of effective management increased between 2012-14 and 2018-20, but the level of variability and, in particular the upper limits to this variability, have fallen (Annex Figure 3.A.1). Median levels of support that can present a moderate risk have also increased, even more so than "high-risk" support. The level of variation between countries has also increased slightly.

Figure 3.18. Variation in the risk profiles of the support mix across countries, 2018-20



Notes: The boxes represent the interquartile range (i.e. the middle half of countries); the horizontal line within the boxes represents the median; the cross represents the mean; and the vertical lines extend to the upper and lower limits. A lack of detailed information on policies has resulted in all spending on infrastructure being assigned to the "moderate risk" category and all support to vessels and gear being assigned to the "high-risk" category (see Endnote 51).
Source: OECD (2022[3]), Fisheries Support Estimate (FSE), http://stats.oecd.org/wbos/default.aspx?datasetcode=FISH_FSE.

StatLink https://stat.link/jv4k61

3.3.5. Conclusion

The OECD FSE database now covers 40 countries and economies. Together, these countries and economies accounted for 90% of world landings over the period 2018-20 and annually provided a total of USD 10.4 billion to the fisheries sector. Encouragingly, spending on MMCS is now the largest type of support (with USD 2.37 billion spent in 2018-20). However, support policies lowering the cost of inputs –

that is support to fuel, vessels and gear – together continue to be the largest component of support (USD 3.12 billion in 2018-20), although their levels have declined substantially since 2012-14.

Considering overall support policy mixes in terms of the risk of encouraging unsustainable fishing they can present in the absence of effective fisheries management leads to two main observations. First, at the level of all countries and economies covered in this report, progress was seen in the first half of the review period, with a notable decrease in the proportion of support that can present a high risk of encouraging unsustainable fishing. Notably, this was driven by a reduction in fuel support in China. Overall progress has, however, stalled since 2016-18 and the policies that can present a high risk of encouraging unsustainable fishing continue to account for about a third of total support.

Second, policy mixes in the OECD countries generally result in a lower exposure to the risk of encouraging unsustainable fishing in the absence of effective fisheries management compared to policy mixes seen in the emerging economies. In the OECD, 42% of support presents no risk of encouraging unsustainable fishing. However, in both the OECD countries and the emerging economies, variation in these shares is significant, and some countries and economies have policy mixes with relatively high risk profiles. In all cases, there are areas where policy reform could contribute to further lowering the risk of encouraging unsustainable fishing.

Countries should carefully review the policies that can present risks of encouraging unsustainable fishing and determine whether recipients of such support operate in sustainably managed fisheries. Where this is not the case, countries should consider using alternative forms of support or better targeting these policies, for example by attaching conditions that restrict eligibility. This may be a particularly helpful approach to reviewing and potentially reforming policies that can present a moderate risk of encouraging unsustainable fishing, and those for which that risk is uncertain. As a precautionary approach, countries may also want to move away from policies which can present risks of harming fish stocks more generally, given the difficulty, and cost, of regularly monitoring whether individual recipients of support are operating in sustainably managed fisheries.

One promising development in this area is the recent WTO Fisheries Agreement which disciplines some of the most potentially harmful types of subsidies: those that benefit IUU fishing; those that benefit the fishing of overfished stocks; and those that benefit fishing in the unregulated high seas. The detailed information on country-level support available in the FSE database could help governments target reform to implement the agreement. The next section discusses the specific mechanisms governments can put in place to avoid supporting IUU fishing.

3.4. Eliminating government support to illegal, unreported and unregulated fishing

3.4.1. A shared goal that calls for a range of policy responses

Drawing on a recent OECD report (Delpeuch, Migliaccio and Symes, 2022[42]), this section considers how OECD countries and partner economies engaging in the OECD Fisheries Committee can ensure that support to fisheries does not contribute to IUU fishing.[27] It suggests avenues to more effectively close public budgets to IUU fishing by maximising the chances of excluding individuals and companies with links to IUU fishing from government support, and minimising the risk that such support benefits IUU fishing *ex ante*, given the inherent difficulty to take action *ex post*.

In looking at how to eliminate government support to IUU fishing, this section considers IUU fishing in a broad sense, without limiting the concept of IUU fishing to one particular definition.[28] This broad understanding of IUU fishing includes a range of fishing activities that a common-sense interpretation would consider “unregulated”, “unreported” or “insufficiently regulated”. This comprises, for example,

fishing on the high seas that concerns species or areas outside the competence of any regional fisheries management organisations and agreements (RFMO/A) and that is not co-operatively regulated in a way that would allow for evidence-based sustainable management of the resources. This also comprises fishing-related activities, which is central to IUU fishing.

This section, and this report, thus have a broader scope than one of the key provisions of the WTO Agreement on Fisheries Subsidies adopted at the 12th Ministerial Conference on 17 June 2022 is a prohibition on subsidies contributing to IUU fishing (contained in Article 3 of the agreement). This prohibition was negotiated as a response to SDG Target 14.6, which aims to "*eliminate subsidies that contribute to IUU fishing and refrain from introducing new such subsidies*".[29] The agreement also calls on WTO members to notify, within one year of the date of entry into force of the agreement, the measures that allow for its implementation and administration – including those taken to implement prohibitions in relation to IUU fishing. Thereafter, members shall promptly notify any changes to such measures and new measures. In addition, members have to notify, on a yearly basis, a list of vessels and operators that they have affirmatively determined as having been engaged in IUU fishing (Article 8). It should also be noted that this report is working with a broader definition of IUU fishing than the one used in the WTO Agreement on Fisheries Subsidies, which is based on the FAO's International Plan of Action against IUU Fishing (IPOA-IUU) (FAO, 2001[43]).

Similarly, government support is understood in this report in a broader sense, including both direct payments and tax exemptions that benefit individuals and companies, as well as support to the sector more generally, such as in the form of subsidised access to infrastructure. In addition, it is also understood to comprise support to fishing-related activities as well as non-specific support that benefits fisheries; that is, support that is available to fisheries as well as other sectors. These broader perspectives on IUU fishing and on government support are motivated by the fact that all the types of IUU fishing and fishing-related activities considered can be unsustainable, and with the objective of closing public budgets to such unsustainable activities. As such, this section has a broader scope than the WTO Agreement on Fisheries Subsidies, using different definitions and having different purposes. The WTO Agreement only disciplines specific subsidies as defined by the WTO.

The varied nature of fishing around the world, and the intricate and diverse way in which fisheries activities are governed, make closing public budgets to IUU fishing a genuinely complex objective. The nature of legal and regulatory systems in place, more generally, also affects what measures are needed and appropriate to avoid supporting IUU fishing in particular economies.

Broadly, there are three common ways in which economies try to avoid supporting IUU fishing. First, some economies use specific mechanisms to deny or withdraw support in relation to IUU fishing, which are set in overarching legislation and regulation. Others use specific mechanisms that are embedded in individual support programmes' agreements or contracts. Finally, others rely on the withdrawal of fishing authorisations, which, combined with the need for an authorisation to be eligible for support, may, implicitly, suspend support eligibility.

Several challenges are common to these three approaches. First, by nature, IUU fishing is hard to observe and document. Establishing links between IUU fishing activities – most often identified in relation to a vessel – and the individual fishers and companies that benefit from these activities and public support can be even more difficult.

Second, delineating what actions should trigger the denial, withholding or withdrawal of support is complicated. IUU fishing, as described in the IPOA-IUU (FAO, 2001[44]), covers a range of different fishing activities and contexts. These include industrial vessels fishing illegally in the waters of a foreign country, fishing in the high seas by a vessel without nationality, small-scale fishers failing to diligently report their catch, the use of prohibited gear or fishing in excess of a quota in the coastal areas of the fisher's own country. The sustainability and socio-economic implications of excluding such different types of activities from support, and the opportunity cost of doing so, vary accordingly.

Furthermore, fishing-related activities are generally less subject to legislation and regulation and harder to monitor, sanction and exclude from government support. These activities include transhipment – whereby fish are transferred from fishing boats onto larger refrigerated vessels, which then carry the fish to port – and the provisioning of personnel, fuel and other supplies at sea, which can play a central role in IUU fishing.

Finally, some types of government support to fisheries are made available to the sector as a whole. This is often the case of public investment in infrastructure or tax exemptions, for example. Excluding particular individuals, companies and vessels from the associated benefits may prove more challenging for these types of support.

Box 3.3. Why is illegal, unreported and unregulated fishing a major issue for global fisheries – and why is cutting support part of the response?

Illegal, unreported and unregulated (IUU) fishing and associated IUU fishing-related activities (i.e. operations in support of, or in preparation for, IUU fishing that happen in ports or at sea) continue to seriously undermine and threaten fisheries, coastal communities and the sustainability of the ocean economy. Largely unseen, IUU fishing complicates the stock assessments that underpin evidence-based fisheries management while causing law-abiding fishers to face unfair competition over resources and in markets. Furthermore, when its products are sold outside official market transactions, IUU fishing results in losses of important tax revenue (OECD, 2013[45]). IUU fishing can also threaten food security, for example by diverting fish away from local markets in regions and communities that depend on local seafood, and may pose food safety risks due to the mislabelling of illegal products. It is also sometimes associated with conflicts over scarce resources and disputed waters, transnational criminal activities, and the exploitation of forced labour.

Because IUU fishing activities do not respect national boundaries, eradicating IUU fishing notably requires closing fishing areas and markets to IUU fishing operators and the products of IUU fishing. Action to curb IUU fishing has been reinforced in recent years: countries have increasingly used port state measures, introduced market related measures and catch documentation schemes (see the FAO voluntary guidelines on catch documentation schemes, FAO, (2017[46])), adopted more comprehensive registration and authorisation processes, and increased the use of digital technologies to monitor fishing (OECD, 2020[1]). International and multilateral co-operation to combat IUU fishing has also been reinforced, particularly through regional fisheries management organisations and agreements (RFMO/As). However, even in the best-managed fisheries, curbing and deterring IUU fishing activities is difficult and expensive, and, where management and enforcement capacity are limited, the issues are even greater. Fundamentally, IUU fishing exists because it is profitable, and will remain so as long as expected revenues exceed expected costs (OECD, 2005[47]). Thus, lowering the expected net benefits from IUU fishing is key to continued progress (Widjaja et al., 2020[48]). This calls for setting sanctions at levels that have a deterrent effect (ECA, 2022[49]), but also for ensuring that those engaging in IUU fishing and associated fishing-related activities do not benefit from government support. This is an important lever to reduce the profitability of IUU fishing, especially in fisheries that are highly dependent on support.

3.4.2. Tools for eliminating support to illegal, unreported and unregulated fishing

Comprehensive authorisation and registration processes

Ex ante, the first step through which governments can deny eligibility to support is embedded in the authorisation process, when a fishing authorisation is needed to access support. This is the case in many

economies. Where fishing authorisation is not yet a condition for support eligibility, establishing such a condition should be an immediate priority. In addition, this could help create the incentive for informal fishers to apply for vessel registration and fishing authorisations where governments are trying to transition informal fisheries away from open-access regimes. A similar condition for fishing-related activities would incentivise creating comprehensive licensing systems to cover them.

In addition, requiring vessels to be flagged in the state providing the support will ensure that the supporting state has jurisdiction to sanction the supported vessel. This may help avoid ambiguities that may occur if the supporting state and flag state employ different definitions of IUU fishing.

Requiring detailed and verified information from vessels during the registration and authorisation processes increases the chances of identifying any links to IUU fishing and facilitates the tracking of vessel activities, including IUU fishing. Excluding IUU fishing from support effectively, therefore, requires registration and authorisation processes that are as comprehensive as possible – and appropriate to different contexts (many economies have simplified procedures for small-scale fisheries).

Progress has been made in registration and licensing processes. For example, in 2018, all economies covered in the *OECD Review of Fisheries 2020* (OECD, 2020[1]) required fishing vessels to be registered and collected information on vessels' characteristics and details on the natural or legal persons in whose names vessels were registered.

However, that report also highlighted two weaknesses of authorisation and registration processes which are directly relevant to ensuring that support does not benefit IUU fishing. First, the identification of vessels' beneficial owners lags behind other areas: in 2018, a third of the economies covered in the *OECD Review of Fisheries 2020* did not ask for information on beneficial owners in the context of registration processes. A quarter of these economies also did not mandate the use of unique, verified and permanent vessel identifiers, such as an International Maritime Organization (IMO) number. Using unique identifiers can facilitate monitoring, control and surveillance by avoiding cases whereby vessels change flags or names to escape global oversight or register in another jurisdiction when their illegal activities are discovered. Second, the regulation of fishing-related activities lags behind that of fishing. In many economies, the licensing processes are less demanding for fishing-related activities than they are for fishing, while in others fishing-related activities are not subject to authorisation at all.

In summary, to minimise the risk that government support benefits IUU fishing, governments should make all support conditional on being flagged to the supporting country and having a fishing authorisation. In addition to conditions that are typically included in authorisations processes, such as position transmission through vessel monitoring systems or reporting of catch, where appropriate, the authorisations themselves should require unique vessel identifiers, such as an IMO number, where appropriate; and detailed information on vessel beneficial owners.

Additional specific mechanisms to deny, withdraw and withhold support

Specific mechanisms to effectively exclude potential beneficiaries from all types of support (*ex ante*) – and withdraw and withhold support (*ex post*) where appropriate – can complement the use of eligibility criteria related to registration and licensing. Such mechanisms can create more flexibility for addressing different types of IUU fishing and speed up the process. They should be sensitive to the national governance context – notably in terms of whether they should occur in overarching legislation and regulation or in an individual support programme agreement or contract – and follow due process. Key issues to be considered in their design include: what triggers action, who is concerned, for how long and whether past support needs to be recovered.

In addition, how different criteria trigger action needs to be clearly established. Action on support is often possible once a vessel has been included on an IUU vessel list or when legal proceedings have been finalised. In some instances, however, the supporting economy might suspend support before a vessel is

listed as being engaged in IUU fishing if there is clear evidence of infringement of domestic regulation or RFMO/A conservation and management measures. Making greater use of such provisions would facilitate action in relation to support, by decoupling it from potentially long processes that may partly fall outside the competence of the supporting authorities, such as vessel listing for IUU fishing by RFMO/As (Tipping, Irschlinger and Bellmann, 2020[50]). Ultimately, this would allow governments to react more promptly to infringements and avoid situations where vessels and operators involved in IUU fishing continue to benefit from support even following an infringement.

While some fishing-related activities, such as transhipment, can be included in fisheries regulation, other types of fisheries-related activities, such as the transfer of fuel, food and crew from "mother ships", may be dealt with more effectively in other areas of regulation (such as labour or energy). Therefore, to fully exclude IUU fishing-related activities from support, it may be necessary to ensure that infringements of non-fisheries regulation can also lead to the withdrawal or withholding of support.

The duration of applicability of support-related sanctions impacts the extent to which they disincentivise IUU fishing (Tipping, Irschlinger and Bellmann, 2020[50]). The duration of sanctions for IUU fishing needs to be graduated and proportional. Similarly, there is a case for support eligibility restriction periods for actors found to have engaged in IUU fishing to be proportional to the gravity of the action. However, if withdrawing support is only linked to authorisation for fishing, authorities may have less flexibility to tailor the sanctions to the gravity of the action. This is important since IUU fishing covers such a broad range of activities, including those for which the withdrawal of fishing authorisation (and all support) would be disproportionately harsh.

Some economies set eligibility restrictions that have minimal and maximal durations depending on the severity of the infringement committed (for up to over 25 years). In addition, many economies restrict eligibility to support as long as vessels are included on an IUU fishing list. EU legislation, for example, applies the principle of proportionality of sanctions by establishing periods for exclusion from support based on a point system that rates the seriousness of each infringement, and the duration of exclusion from support depends on the number of points. In addition, when a vessel is included on the EU list of vessels engaged in IUU fishing, operators are excluded from support for at least 24 months and for the whole period during which the vessel is listed. The effectiveness of such mechanisms rests on the effectiveness of IUU vessel listing and delisting processes and their responsiveness to new information, which implies a need for effective and responsive decision making, particularly where several countries or authorities are concerned (this is discussed below under "transparency and information-sharing").

In summary, it is recommended to use appropriate processes to effectively exclude from all types of support all potential recipients linked to IUU fishing (understood in a broad sense) and fishing-related activities in support of IUU fishing. This notably entails:

- being transparent about the consequences of IUU fishing before support is provided and the use of support-related enforcement actions
- ensuring proportionality of government action by giving due consideration to the nature of the IUU fishing activity and the context in which it happened
- delineating who is concerned, for how long and whether past support needs to be recovered
- not necessarily tying action on support to other IUU enforcement actions (such as processes related to IUU vessel listing).

Definitions of illegal, unreported and unregulated fishing and fishing-related activities

The definition of IUU fishing and IUU fishing-related activities in legislation is a key issue. A definition of IUU fishing set in national legislation is often used as one of the criteria that can trigger action in relation to support. Where IUU fishing definitions are not used to cut support to IUU fishing, either because the national legislation does not define IUU fishing per se or because the definition is meant for other purposes,

IUU fishing is implicitly defined as stemming from breaches of the law and infringement of regulations or the conditions set in the support programme contracts or agreements. Cutting support based on breaches of the law or infringements of domestic regulation, including reporting obligations, may thus be sufficient to exclude IUU fishing from support.

However, defining IUU fishing per se in legislation is potentially useful to cut support for infringements that happen outside the supporting state's jurisdiction. By adopting comprehensive and practical definitions of IUU fishing and associated fishing-related activities, governments can both facilitate co-operation and ensure greater clarity for flag states, coastal states and vessel operators on what activities will be considered IUU and result in the loss of support.

Definitions also need to be flexible to different contexts and types of fishing. If they are too rigid, they risk excluding (or even criminalising) more customary or informal types of management, especially in areas where centralised reporting of catches is challenging or impossible (Song et al., 2020[51]). These considerations can also extend beyond the national contexts if trade agreements contain provisions on IUU fishing and support, as is increasingly the case.

Fishing-related activities, which can be central to IUU fishing, are not specifically included in the IPOA IUU description of IUU fishing. Fishing-related activities themselves are rarely defined in national legislation at all. The Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (PSMA) defines fishing-related activities for the purpose of the agreement in Article 1(d) as: "*any operation in support of, or in preparation for, fishing, including the landing, packaging, processing, transhipping or transporting of fish that have not been previously landed at a port, as well as the provisioning of personnel, fuel, gear and other supplies at sea*". Better definitions of fishing-related activities in relevant legislation, and implicit inclusion of fishing-related activities in support of IUU fishing in IUU fishing definitions, would contribute to strengthening regulation and to more effective deterrence of IUU fishing (OECD, 2020[1]), including by denying support

In summary, it is recommended that governments adopt a definition of IUU fishing and fishing-related activities under national legislation, regulation or other relevant official document, in line with existing international definitions. Such a definition will be particularly helpful when international co-operation is required. The IPOA-IUU is the most commonly used reference for defining IUU fishing, and the PSMA for defining fishing-related activities.

It is also recommended that governments better regulate and monitor the transhipment of fish and other fisheries-related activities, such as at-sea vessel supplying, including with authorisation and reporting obligations. The *FAO Draft Voluntary Guidelines on Transhipment* (FAO, 2022[52]) provide a detailed list of recommendations to help countries establish the authorisation, conditions, notification, reporting and monitoring systems needed to better regulate and monitor transhipment.

3.4.3. Curbing support to illegal, unreported and unregulated fishing in practice

By its nature, IUU fishing is hard to observe and document. Establishing links between IUU fishing activities – most often identified in relation to a vessel – and the individual fishers and companies that benefit from these activities as well as from public support can be even more difficult.

In addition to legal provisions to deny, withdraw or withhold support, ensuring fisheries support does not benefit IUU fishing, therefore, requires processes to concretely target the vessels that engage in IUU fishing and IUU fishing-related activities, their operators, and owners and beneficial owners (Tipping, Irschlinger and Bellmann, 2020[50]). In some serious cases of IUU fishing, it may also be desirable to target all the vessels operated or owned by the guilty party to maximise the impact on their risk-benefit prospects of engaging in IUU fishing (Hutniczak, Delpeuch and Leroy, 2019[53]; FATF, 2014[54]). This stresses the importance of Recommendation No. 4.1 on using more detailed information on vessel beneficial owners in authorisation processes.

IUU fishing detection

Detecting and sanctioning IUU fishing requires effective monitoring of fishing activities, both inside and outside a country's jurisdiction. Improving monitoring capacity, including on the high seas, is therefore vital for detecting IUU and ensuring support is withdrawn and, where necessary, repaid. However, between 2012-14 and 2016-18, spending on MMCS fell substantially relative to fleet size in several economies (OECD, 2020[1]). Reforming subsidies in line with the disciplines agreed on in the WTO Agreement on Fisheries Subsidies, and more generally moving away from subsidies that encourages overfishing and overcapacity, could free resources that could be repurposed to MMCS. Linking fishing authorisation to the use of vessel monitoring instruments and unique vessel identifiers (as suggested in Recommendation No. 4.1) and better regulation of transhipment in line with the *FAO Draft voluntary guidelines on ranshipment* (FAO, 2022[52]) provide would also increase the chances of detecting IUU fishing and reduce the likelihood of governments supporting IUU fishing unknowingly.

The monitoring of vessels in port can also help countries identify IUU fishing. Port states can inspect vessels entering their ports and deny access or use in cases of IUU fishing. The PSMA establishes a commitment for parties to meet a minimum standard of port inspection, and encourages international co-operation in this respect (Box 3.3). Fully implementing the PSMA provisions would not only improve the detection of IUU fishing, but also reduce the profitability of IUU fishing by denying the use of facilities and access to markets. Further, if the port in question is supported by the government, implementing the PSMA provisions will also directly prevent IUU fishing from benefiting from government support. The OECD Review of Fisheries 2020 showed that while 85% of economies covered in the report were parties of the PSMA and most of them had the legislation in place to implement its key provisions, a number of them were still facing difficulties in implementing a risk-based approach to prioritise inspections, set inspection targets, and deny port entry or use to vessels suspected of IUU (OECD, 2020[1]).[30]

It is thus recommended to continue enhancing the monitoring of fishing and fishing-related activities to better detect and deter IUU fishing, fully implement the key provisions of the PSMA, and, where possible, become a party to the agreement.

Information-sharing and transparency

Information-sharing among government agencies, between economies and with RFMO/As is key to improving the evidence base on which to exclude IUU fishing from support – both *ex ante* and *ex post* – and shorten associated processes. A rapid and effective flow of information from the authority making a determination of IUU fishing to the authorities delivering fishing authorisations and those delivering the support is required.

Notably, this requires access to data on those receiving support, which remains unavailable at a disaggregated level in many countries; data on registered and authorised vessels (as well as their operators, owners and beneficial owners); and data on vessels identified as engaging in IUU fishing. Making these data available to all relevant authorities would help states providing support stay informed and check IUU vessel lists against the records of vessels and individuals and companies having received support. This remains a key area for progress. Often, existing lists are incomplete; they list vessels but not the individual fishers and companies that are linked to them; and updates are not frequent enough. In many instances, lists are not fully available to the public or across government agencies. Lastly, many countries rely on the RFMO IUU vessel lists. These, however, need to be complemented by information on vessels, individuals and companies found to have breached the law or infringed domestic regulation, including reporting obligations, in the EEZ – even when this is not labelled as IUU fishing, per se, as per national definitions of IUU fishing.

One particular area for which information tends to be missing is beneficial ownership, as information is not always collected in the context of vessel registration and authorisation processes. This information is not only useful for domestic fishing authorities, but can also be the basis for co-operation and tracking of the foreign investments of beneficial owners. In cases where there is one beneficial owner for multiple vessels, this information can be used to exclude all of the owner's vessels from support in cases of severe IUU fishing (even if the IUU activities take place in other jurisdictions). Where possible, ensuring appropriate data sharing of beneficial ownership information between authorities, including fisheries-relevant authorities – in the same country, and with partner countries and RFMO/As – in cases of IUU fishing would be very helpful for targeting enforcement actions.

In some countries, information on beneficial ownership is publicly available through public company registries. Other countries are considering adopting similar systems. In addition, there is already international co-operation and exchange of beneficial ownership information for tax purposes. The OECD Global Forum on Transparency and the Exchange of Information for Tax Purposes, which includes 163 member jurisdictions, monitors the implementation of the standards on the automatic exchange of information and exchange of information on request. These two standards include various requirements pertaining to beneficial ownership information on legal entities and arrangements, including reporting, availability, access and exchange (OECD, 2017[55]).

The peer reviews of these requirements have shown that deficiencies remain in many jurisdictions' legal framework, and they have faced challenges with implementation in practice. However, while beneficial ownership information may not always be readily available to tax authorities (IADB/OECD, 2019[56]), jurisdictions have made steady progress in recent years to implement the beneficial ownership requirements – some of them introducing a beneficial ownership register.

In addition, investing in recording and publishing clear information about the processes in place to cut support to IUU fishing and how they are implemented could reinforce their effectiveness. Publishing this type of information can deter IUU fishing by increasing the expected costs of engaging in these activities and reducing the financial incentive for operators (Tipping, Irschlinger and Bellmann, 2020[50]). While rarely publicly accessible, some economies record information on the number of support measures withheld or withdrawn and, more rarely, on their value. However, little to no information is available about cases where support was denied in the first place.

As a result, it is recommended to improve the capacity to make IUU fishing determinations; identify the people and companies concerned; and identify support recipients among them by: improving information-sharing within and between government agencies, economies and RFMO/As; publishing and regularly updating IUU vessel lists, or lists of vessels contravening to fisheries legislation and regulation, in the EEZ where this may not considered IUU fishing per se; increasing transparency on the processes in place to cut support to IUU fishing and their implementation; and, where compatible with privacy legislation, increasing transparency on the recipients of government support.

3.4.4. Reforming fisheries support

Moving away from support that is most likely to encourage illegal, unreported and unregulated fishing

The pervasive nature of IUU fishing means that ensuring that government support does not benefit IUU fishing is challenging for policy makers. This issue is exacerbated when considering jurisdictions where the capacity to regulate and monitor fishing is limited. The fragmented governance environment in which fishers operate further muddies the waters by requiring policies to ensure that the support programmes comply with several legal frameworks at the national, supranational and international levels (in many cases).

To supplement the mechanisms to both prevent support from flowing to IUU fishing and to withdraw support from operators found to have engaged in IUU fishing, as discussed above, governments can depressurise the system by reforming how they support fisheries in the first place. This requires transitioning away from the types of support the most likely to encourage overcapacity and IUU fishing.

Support to fishers is delivered in many forms, with many objectives, and how these contribute to IUU fishing varies. While no support explicitly promotes IUU fishing or provides incentives for IUU fishers that are different from those provided to legal fishers, some forms of support are more likely to contribute to IUU fishing. It is, therefore, possible to design policies that minimise the potential to contribute to IUU fishing.

The main difference between IUU fishing and other fishing is that IUU fishing does not respect the management control that limits fishing efforts. Therefore, assuming equal access, support that incentivises increased effort will increase IUU fishing effort proportionally more than regulated effort. Conversely, support with a more neutral effect on effort will affect IUU fishing and regulated fishing more equally, and with a generally less negative impact on the health of fish stocks.

Support that reduces the costs of fishing, such as by subsidising the cost of inputs – fixed (vessels and gear), and, even more so, operating expenses, fuel in particular – are the most likely to increase IUU fishing through impacts on effort levels (Martini and Innes, 2018[2]). An effective means of preventing IUU fishing from benefiting from government support is, therefore, to transition away from support to inputs.

In addition, IUU fishing is likely to benefit from some forms of support to the sector as a whole, such as infrastructure, where exclusion *ex ante* is difficult or impossible. As these forms of support can also be effort-increasing in nature and, given the difficulty of preventing individual operators from benefiting from them, eliminating such support will still be the most effective action in most instances. Where such support remains, other methods of tackling IUU fishing, such as port state measures or improved MCS, will be necessary.

It is thus recommended to reduce or redirect support away from policies that have the most potential to increase fishing effort and capacity and consequently drive higher levels of IUU fishing. This is notably the case of support that reduces the costs of vessels and fuel.

Finally, while not considered “unregulated” under the IPOA-IUU, and authorised by some countries, fishing on the high seas that concerns species or areas outside the area of competence of any RFMO/A is not co-operatively regulated in a way that would allow for the sustainable management of the resources. It is therefore also recommended to explicitly exclude from support fishing on the high seas that occurs outside the competence of any RFMO/A.

This may prove difficult in practice, as fishing outside the competence of any RFMO/A may represent only a fraction of a vessel’s activities on the high seas and the practice of transhipping, whereby vessels transfer harvested fish to other vessels, further complicates the tracing of operations in the high seas and the task facing governments.

Alternative support options

As shown above, alternatives to support the sector exist. Government support can be reoriented towards policies that improve the sustainability of the sector (such as investment in MMCS) or support that increases the well-being of fishing communities while not entering into the revenues and costs of individual fishers. Ideally, such support will be targeted at coastal communities in need generally, and contribute to their well-being, or create economic opportunities generally. Support policies that reduce the value of illegal fish products, such as policies that improve the traceability of fish products, can discourage IUU fishing while also rewarding regulated operators.

Repurposing support away from policies that have the potential to benefit IUU fishing and towards mithose that do not would be a win-win for governments. Not only would such reforms reduce the opportunity for IUU fishing to benefit from government support, they would also contribute to creating a more equitable and socially, economically and environmentally sustainable sector. They would benefit ocean health more generally and level the playing field for global fisheries. Supporting the achievement of Sustainable Development Goal 14, such repurposing would overall contribute towards a net improvement in the social benefits of fishing.

3.5. Exploratory discussion of non-specific support to fisheries

3.5.1. Exploring non-specific support to fisheries and why it matters

The section considers support that benefits a range of different sectors, including the fisheries sector, a relatively new area of research. It should not be confused with the features of the WTO Agreement, as this agreement refers to the definition of (specific) subsidies as set in the Agreement on Subsidies and Countervailing Measures. It only aims to start enriching discussions on how government action in general can contribute to the sustainability and resilience of fisheries in a domestic context, recognising a general lack of comparable data, and making no attempt to quantify, nor measure its impact on fisheries' socio-economic performance and sustainability.

Global challenges such as recovery from the COVID-19 pandemic have spurred government support for energy. Support for fossil fuels almost doubled in 2021 and the large-scale aggression by the Russian against Ukraine has brought new challenges which are expected to precipitate an additional rise in consumption subsidies (OECD, 2022[57]). At the same time, the world faces the pressing challenge of adapting to climate change while mitigating GHG emissions. To overcome these challenges, governments need to understand how their support policies impact different sectors of the economy and how best to target public spending to achieve its objectives.

To better target reforms, governments need information on the nature and scale of support received by different sectors and how that support affects socio-economic performance and sustainability. This includes support provided through non-specific policies; that is, support that does not target one sector exclusively, but benefits a range of sectors simultaneously. Examples of non-specific policies that provide support to fisheries include support to coastal infrastructure that can be used by the fishing industry but also by maritime transport or tourism, or support to the marketing and transport of all food products. Further examples include fuel tax exemptions or preferential rates that benefit agriculture, forestry, shipping and off-road vehicle use. Hereafter, such policies are referred to as providing non-specific support to fisheries (NSSF).

Similar to support policies that are specifically targeted at one particular sector, policies that provide non-specific support have the potential to impact industries in several different ways. For example, in fisheries, non-specific support can be environmentally beneficial if it promotes effective fisheries management or be environmentally harmful if it ends up encouraging overfishing (OECD, 2020[1]; Martini and Innes, 2018[2]). Thus, to fully understand the impact of government policy on a sector's performance, it is thus necessary to consider the long-term impacts of support broadly. Discussions around the role of government support are ongoing across many sectors, with the objective of identifying those policies that can usefully correct market failures and those that present risks in terms of equity or environmental sustainability (Sauvage, 2019[58]).

To date, however, these discussions are constrained by the absence of information on the nature and overall magnitudes of support received by particular sectors through non-specific policies.[31] This is not covered by the scope of the WTO Agreement on Fisheries Subsidies, which concerns only specific subsidies. Furthermore, there are no officially recognised data or overarching mechanisms for reporting policies that provide non-specific support. Finally, measuring non-specific support and analysing variations in magnitudes over time and across countries is a complicated task. In many cases it can be difficult to identify a relevant reference price for the supported goods or services and, in the case that support comes from a tax exemption, the magnitude of support derives both from the extent of the exemption and the initial level of taxation (IMF, 2019[59]).

To fill the information gap on NSSF, this section reviews the available information about the nature of policies providing NSSF. The objective is to provide preliminary insights on NSSF to policy makers as a first step in supporting dialogue on this complex issue and enriching discussions on fisheries support more generally and how to ensure it contributes to sustainability and resilience in a domestic context. No attempt is made to quantify NSSF, nor to measure its impact on fisheries' socio-economic performance and sustainability.

This section builds on an analysis of publicly available policy data to illustrate where policies that provide NSSF may be found along the fisheries value chain and describe the nature of energy-related policies that provide NSSF using the *OECD Inventory of Support Measures for Fossil Fuels*, the only source of comparable and officially recognised data on policies that provide NSSF.[32]

Without pre-empting any future attempt to agree on an official definition of non-specific support in other fora, NSSF is considered here to comprise any government support that benefits the fisheries sector along with a defined set of other sectors, while not being available economy wide. Support, itself, is defined in the same way as it is defined in the FSE database, however unconstrained by specificity. It, therefore, includes both direct support to individuals and companies and support for services to the sector (see Box 3.1).

3.5.2. Policies providing non-specific support to fisheries occur all along the value chain

Like specific support, policies that provide NSSF can occur at many stages of the fisheries value chain. Figure 3.19 illustrates the many ways in which this can occur. Examples of policies that provide NSSF before fishing takes place include supporting the provision and modernisation of port infrastructure. Policies that provide NSSF post-fishing include support to food marketing and promotion, at-port storage, or transport in coastal areas. Table 3.4 provides real-life examples of such policies identified in open-source data reviewed for this section.

Figure 3.19. Possible occurrence of non-specific support to fisheries throughout the fisheries value chain

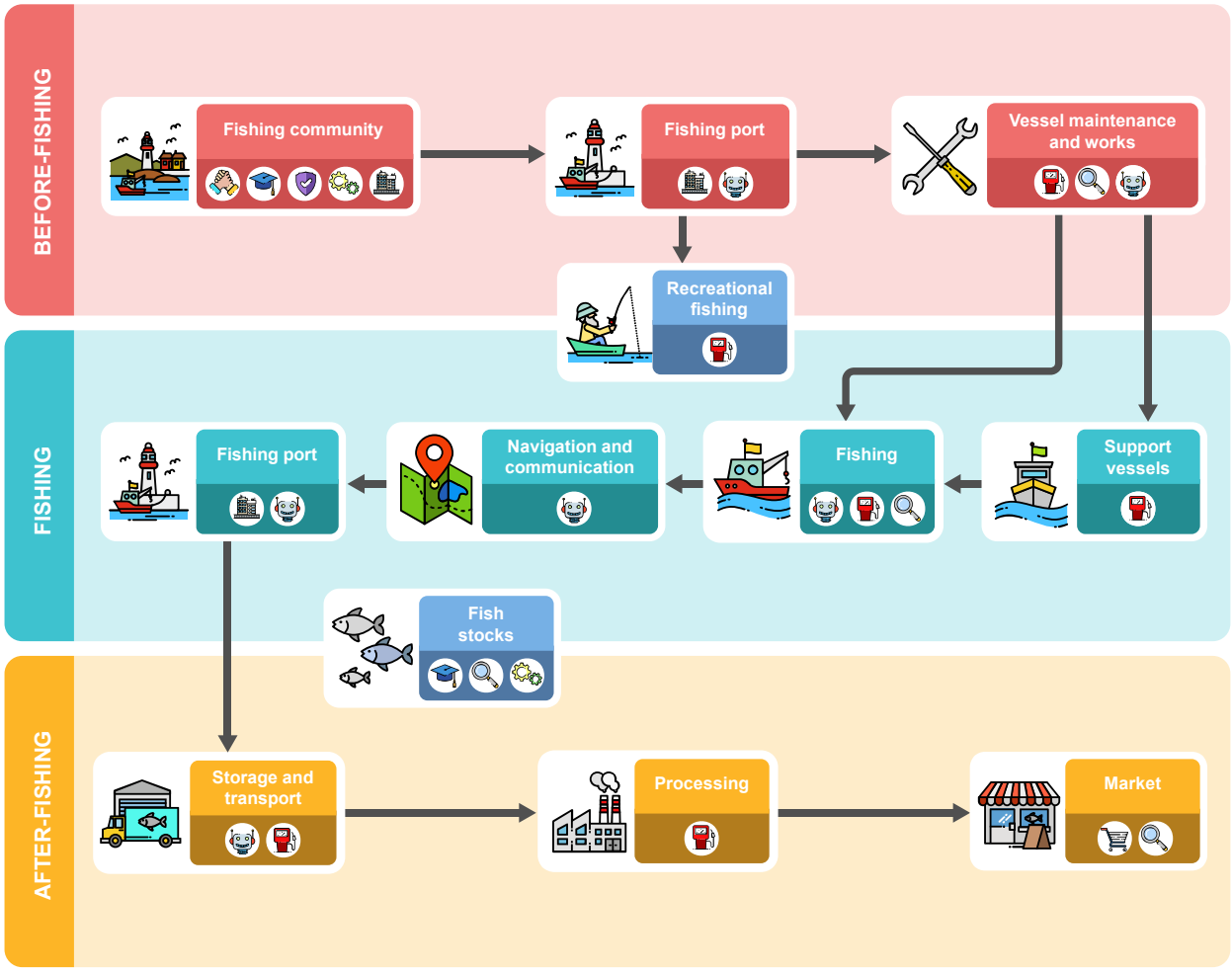


Table 3.4. Examples of policies that provide non-specific support to fisheries along the value chain

Occurrence in fisheries value chain	Policy example	Country
Fishing community	*DOLE Integrated Livelihood Program*: A programme administered by the Department of Labour and Employment which aims to reduce poverty by providing finance to livelihood projects. Beneficiaries include "marginalised fisherfolk", women and youth, elderly workers, and working persons with disabilities (Philippines Department of Labor and Employment, n.d.[60]).	Philippines
Marine stock management	*Coastal belt making*: Coastal area rehabilitation programme. Improve and restore coastal ecosystems.	Indonesia
Fishing port	*Coast Guard*: Marine building construction programme to protect against abrasion. Construct beach buildings.	Indonesia

Occurrence in fisheries value chain	Policy example	Country
Recreational fishing	*Excise Tax Refund for Fuels Used in Tourist Boats*: As stipulated by Act 438/1976 (Article 14, Paragraph 2) and Act 2386/1996, an excise tax refund is provided for fuels used by boats for tourism in Greece.	Greece
Fishing	*Reduced rate of excise for red diesel/Rebated rate for gas oil ("red diesel"):* A reduced excise rate is applied to "red diesel" that is used in certain industries, including the fishing industry. In the United Kingdom, "red diesel" is used off-road and accounts for approximately 15% of all diesel used in the United Kingdom (HM Revenue & Customs, 2021[61]).	United Kingdom
Navigation and communication	*Providing navigational aids and other facilities*: Other – grants and other direct transfers of funds.	India
Storage and transport	*International Freight Assistance Mechanism*: A temporary emergency support measure in response to the COVID-19 pandemic. The programmes are designed to aid the export of high-value, perishable products (Australian Trade and Investment Commission, 2021[62]).	Australia
Processing	*Subsidy on electricity used by ice plants*: Diesel subsidy – Government provisions of goods and services.	India
Market	*Agri-Marketing Program (formerly known as Canadian Agriculture and Food International)*: The "Agri-Marketing Program" (known as Canadian Agriculture and Food International until 2009) provides support to food producers and processors, including in the fisheries and aquaculture sector. The Agri-Marketing Program aims to promote Canadian products to increase and diversify international markets as well as to seize domestic market opportunities. The programme is administered by Agriculture and Agri-Food Canada (Government of Canada, 2020[63]).	Canada

Sources: Data published by the International Institute for Sustainable Development on support to fisheries in Indonesia (2015-20) and India (2016-19), discussed in Suharsono et al. (2021[64]) and Sharma et al. (2021[65]); *OECD Inventory of Support Measures for Fossil Fuels* discussed in OECD (2021[66]); Australian Trade and Investment Commission (2021[62]); Government of Canada (2020[63]); Philippines Department of Labor and Employment (n.d.[60]); HM Revenue & Customs (2021[61]).

3.5.3. A focus on energy-related non-specific support to fisheries

The OECD Inventory of Support Measures for Fossil Fuels

The only source of comparable and officially recognised data on policies that provide NSSF is the *OECD Inventory of Support Measures for Fossil Fuels* (hereafter, "the Inventory"). This subsection analyses this data set to give a preliminary picture of energy-related NSSF.[33]

The Inventory provides information on energy support policies collected by the OECD for 50 member countries and partner economies (Box 3.4). The metadata included in the Inventory was used to identify the policies that benefit the fisheries sector, in addition to other sectors.[34] A total of 136 policies were found, with at least one policy for most of the OECD countries and emerging economies covered in this report, suggesting that policies providing energy-related NSSF are a common form of support to the fisheries sector.[35]

The Inventory covers a large time horizon. One of the policies identified as providing NSSF is reported to have started in 1928. The vast majority (98%) of such policies were active in some years after 2010; 78% were active over the 2016-18 period; and about 60% were reported to have started from 1991 onwards.[36]

The Inventory contains descriptions of the policies, information on the sectors that benefit and overall associated amounts. In most cases, information on how much the policies benefited individual sectors is not available. As such, the Inventory does not provide information on the magnitude of NSSF, but only signals that some NSSF was provided by a number of policies.

Box 3.4. The *OECD Inventory of Support Measures for Fossil Fuels*

The *OECD Inventory of Support Measures for Fossil Fuels* identifies, measure by measure, how 50 OECD countries and G20 and Eastern Partnership economies provide direct budgetary support or tax concessions to fossil fuels, including end-use electricity support. It documents over 1 300 policies, with quantitative data available from 2010 onwards.

The Inventory covers many of the countries and economies covered in this chapter, including some of the world's largest fishing nations. The only countries and economies covered in this chapter that are not covered in the Inventory are Costa Rica, Malaysia, Peru, the Philippines, Chinese Taipei and Viet Nam.

The data were described and analysed in the *OECD Companion to the Inventory of Support Measures for Fossil Fuels 2021* (2021[66]), which identified and analysed ocean-related fossil fuel support. It found that ocean-related fossil fuel support measures have been put in place by at least 30 countries and economies covered by the Inventory through 119 specific measures. Countries and economies with extensive coastlines and maritime activities were found to have more ocean-related measures. Offshore oil and gas extraction were the main beneficiaries of ocean-related measures. This support was granted both as direct support (such as preferential tax treatment for offshore oil and gas extraction) and as general services support (such as support for offshore research and exploration). In countries with little or no domestic fossil fuel production, ocean support was found to generally consist of preferential tax rates on fuels used in fisheries and aquaculture or support for fossil fuel consumption in maritime transport.

Source: OECD (2021[66]). For more information see: https://www.oecd.org/fossil-fuels and OECD *Inventory of Support Measures for Fossil Fuels* data at: https://stats.oecd.org/Index.aspx?DataSetCode=FFS_INDICATOR_DETAILED%20.

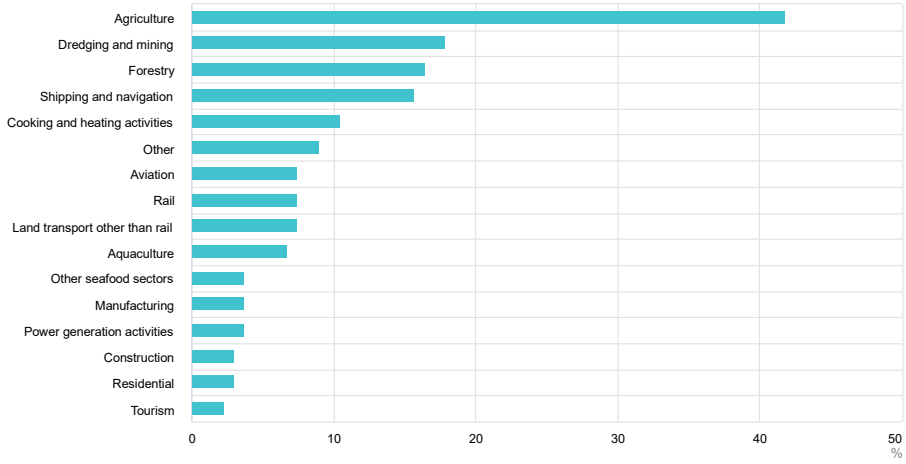
Many sectors benefit from the policies that provide NSSF, with significant variation across benefiting clusters

The Inventory shows that many other sectors benefit from the policies that provide NSSF (Figure 3.20). Agriculture most commonly benefits from these policies. It is followed by dredging, mining and mineral extraction activities; forestry; and shipping and navigation.

To gauge implicit policy intent, benefiting sectors were clustered and those clusters were scanned to identify those that corresponded to plausible implicit policy intent. Three such clusters were detected in the data:

- "Off-road use": 44% of the policies which provided NSSF benefited aviation, rail, forestry, mining and dredging, shipping and navigation, agriculture, aquaculture and/or other seafood sectors (but no other sector).
- "Primary sector production": 12% of these policies benefited agriculture, forestry, aquaculture and/or other seafood sectors (but no other sector).
- "Food production": 7% of these policies benefited agriculture, aquaculture and/or other seafood sectors (but no other sector).

Figure 3.20. Proportion of energy-related policies providing non-specific support to fisheries that benefit other individual sectors



Notes: Where one policy benefits several sectors, in addition to fisheries, it has been counted as benefiting each of those sectors. Total percentages accordingly add up to more than 100%. Each row should be interpreted as the percentage of all policies that benefit one particular sector (potentially in addition to several others).
Source: Author's calculations based on the *OECD Inventory of Support Measures for Fossil Fuels*, https://stats.oecd.org/Index.aspx?DataSetCode=FFS_INDICATOR_DETAILED%20.

Most energy-related non-specific support to fisheries is provided through fuel tax concessions

The majority of the energy-related policies that provided NSSF were tax concessions (89%), such as tax exemptions, rebates, refunds and preferential rates for certain users from taxes that are normally levied by the government in the economy (Table 3.5). The majority of countries and economies included in this chapter (87%) have provided NSSF through at least one tax concession policy.

Policies providing energy-related NSSF overwhelmingly concerned fuel (99%), although some policies were directed at, or covered, electricity. Approximately 10% of these were tax concessions for various taxes with environmental purposes, such as carbon dioxide tax exemptions.

Table 3.5. Use of energy-related non-specific support to fisheries polices, by financial mechanism, where at least one policy was counted

Direct transfer	Tax expenditure
OECD countries	
Australia, Chile, Japan and Latvia	Australia, Belgium, Canada, Chile, Denmark, Estonia, France, Germany, Hungary, Ireland, Italy, Korea, Latvia, Lithuania, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovenia, Spain, Türkiye, the United Kingdom and the United States
Emerging economies	
Brazil and China (People's Republic of)	Argentina

Note: This is based on the full data set, including the 22% of policies that were inactive over 2016-18.
Source: Author's compilation based on the *OECD Inventory of Support Measures for Fossil Fuels,* https://stats.oecd.org/Index.aspx?DataSetCode=FFS_INDICATOR_DETAILED%20.

Evidence suggests that the magnitude of energy-related non-specific support to fisheries can be significant

Some of the countries covered in this chapter publish data on amounts transferred to the fisheries sector through non-specific energy-related policies. These amounts were compared to the total amounts transferred through fisheries-specific policies reported to the FSE database. These data suggest that non-specific energy-related policies can be an important source of support for the sector.

For example, in the Netherlands, the fisheries sector benefited from a non-specific fuel tax exemption, which resulted in support up to four times the value of total FSE between 2009 and 2018 (depending on the year).[37] This fuel tax exemption is designed to offset a nationally applied fuel levy that is one the highest in the world (IEA, 2020[67]) to level the playing field for the fishing fleets fuelling in the Netherlands. All sea-going vessels purchasing fuel in the Netherlands are eligible for this fuel tax exemption regardless of their flag or coastal state.

3.5.4. Conclusion

To date, information on policies that provide NSSF remains difficult to gather. Comparison across countries and time is even more difficult. The only source of comparable information on policies that provide NSSF is the *OECD Inventory of Support Measures for Fossil Fuels,* which describes the policies providing energy-related support used by 50 countries and economies (comprising most of the countries and economies covered in this chapter). This Inventory shows that many of these countries and economies have provided some NSSF through energy-related policies in recent years. However, the Inventory does not contain information on the amounts transferred to the fisheries sector through these policies. It shows that most of the policies providing energy-related NSSF are fuel tax concessions, and agriculture is the sector that benefits from these policies most frequently, in addition to other sectors. The limited evidence available suggests that, in some countries, energy-related NSSF can be significant relative to fisheries-specific support.

Better understanding the effectiveness of public policies in reaching the goals governments set for their fisheries calls for further work describing the nature and magnitude of support granted through non-specific policies, including policies that are not energy-related, and analysis of its impacts on fisheries performance and sustainability, which, similar to specific government support to fisheries, may depend on the nature of the policy, existing management systems and the status of the resource.

Annex 3.A. Additional tables and figures on government support to fisheries

Annex Table 3.A.1. Total support to fisheries in the countries and economies covered in the Fisheries Support Estimate, expressed in relation to different measures of sector size, 2018-20

Relative to fleet size (USD/gt)		Relative to the number of jobs in the sector (USD/fisher)		As a proportion of the value of landings (%)	
Poland	6 905	Sweden	73 204	Poland	519%
Sweden	4 515	Denmark	64 506	Slovenia	209%
Brazil	3 652	Poland	52 735	Sweden	97%
Slovenia	3 571	New Zealand	32 815	Canada	35%
Canada	3 069	Belgium	30 087	Costa Rica	35%
Denmark	1 607	Slovenia	28 189	Türkiye	28%
Japan	1 475	Norway	24 102	Denmark	22%
Australia	1 313	Canada	17 775	United States	19%
Belgium	1 190	Iceland	12 567	New Zealand	18%
Costa Rica	869	Ireland	12 448	Japan	17%
Italy	721	Latvia	11 212	Belgium	17%
Estonia	697	Germany	8 781	Estonia	16%
New Zealand	694	Japan	8 381	Greece	14%
Norway	636	Lithuania	7 668	Ireland	13%
Türkiye	602	United States	6 694	Latvia	13%
Ireland	601	Australia	6 425	China	12%
Colombia	439	Italy	4 387	Italy	11%
Germany	400	United Kingdom	4 290	Norway	11%
China	381	Netherlands	3 674	Germany	9%
Greece	354	Costa Rica	3 077	Lithuania	7%
Korea	350	Estonia	2 888	Australia	6%
Iceland	310	Türkiye	2 779	Korea	5%
Latvia	295	Korea	2 175	Colombia	5%
Mexico	263	Spain	1 626	United Kingdom	4%
United Kingdom	262	Peru	1 305	Iceland	4%
Lithuania	157	Greece	1 251	Chinese Taipei	3%
Portugal	154	Argentina	1 162	Mexico	3%
Argentina	131	Portugal	853	Portugal	2%
Spain	108	Brazil	674	Spain	2%
Chinese Taipei	94	Malaysia	611	Netherlands	2%
Chile	67	China	484	Chile	1%
Netherlands	67	France	377	Argentina	1%
France	29	Chile	346	France	0%
India	n.a.	Mexico	267	Indonesia	0%
Indonesia	n.a.	Chinese Taipei	228	Brazil	n.a.
Malaysia	n.a.	Colombia	86	India	n.a.
Peru	n.a.	India	38	Malaysia	n.a.
Philippines	n.a.	Viet Nam	21	Peru	n.a.
United States	n.a.	Indonesia	10	Philippines	n.a.
Viet Nam	n.a.	Philippines	0	Viet Nam	n.a.

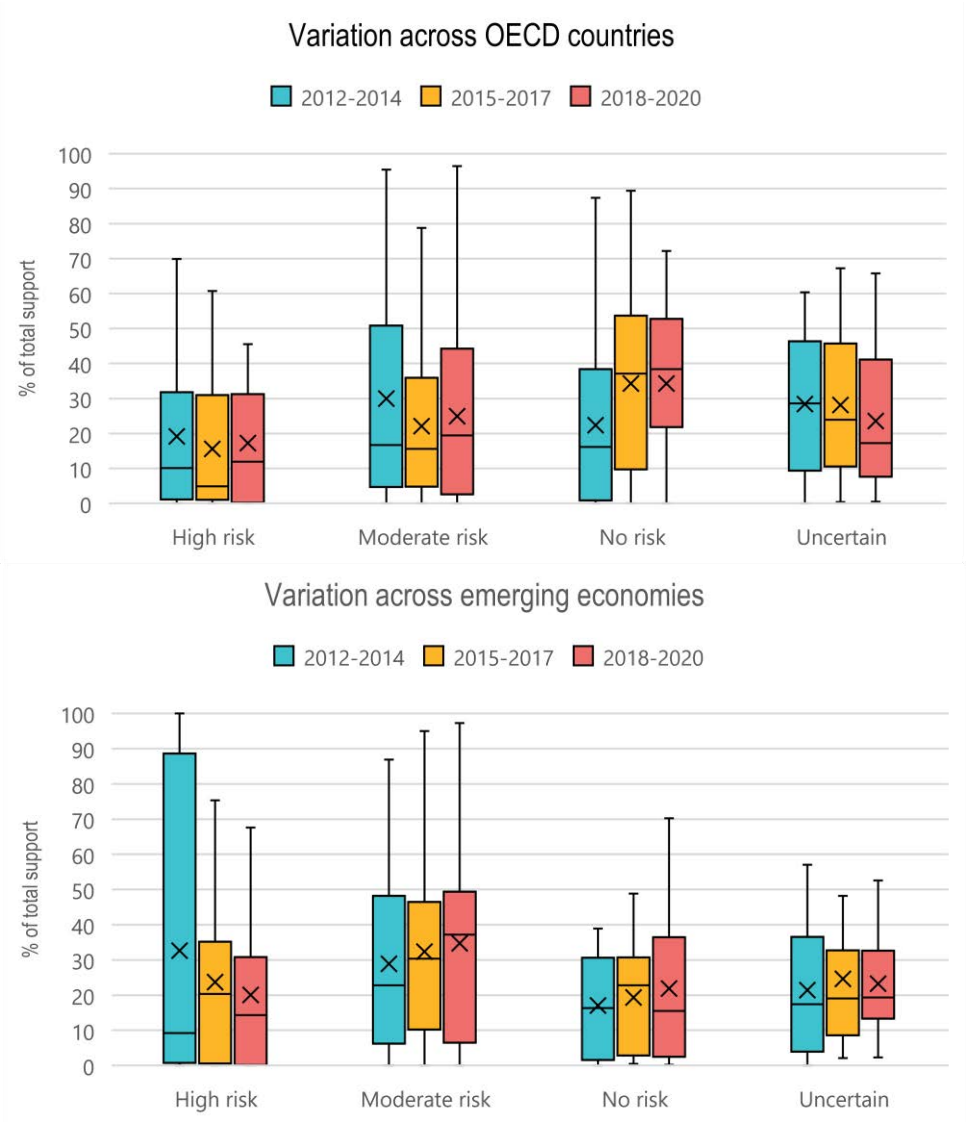
Note: n.a. indicates that the data were not available. Variation in relative total levels of support reflect, to some extent, variation in the comprehensives of reporting to the FSE database. For example, Support to fuel is in many cases non-specific to fisheries, as the same policy sometimes also applies to other sectors such as agriculture. On this basis, several countries and economies reporting to the FSE data set do not include support to fuel in their reporting, which affects the relative total support to inputs.
Source: OECD (2022[3]), Fisheries Support Estimate (FSE), https://stats.oecd.org/Index.aspx?DataSetCode=FISH_FSE.

Annex Table 3.A.2. Share of support for services to the fisheries sector (SSS) funded with public money

Economy	Share of SSS
Iceland	-126%
Netherlands	-22%
Argentina	59%
Australia	66%
Costa Rica	73%
New Zealand	76%
Norway	78%
Brazil	86%
Ireland	88%
Estonia	90%
Canada	95%
Colombia	96%
Denmark	96%
United States	98%
Peru	99%
Philippines	99%
Viet Nam	100%
Malaysia	100%
Indonesia	100%
India	100%
Chinese Taipei	100%
China	100%
United Kingdom	100%
Türkiye	100%
Sweden	100%
Spain	100%
Slovenia	100%
Poland	100%
Mexico	100%
Lithuania	100%
Latvia	100%
Korea	100%
Japan	100%
Italy	100%
Greece	100%
Germany	100%
France	100%
Chile	100%
Belgium	100%
Portugal	n.a.

Note: A negative share indicates that payments made by the fisheries sector (PMS) exceeded government support for services to the sector (SSS).
Source: OECD (2022[3]), Fisheries Support Estimate (FSE), https://stats.oecd.org/Index.aspx?DataSetCode=FISH_FSE.

Annex Figure 3.A.1. Variation in support mix risk profiles at the country level, over the reference periods



Notes: The boxes represent the interquartile range (i.e. the middle half of countries); the horizontal line within boxes represents the median; the cross represents the mean; and the vertical lines extend to the upper and lower limits. A lack of detailed information on policies has resulted in all spending on infrastructure being assigned to the "moderate risk" category and all support to vessels and gear being assigned to the "high-risk" category (see Endnote 51).
Source: OECD (2022[3]), Fisheries Support Estimate (FSE), https://stats.oecd.org/Index.aspx?DataSetCode=FISH_FSE.

StatLink https://stat.link/qj27sl

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Notes

[1] Landings value data were unavailable for Brazil, India, Malaysia, Peru, the Philippines and Viet Nam, so the FSE for these countries was excluded from this calculation.

[2] This is based on a subset of countries, where data on both support and the value of landings were available (Argentina, China, Indonesia and Chinese Taipei).

[3] It is reasonable to consider the EU as a single entity when discussing fisheries support as funding and its allocation are largely determined at the EU level.

[4] Support, catch volume, fleet gross tonnage and employment are, to some extent, all correlated. Large fleets may need more money in absolute terms, but more support can also mean a larger fleet, employment and catches.

[5] Over the whole period, spending on SSS in emerging economies fell by a total of USD 0.17 billion, from USD 0.86 billion in 2012-14. PMS changed little, from USD 0.05 billion in 2012-14. The relative contribution of net SSS to net total FSE across emerging economies also increased, then decreased over the period, but it was higher in 2018-20 (13%) than it was in 2012-14 (10%) as the level of DSI also fell.

[6] Some services will also depend on the size of the exclusive economic zone, as large bodies of waters are more expensive to control; on the diversity of fishing activities; and on various country-specific characteristics, such as the geographical context or governance. In short, it is unlikely that a clear and direct relationship exists between any single factor and the appropriate level of SSS.

[7] This indicator does not include data for some of the emerging countries (Brazil, India, Malaysia, Peru, the Philippines or Viet Nam), as the value of landings was not available.

[8] When considering FSE relative to the value of landings, it should be noted that while some countries have both marine and inland fisheries, only data on the value of marine landings are available. When all countries and economies are accounted for, marine landings represent the vast majority of landings value, so while the indicator is overestimated, it is not anticipated to be substantially so. This will be different at the country level, where employment data suggest that inland fishing is potentially significant in some cases (e.g. in Argentina, Colombia, Estonia, Germany, Lithuania and Poland, where inland employment accounts for over 30% of the total, and in India where it is over 70%) even if the unit values of inland landings are generally relatively low compared to marine landings.

[9] The intensity of spending on net SSS fell between 2012-14 and 2016-18 in the OECD (from USD 618/gt to USD 579/gt) but has increased since, despite a slight reduction in net spending on SSS across the OECD, as the size of the fleet declined more (-4%).

[10] While fleets are typically relatively large and reported spending on SSS relatively low in the emerging economies, data limitations also exist. Information on gt is not available for all the emerging countries and there is uncertainty about how comprehensively spending on services like management, often a significant component of SSS, are reported to the FSE.

[11] While total FSE increased in some of these economies (India, Peru and Chinese Taipei), it was more than offset by larger reductions in others (mainly Brazil, China and Malaysia).

[12] These figures may be conservative estimates of the financial contribution for access to foreign waters granted under the EU Fisheries Partnership Agreements. Indeed, they reflect the "fixed" component of the payments foreseen in the agreements. In some cases, additional payments may have been made when fishing exceeded the reference tonnage, according to conditions specific to each agreement. Data were not available to adjust the amounts accordingly in the FSE database.

[13] This may also be influenced by differences in the capacity to grant budgetary support, which may constrain the total DSI. Differences in purchasing power at the level of different countries or economies may also mean that the relative level of support per dollar is not the same in all cases.

[14] Detrimental impact on global warming can come both through increased GHG emissions resulting from increased fishing effort and detrimental impacts on fish stocks and ocean ecosystems, which affect its climate regulation potential.

[15] To go beyond first-principles analysis of effects, a bio-economic model of the global fishery based on economic theory of production was developed allowing the effects of six common forms of fisheries support on capacity, effort and stock size to be determined under different management conditions (Martini and Innes, 2018[2]). The six main categories of policies that provide direct support to individuals and companies were: 1) payments based on fishers' income; 2) own capita (i.e. return to fishing operations); 3) vessels; 4) variable input use (i.e. gear); 5) fuel; and 6) output (i.e. catch volume). Income effects were quantified by calculating transfer efficiency. Forthcoming OECD work, building upon this, provides additional insights in this area by modelling and assessing the impacts of different support policies from the perspective of trade between regions.

[16] Management measures that aim to constrain caches (e.g. total allowable catch limits), effort (e.g. effort controls) or both (e.g. individual transferable quotas) have recognised differing potential to influence how and the extent to which support manifests in a fishery (OECD, 2006[9]; UNEP, 2004[20]), along with policies addressing more specific issues such as IUU fishing (OECD, 2020[1]).

[17] Investigating the relative effects of common types of direct support policies, Martini and Innes (2018[2]) have demonstrated that all forms of support assessed reduce fish stocks to some extent and reducing support leads to a net decline in effort and an improvement in fish stocks.

[18] It is perhaps worth clarifying that Figure 3.4 is concerned with clarifying differences in the inherent risk (i.e. likelihood) that different policy types present with respect to encouraging unsustainable fishing and the factors that can influence this risk. The size of impact (i.e. the outcome), should unsustainable fishing eventuate, is also influenced by the level of spending on the support in question. As such, the indicated level of risk does not presuppose the magnitude of the potential outcome.

[19] The broadly analogous manner in which both support to variable costs and support to fixed costs can lead to a decline in fish stocks – and for long-term catch to increase if the stock is underfished and to rise if the stock is overfished – has been formally demonstrated in previous OECD work, see Annex 5.A in OECD (2006[9]).

[20] This is the case, for example, of the EU Fisheries Partnership Agreements, , which target the surplus of the total allowable catch of the living resources and include both a financial compensation for access to resources in the EEZ of third countries as well as a financial contribution to promote the sustainable management of fisheries in these countries, for example though the reinforcement of control and surveillance capacities, and support to local fishing communities.

[21] Such "effort creep" is a recognised and persistent issue for fisheries management (see, for example, O'Neill and Leigh (2007[68]) and Palomares and Pauly (2019[69])).

[22] While direct income support does not reduce participation in the fishery, more success can be achieved when funding is explicitly targeted at reducing the number of people dependent on fishing. Under the licence and early retirement components of the Northern Cod Adjustment and Rehabilitation Program and the Atlantic Groundfish Strategy, approximately 35% of groundfish licence holders in Newfoundland and Labrador, Canada, retired their enterprises and left the industry.

[23] Likewise, support classified under "other" (in the FSE or elsewhere) would be allocated here because it contains a mix of policies (in addition to applying to categories that can have different types of impact depending on policy features).

[24] More granular information on the nature of the policies classified in the "uncertain risk" category could, in the future, allow for the allocation of individual programmes to other cells of the matrix.

[25] The FSE indicators do not currently distinguish between support to infrastructure (access) and support to infrastructure (capital), resulting in all spending on infrastructure being assigned to the "moderate risk" category. Distinction also cannot currently be made between support to vessels and gear (capacity enhancing) and support to gear (safety and environmental impact). Evidence, however, suggests that across the whole data set, a large share of this support is probably capacity enhancing (e.g. support to vessel construction in China). Following the risk-based approach taken to analyse support in this section, all support to vessels and gear has been assigned to the "high" risk category. Future revisions of the FSE structure and reporting requirements could allow for these allocations to be refined.

[26] Policies with uncertain risk represented 19% of total support (USD 1.0 billion) in 2018-20, having progressively increased in both absolute and relative terms (3% of FSE, USD 0.3 billion, in 2012-14).

[27] This section draws on a recent OECD paper "Eliminating government support to IUU fishing" (Delpeuch, Migliaccio and Symes, 2022[42]). It summarises the paper's findings, including by reproducing text, with an updated framing in light of the recent WTO Agreement on Fisheries Subsidies.

[28] The WTO Agreement refers to the IPOA-IUU definition of IUU fishing. In their domestic legislation, economies sometimes also use the IPOA-IUU definition, but specific definitions are also often used (see Section 3.4.2).

[29] The international community has recognised the need to eliminate support to IUU fishing and has made it a priority for action for over two decades. For example, the FAO voluntary IPOA-IUU already called on countries to avoid support to IUU fishing in 2001.

[30] As of September 2022, eight countries and economies covered in this report were not party to the PSMA: Argentina, Brazil, China, Colombia, India, Malaysia, Mexico and Chinese Taipei/

[31] Consequently, alternative information sources based predominately on estimations are often being used as a basis for policy discussions.

[32] Open source data sets used to extract policy data for analysis include the *OECD Inventory of Support Measures* (for more information, see Box 3.4) and data published by the International Institute for Sustainable Development on support to fisheries in India and Indonesia. IISD data can be accessed at: https://www.iisd.org/publications/supporting-marine-fisheries-india and https://www.iisd.org/publications/sustainable-marine-fisheries-indonesia.

[33] A small number of additional policies from the FSE reporting process have been included in the NSSF Inventory, where requested by the reporting country or economy or where deemed appropriate.

[34] With a similar method, the OECD Sustainable Ocean Economy data set reports the measures that benefit the ocean economy in a series of indicators on ocean-related fossil-fuel support. See: https://www.oecd.org/ocean/data.

[35] Colombia, Costa Rica, Iceland and Sweden are the only OECD countries covered in this report and in the Inventory for which no measures were identified as providing NSSF.

[36] This is assuming that no end date in the metadata means policies have remained active until 2020. Calculation of polices that started from 1991 onwards includes those where no start date was available in the metadata.

[37] Between 2009 and 2018, the value of the non-specific fuel tax exemption was at least 15 times more than the “direct support to individuals and companies” reported in the FSE database.

OECD Review of Fisheries 2022

The *OECD Review of Fisheries 2022* brings together and analyses data on fisheries management and support policies to inform decision makers and help foster sustainable and resilient fisheries that can provide jobs, food, and livelihoods for future generations. The *Review* assesses the health and productivity of fish stocks and explores how they can be better managed. It updates and analyses the OECD Fisheries Support Estimate (FSE), the most comprehensive and detailed collection of country-level data on governments support to fisheries, covering both subsidies and services to the sector in OECD countries and other major fishing nations. These support measures are categorised according to the risks of encouraging unsustainable fishing they can pose in the absence of effective fisheries management. Lastly, the *Review* suggests policy options to eliminate support to illegal, unreported, and unregulated (IUU) fishing and investigates how to avoid ocean plastic pollution from ghost fishing gear.

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