Supporting Marine Fishing Sustainably:

A review of central and provincial government support for marine fisheries in Indonesia

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Supporting Marine Fishing Sustainably: A review of central and provincial government support for marine fisheries in Indonesia

July 2021

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Executive Summary

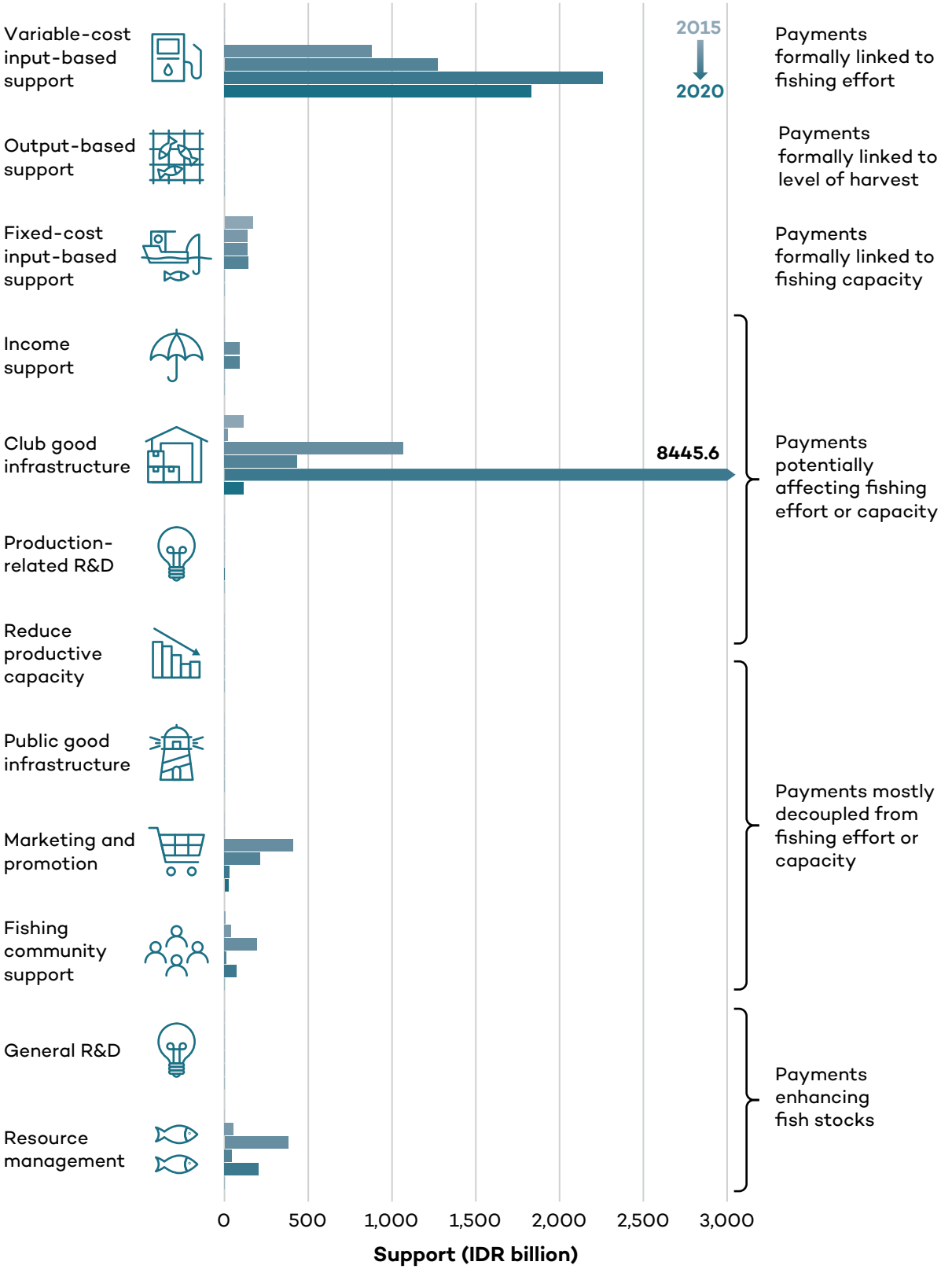
Indonesia's fisheries sector is an important source of nutrition, jobs, and income domestically and plays a key role in the country's ability to achieve sustainable development. Indonesia is also the world's second-largest producing country (after China) when it comes to capture fisheries, accounting for roughly 8% of global marine capture between 2015 and 2018. While Indonesia is still not fully exploiting the huge potential of its marine resources, a number of fish stocks, including some with high economic value, are already suffering from overfishing, and many others are considered to be fully exploited. Sound fisheries policy is thus essential to ensure fisheries can sustainably deliver socio-economic benefits for the Indonesian population.

One key factor in this equation is public support to the fisheries sector. Governmental assistance to fishing communities is a common policy priority in many coastal countries, but not all of this support is delivered in ways that align with the sector's long-term sustainability. While some government interventions can play critical roles in achieving key public policy objectives such as poverty alleviation, job creation, or resource management, there is strong evidence that certain forms of support can also contribute to the buildup of excessive fishing capacity and the depletion of fish stocks by reducing the cost of fishing operations or enhancing revenues. Some measures may also simply be ineffective or inefficient in achieving their desired outcome.

Ensuring that public support to fisheries promotes sustainable development in Indonesia thus requires a review of support measures benefiting the sector and their potential implications from a social, economic, and environmental perspective. However, it is challenging to find a coherent data picture. This report aims to contribute to an informed, evidence-based national discussion on government support for fisheries by developing a database of the support measures provided to marine fisheries by the central government and three provinces: Aceh, Maluku, and North Sulawesi. It also identifies specific support measures that should be prioritized for detailed evaluation in the future.

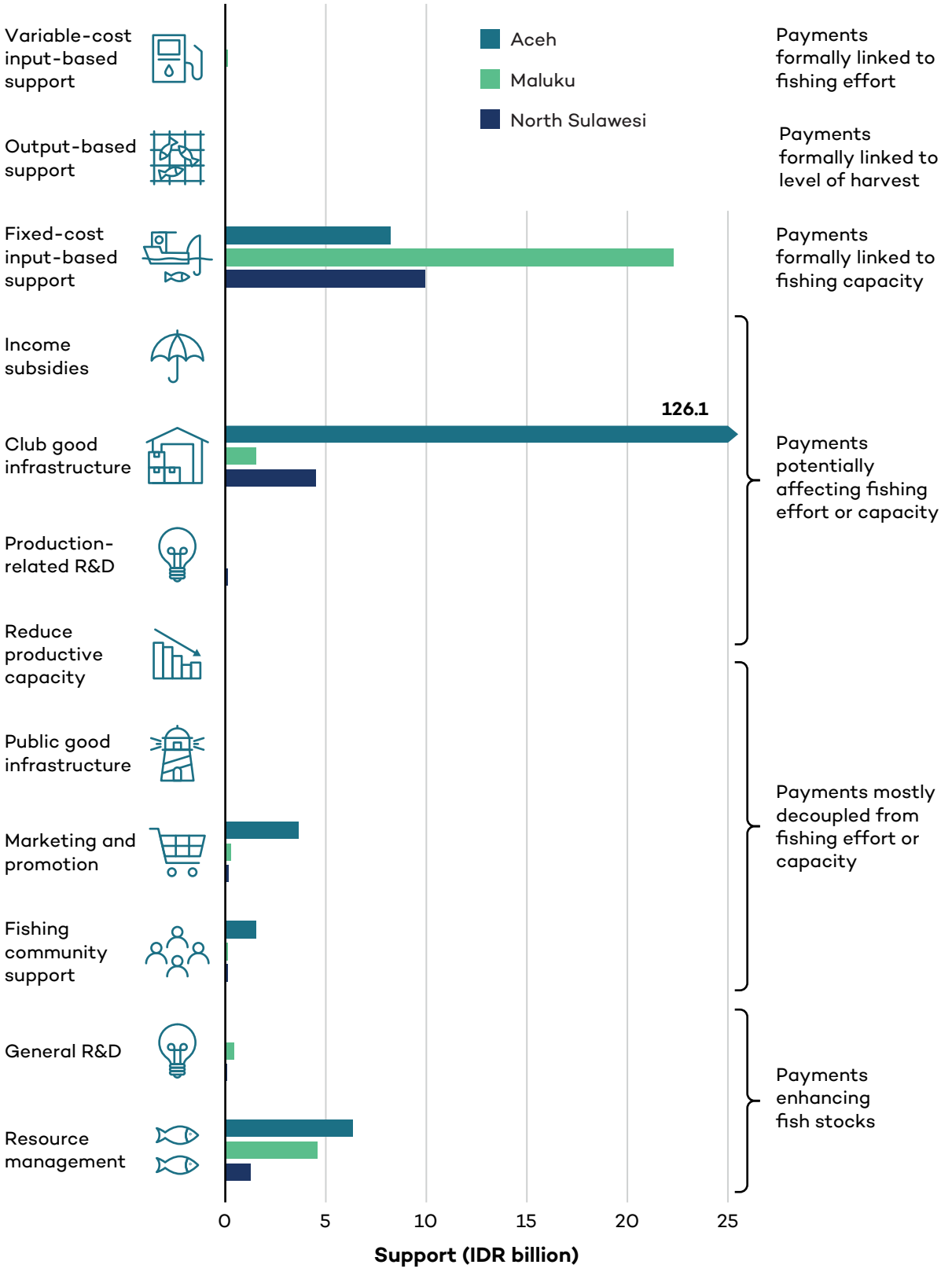
This study finds that supporting the fisheries sector is an important policy objective for both the central and provincial governments. Indonesia's support to fisheries is significant in absolute terms, at around IDR billion 2,067.9 (~USD 144 million) in 2018 up to IDR billion 11,012 (~USD 771 million) in 2019 (see Figure ES1), although it remains relatively limited given the size of the sector, which is worth around IDR 179 trillion (USD 12.5 billion). By comparison, over 2016–2018, the 39 countries reporting government fisheries support data to the Organisation for Economic Co-operation and Development (OECD) provided average annual support of USD 9.4 billion to the fisheries sector. This amount is also much lower than support provided to the agricultural sector, which was worth around USD 29.3 billion in 2019. The central government's support is largely focused on the provision of fuel below the market price and spending for the construction and management of—as well as access—to shared infrastructure facilities. Together, these two categories accounted for roughly 90% of all support between 2017 and 2020, with fuel support alone representing over 50% of total expenses on average. Smaller amounts are also dedicated to vessel construction, income support, marketing and promotion, support to fishing communities, or fisheries management.

Figure ES1. Central-level support to marine fisheries by categories: trends from FY2015 to FY2020 (IDR billion)



Source: Authors'calculations.

Figure ES2. Provincial-level (Aceh, Maluku, North Sulawesi) support to marine fisheries by categories: average FY2016–FY2019 (IDR billion IDR)



Source: Authors' calculations.

By contrast, provincial-level support (see Figure ES2) focused more on vessel acquisition, modernization, and related machinery and equipment. In Maluku and North Sulawesi, this form of support accounted for 60% to 80% of total spending. In Aceh, the situation was quite different, with 80% of support measures going to fisheries-related infrastructure, followed by vessel acquisition. Provincial governments also provided some support for fisheries management, as well as relatively small amounts for marketing and promotion, research and development, and support to fishing communities.

The report used a three-step prioritization framework to identify support measures that would benefit most from a more detailed evaluation of sustainability impacts. This consisted of: (1) categorizing support by the strength of its link to fishing capacity or effort (see Figures ES1 and ES2); (2) within key categories, identifying the most significant support measures; (3) providing contextual information on identified support measures. The report does not attempt to conduct an in-depth analysis of those measures identified as priorities for evaluation, which should be the subject of a subsequent research effort.

Starting with the first step, two support categories stood out as deserving closer attention: support for variable-cost inputs for fishing and support for fixed-cost inputs for fishing. Both are generally considered risky from a socio-economic and environmental perspective because they tend to encourage more fishing, and variable-cost input-based support is also known to be relatively inefficient in improving fishers' income. Following the second and third steps of the prioritization framework, the report identified **five specific support measures that would benefit from an in-depth assessment** of their impacts. These are:

CENTRAL-LEVEL PROGRAMS:

- The distribution of subsidized fuel (kerosene and diesel) through the Fisher Dealer Solar Package (SPDN) and Fishers' Fuel Filling Station (SPBN).

ACEH PROVINCE

- Support for vessel construction provided under the program for procurement of fishing boats.

MALUKU PROVINCE

- Support for vessel construction provided under the program for procurement of small-scale boats below 5 gross tonnage (GT) targeting large pelagic fisheries.
- Support for vessel construction provided under the program for procurement of fishing vessels of 15 GT for small pelagic fisheries.

NORTH SULAWESI

- Support the provision of engines to non-motorized small fishing boats.
- The poverty-eradication program involving transfers of engines, transfer of fishing vessels, fishing gear, and post-harvest equipment.

Recommendations

This report makes the following recommendations:

1. Conduct an in-depth assessment to determine the effectiveness of key fisheries support measures.

Fuel support varied from IDR 877 billion (USD 64.73 million) in 2017 to IDR 2,257 billion (USD 166.59 million) in 2019. The current system of distribution of fuel support is not specifically targeted at small-scale fishers and benefits all vessels below 30 GT. It may encourage excessive levels of fishing for resources that are already fished beyond sustainable levels or approaching that point. This would appear to be a real risk for several fisheries where the support is available, as most fish stocks are—according to government data—fully or overexploited. An in-depth assessment could examine whether the fuel support system could be better targeted, both to fisheries where effort can be safely increased or to small-scale fishers or replaced by alternative forms of support that are more effective in supporting fishers' incomes without increasing fishing capacity at the same time.

Support for vessel construction, modernization, and equipment. While fixed-cost support measures may contribute to poverty reduction and livelihood security, they also tend to increase fishing capacity and could involve some risks when applied to stocks that are already overfished. More specifically, there is evidence that some fixed-cost support measures, which are mostly targeted at pelagic fisheries, are not always aligned with efforts to ensure these valuable fisheries remain sustainable sources of income and food security. Some specific support measures for fishing boat engines appear to warrant further investigation because of their potential negative impacts on the long-term sustainability of the fisheries they target.

Finally, there appears to be uncertainty around the effectiveness and equity of the distribution of some support for fixed costs. As with the fuel support program, an in-depth assessment of these fixed-cost support programs could examine how they could be better targeted to increase productivity as opposed to fishing capacity where this was sustainable, and more generally to assess whether alternative forms of support could be provided that were effective in supporting fishers' incomes without increasing fishing capacity in fully exploited fisheries.

2. Conduct ongoing monitoring of the effectiveness of Indonesia's fisheries support measures.

The in-depth assessments suggested above could be complemented with ongoing monitoring of the effectiveness of Indonesia's fisheries support measures. This monitoring could take a broader perspective than the level of fish production currently used as an indicator of success in evaluating support programs. For example, a broader range of factors relevant to inclusivity and sustainability such as the status of stocks or the degree to which support reaches target groups could be envisaged in this monitoring.

3. Increase transparency on official data.

The in-depth and more general assessments of the measures above would be greatly facilitated by more transparent official data. While some information regarding budget allocation and

realization is available through government publications or dedicated websites in certain provinces, most public data is either incomplete or is highly aggregated.

Fishing is both a cultural and an economic mainstay of Indonesian life. The fact that many of the country's most valuable fish stocks are already fully or overexploited points to the potential vulnerability of the ecology underlying this very important sector—and consequently to the vulnerability of the livelihoods it supports. Detailed and more general assessments of specific fisheries support policies in their contexts, improved transparency of national data on fisheries and the support they enjoy, and a reconsideration of policy evaluation metrics toward assessing the sustainable profitability of the sector will help ensure Indonesia's policies support fishing livelihoods for decades to come.

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Abbreviations and Acronyms

ABK	Fishing Vessels Crew
ASCM	Agreement on Subsidies and Countervailing Measures
Bappeda	Regional Development Planning Agency
Bappenas	Ministry of National Development Planning of the Republic of Indonesia
BKIPM	Fish Quarantine Agency, Quality Control, and Safety of Fishery Products
BKPM	Indonesian Investment Coordinating Board
BPH Migas	Governing Body of Downstream Oil and Gas
BPS	Indonesia Bureau of Statistics
BRSDKP	Research Agency and Human Resources for Marine and Fisheries
DIPA	Budget Expenditure List
DKP	Provincial Marine and Fisheries Department
EEZ	Exclusive Economic Zone
FMA	Fisheries Management Area
GDP	gross domestic product
GT	gross tonnage
IKMKP	Marine and Fisheries Community Welfare Index
IUU	illegal, unreported, and unregulated
KUSUKA	Fisher Identification Card
MMAF	Ministry of Marine Affairs and Fisheries
MPA	Marine Protected Areas
MSC	Marine Stewardship Council
RB	bureaucratic reform
RPJMN	Midterm Development Plan
PUSRISKAN	Fisheries Research Centre
SDGs	Sustainable Development Goals
SPBN	Fishers' Fuel Filling Station
SPDN	Fishers Dealer Solar Package
TAC	total allowable catch
UMK	regency minimum wage
WPPNRI	Indonesia Fishery Management Area
WTO	World Trade Organization

1.0 Introduction

As an important source of nutrition, jobs, and income, the fisheries sector is key for Indonesia's ability to achieve sustainable development. Indonesia is the second-largest producing country when it comes to capture fisheries (after China), accounting for roughly 8% of global marine capture between 2015 and 2018 (Food and Agriculture Organization of the United Nations [FAO] 2020). This growing sector provides livelihoods to roughly 2 million people, represents a critical source of animal protein intake, and generates significant export earnings. While Indonesia is still not fully exploiting the huge potential of its marine resources, several fish stocks, including some with high economic value, are already suffering from overfishing, and many others are considered to be fully exploited. Sound fisheries policy is thus essential to ensure fisheries can sustainably deliver socio-economic benefits for the Indonesian population.

One core theme for the sustainable management of fisheries is the role played by government support. If support is not well designed, it can fail to achieve lasting social benefits efficiently, particularly if it undermines fish stocks upon which livelihoods depend. If it is well designed, support can address market failures and advance critical public policy objectives, promoting better social and economic outcomes while investing in environmental resilience (OECD, 2020).

The importance of ensuring the sustainability of fisheries is well recognized in national and international commitments. Based on the Ministry of Marine Affairs and Fisheries (MMAF) Strategic Plan 2020–2024 (Renstra KKP 2020–2024), the Indonesian government aims to increase the contribution of the fisheries sector toward the national economy while also improving the conservation of marine resources and protecting biodiversity. At an international level, Indonesia has endorsed the United Nations' Sustainable Development Goals (SDGs), including SDG 14, which commits governments to "conserve and sustainably use the oceans, seas, and marine resources for sustainable development." This SDG includes a specific target on subsidies (Target 14.6), which calls for the prohibition of certain forms of fisheries subsidies that contribute to overcapacity and overfishing, and the elimination of subsidies that contribute to illegal, unreported, and unregulated (IUU) fishing.

Ensuring public support to fisheries promotes sustainable development will require a review of support measures benefiting the sector and their potential implications from a social, economic, and environmental perspective. In the absence of publicly available data on the amount and type of support measures provided to the sector, undertaking this review is particularly challenging. This report aims to contribute to an informed, evidence-based national discussion on government support for fisheries by producing an open-access database on support measures provided to the sector. To help keep its scope manageable, it is focused solely on marine fisheries. It is based on a bottom-up collection of support measures—available for download online—covering policies issued by the central government and three provinces: Aceh, Maluku, and North Sulawesi. The report also identifies specific support measures that should be prioritized for detailed evaluation in the future.

The data is all based on official government sources, though in some cases we have quantified the value of policies independently. It takes a broad view across the full value chain and examines all forms of support, including measures such as social protection, infrastructure, and spending to monitor and evaluate marine fisheries. We hope that this improved data transparency will enable more informed multistakeholder discussions on the best role for government support for marine fisheries, taking into account social, economic, and environmental objectives.

The report is structured as follows:

- Chapter 2 summarizes key facts about the context of fisheries in Indonesia.
- Chapter 3 describes this report's scope and methodology.
- Chapter 4 summarizes central and provincial support measures that have been identified.
- Chapter 5 identifies priority measures for evaluation for sustainability impacts.
- Chapter 6 summarizes key findings and provides recommendations on next steps.

2.0 Context

2.1 Indonesian Fisheries Sector Background

Indonesia is an archipelagic country, consisting predominantly of marine waters. Of the 8.3 million km^2 area of the Republic of Indonesia, 6.4 million km^2 are marine areas, including 16,671 large and small islands. Indonesian seas have high biodiversity, hosting an estimated 37% of the world's fish species, including highly valuable species such as tuna, sardines, shrimp, lobster, shellfish, seaweed, and reef fish, including ornamental fish. The fisheries sector is a crucial one for the country's economy and population and has expanded dramatically in recent decades, as reflected in the increasing total catch from marine capture fisheries. After averaging 3.03 and 4.37 million tonnes in the 1990s and 2000s (FAO et al., 2020), respectively, Indonesia's total marine capture production reached 6.98 million tonnes in 2019 (Table 1), a 4.17% increase compared to the previous year (MMAF, 2019). This expansion is a key policy objective of the Indonesian government (see more in Section 2.3).

Table 1. Indonesia's fisheries sector production in 2019

	Fisheries Sector Production (in million tonnes)	
Capture Fisheries	Marine capture	6.98
	Freshwater capture	0.55
	Total	**7.53**
Aquaculture	Fish	6.41
	Seaweed	9.92
	Total	**16.33**
Total Production		**23.86**

Source: MMAF, 2019.

Marine fisheries production has high economic value and is a major source of income in Indonesia. Based on the latest official data from the central statistics bureau (Biro Pusat Statistik [BPS], the main commodities in 2017 for marine-capture fish production in Indonesia were mackerel, skipjack tuna, and shrimp, with a total value of IDR 181 trillion (~USD 12.5 billion)], and the target for 2020 for capture fisheries (both marine and fresh water) was IDR 231 trillion (MMAF, 2019). Overall, the contribution to GDP of the fisheries sector, including capture fisheries and aquaculture, has increased steadily since 2015 to reach 2.65% in 2019 (MMAF, 2019)

2.1.1 Jobs and Communities

Fishing employs a significant proportion of Indonesia's population, particularly on the smaller islands of its archipelago. The number of fishers recorded in the Satu Data database (MMAF, 2021) as of March 22, 2020, was 1,459,874 people, or about 1.2% of the total population (BPS, 2020). Identification of the active fishing population is becoming more precise. A total of 719,309 fishers already have Marine and Fisheries Business Actor Cards (Kusuka-Kartu Pelaku Usaha Kelautan dan Perikanan), which is used as an official identification card for fishers.

The majority of Indonesian fishers are small scale, with vessels under 10 GT. In total, there are 768,972 boats in the fishing fleet, of which only approximately 36% are motorized, while the rest of the boats either use portable engines or are motorless (BPS, 2020). Fishers are the primary occupants of coastal village settlements—which are generally low-income communities—and often live in crowded and poor conditions (Badan Pusat Statistik, 2019).

2.1.2 Fisheries' Contribution to Food Security

The fisheries sector in Indonesia plays an important role in national food security. As an archipelagic nation with ample access to marine resources, Indonesia relies on fishery products as a substantial source of animal protein domestically. On average, fish-derived animal protein accounts for 52.68% of the animal-sourced protein consumed by the Indonesian population, ranking Indonesia in the top 10 of the most fish-dependent nations in the world (Bennett et al., 2018). Per capita domestic fish consumption grew from 38.1 kg in 2014 to 47.3 kg in 2017 (Badan Koordinasi Penanaman Modal [BKPM], 2018), which is very high compared to international per capita consumption of 20.5 kg in 2018 (FAO et al., 2020).

2.1.3 Export Earnings From Fisheries Products

Indonesia is among the world's largest exporters of fish products, consistently accounting for over 3% of world exports in the last 5 years. The export value of fishery products for 2019 reached USD 4.94 billion. This is a 1.56% increase in export value compared to 2018, and overall, the export value of fishery products has increased 5.76% over the last 5 years (MMAF, 2019). The government aims at further increasing such exports.

According to the head of the Fish Quarantine Agency, Quality Control and Safety of Fishery Products (BKIPM), the main markets for export are the United States, followed by China, Japan, Malaysia, Chinese Taipei, Thailand, Singapore, Vietnam, Italy, and Hong Kong (Badan Karantina Ikan, Pengendali Mutu dan Keamanan Hasil Perikanan, 2020). Looking at the main fishery export commodities, shrimp is the main contributor, with a share of 34.83% of the total export value (MMAF, 2019). The second most important fishery commodity is tuna, with Indonesia primarily producing the skipjack and yellowfin varieties. Squid and octopus are the third most exported group of species (MMAF, 2019); see Table 2.

Table 2. Export volume and value of fisheries products by major commodities in 2019

Commodities	Volume (Kg)	%	Value (USD)	%
Squid-Octopus	143,847,343.07	12.15	556,290,650.98	11.27
Crab	25,942,911.49	2.19	393,497,773,68	7.97
Seaweed	209,241,303.11	17.67	324,849,979.30	6.58
Tuna-Mackerel-Skipjack	184,130,234.06	15.55	747,538,121.98	15.14
Shrimp	207,704,831,41	17.54	1,719,197,167.57	64.83
Others	413,329,067.04	34.90	1,194,591,107.98	24.20
Total	**1,184,195,690.17**		**4,935,964,801.49**	

Source: MMAF, 2019.

2.2 State of Indonesia's Marine Fisheries

The Indonesian government has estimated that the sustainable overall potential of marine fish resources is 12.54 million tonnes per year, including both Indonesia's territorial waters and its Exclusive Economic Zone (EEZ). The total allowable catch of all potential fish resources is 10.03 million tonnes per year, or about 80% of the sustainable potential. In 2019, marine capture production amounted to 6.98 million, or around 69% of total allowable catch (MMAF, 2019)

While overall it appears that not all of the total allowable catch was exploited in 2019, several stocks are already suffering from overfishing, and many others are considered to be fully exploited. Table 3 shows the level of fish resource utilization obtained from the Decree of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia No. 50/Kepmen-KP/2017 concerning *Potential Estimation, Number of Allowed Catches and Utilization Level of Fish Resources in the Fisheries Management Area of the Republic of Indonesia* (WPPNRI). Utilization is classified into three levels: moderate (E≤0.5), when catch can increase; fully-exploited (0.5 <E <1.0) meaning catch can be maintained with careful monitoring; and overexploited (E≥1,0), when catch must be reduced.

Table 3. The level of utilization of fish resources according to the WPPNRI

	WPPNRI										
	571	**572**	**573**	**711**	**712**	**713**	**714**	**715**	**716**	**717**	**718**
Small pelagic	0.83	0.50	1.50	1.41	0.38	1.23	0.44	0.88	0.48	0.7	0.51
Large pelagic	0.52	0.95	1.06	0.93	0.63	1.13	0.78	0.97	0.63	1.00	0.99
Demersal	0.33	0.57	0.39	0.61	0.83	0.96	0.58	0.22	0.45	0.39	0.67
Reef fish	0.34	0.33	1.09	1.53	1.22	1.27	0.76	0.34	1.45	0.91	1.07
Shrimp	1.59	1.53	1.70	0.53	1.11	0.52	0.39	0.78	0.50	0.46	0.86
Lobster	1.30	0.93	0.61	0.54	1.36	1.40	1.73	1.32	0.75	1.04	0.97
Mud crab	1.00	0.18	0.28	1.09	0.70	0.83	1.55	1.19	0.38	0.87	0.85
Swim crab (Rajungan)	0.93	0.62	0.98	1.18	0.65	0.73	0.77	0.98	0.50	1.21	0.77
Squid	0.62	0.39	1.11	1.84	2.02	1.19	1.00	1.86	1.42	1.09	1.28

White moderate (E≤0.5) Yellow fully-exploited (0.5 <E <1.0) Red overexploited (E≥1,0)

Source: MMAF, 2017a.

At present, most of the marine fish resources in the 11 WPP-NRIs (national fisheries areas) have been fully or even excessively utilized. A number of reports, many conducted by the Indonesian government, point to how much more value marine fisheries could provide to Indonesia if management were more effective, and overfished stocks were allowed to recover. (Ariansyach 2017) A study by the World Bank noted that improvements to Indonesia's fisheries management would add value of up to USD 3.3 billion per year within 10 years. Better fisheries management can also simultaneously address some of the factors contributing to overfishing in Indonesia, which are data deficiencies and lack of coordination among agencies (Thomas, 2019).

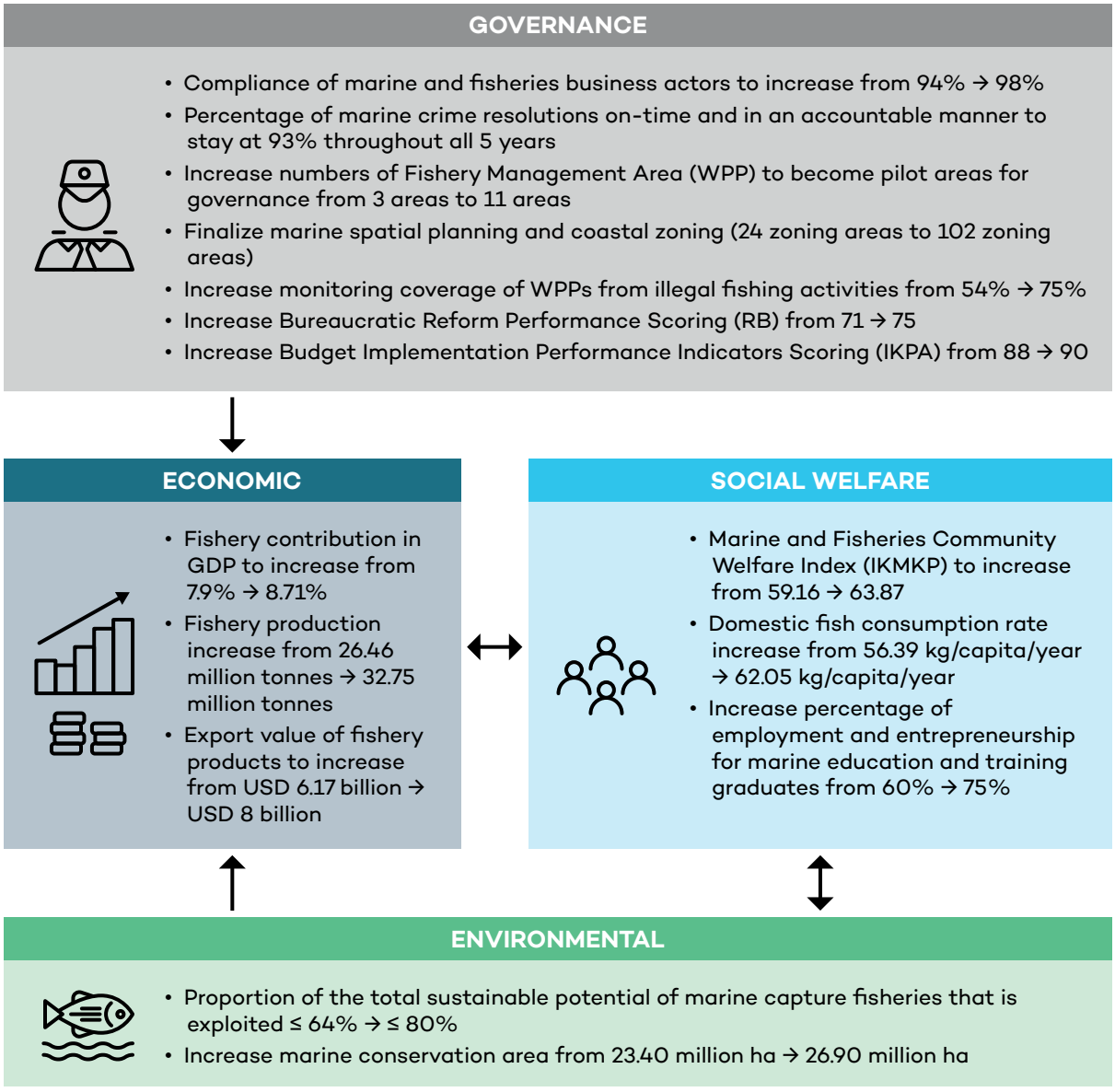
Another challenge to the sustainability of fisheries in Indonesia is IUU fishing, which includes various types of fishing practices that occur in breach of fishing regulations. Since 2015, however, the Indonesian government has been focusing on combating IUU fishing. According to the MMAF annual report, efforts to regulate IUU fishing have resulted in improvements in the status of certain stocks. For example, in order to apply for government assistance such as insurance and fuel subsidies, the beneficiaries must be registered fishers/cooperative fishers and must provide letters of compliance with government regulations such as Proof of Ship Registration, Certificate of Acceptable Operation, Sailing Approval letter etc. (MMAF, 2017b; Republic of Indonesia, 2019). By ensuring that only legal fishers can receive government support, these rules can help reduce incentives to engage in IUU fishing. However, current regulations do not yet require recipients of government support to be engaged in sustainable fishing activities.

2.3 Indonesia's Objectives in the Fisheries Sector

MMAF cited four main objectives for its 2020–2024 strategic plan:

1. Improving the capacity and competence level of the human resources within the maritime and fisheries sector, as well as strengthening innovation and research and development (R&D).
2. Increasing the contribution of the maritime and fisheries sector to the national economy.
3. Improving the conservation and biodiversity of marine and fisheries resources.
4. Improving good corporate governance within the MMAF.

Figure 1. Major policy objectives relevant to marine fisheries in Indonesia 2020–2024



Source: MMAF, 2020.

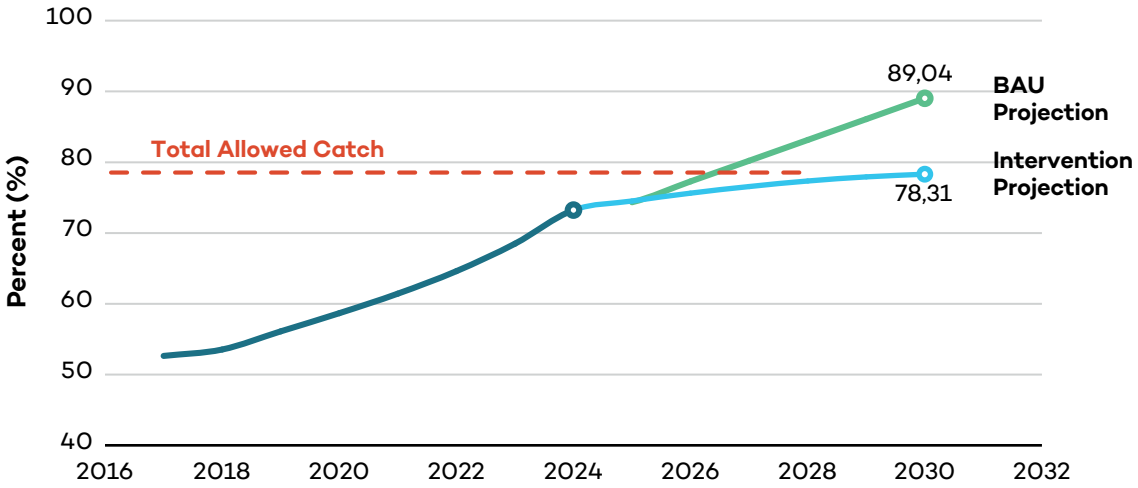
Figure 1 shows MMAF's specific objectives for the fisheries sector for 2020–2024, including both aquaculture and capture fisheries, sorted by broad thematic category. These include a number of objectives regarding various aspects of fisheries governance, as well as key economic objectives, such as increases of the sector's share of total GDP, the sector's total production, and exports of fishery products. Since aquaculture production accounts for more than twice that of capture fisheries, a large part of the economic objective might be attributable to the contribution of the aquaculture sector. The need for the fisheries sector to support important social objectives, such as better nutrition and improved welfare in fishing communities, is also clearly recognized. Another objective is for Indonesian fleets to catch 80% of the sustainable potential of the country's marine fisheries resources, which is the level of the overall total allowable catch. There is, however, no specific objective aimed at preventing overfishing or supporting the recovery of fish stocks that are currently overexploited.

Based on Indonesia's Midterm Development Plan 2020–2024 (RPJMN 2020-2024) (Bappenas, 2020), the main strategy to achieve these objectives focuses mainly on the improvement of marine fisheries and maritime management and governance. Additional strategies cited include improving stock data and marine conservation area management, exploring capture fisheries in the EEZ, development of eco-fishing ports, as well as improving the ease of business, investment, and insurance facilitation for fishers.

Internationally, Indonesia is committed to achieving SDG 14 on conservation and sustainable use of the oceans, seas, and marine resources for sustainable development. This commitment is reflected in two national regulations: Presidential Regulations No 59/2017 on the implementation of SDGs, and Bappenas Regulation No 7/2018 on the coordination, evaluation, and reporting of SDGs. Out of SDG 14's seven sub-goals, Indonesia has officially prioritized focus on SDG 14.4 on sustainable harvesting and SDG 14.5 on Marine Protected Areas (MPA) harvesting (Ahmad, 2020).

Figure 2 shows the expected evolution of marine capture fisheries production as a percentage of the total potential that can be caught within biologically sustainable levels up to 2030. In a business-as-usual scenario, without intervention in the management of marine and fisheries resources, total catch is expected to exceed the total allowable catch (TAC)—which is established at 80% of the total sustainable potential of marine capture fisheries—by 9.04% in 2030 (green line). With intervention focusing on improving fisheries management, total catch is expected to remain below the TAC by 2030 (blue line). It is, however, important to note that these numbers only reflect total capture as compared to the aggregated sustainable potential and TAC for all fisheries. Even in a situation where total capture does not exceed this overall TAC, specific stocks may be overexploited, which seems to currently be the case according to the latest government data.

Figure 2. Capture fisheries production as a percentage of the total potential that can be caught within biologically sustainable levels



Source: Ahmad, 2020.

Finally, Indonesia actively participates in current WTO negotiations to prohibit certain forms of fisheries subsidies that contribute to overcapacity and overfishing, and eliminate subsidies that contribute to IUU fishing, while also working together with Regional Fisheries Management Organizations (RFMOs) on the management of highly migratory species (Ahmad, 2020).

Box 1. How have Indonesian authorities supported fisheries during COVID-19?

Indonesia is currently implementing an emergency response to the COVID-19 pandemic, including for the maritime affairs and fisheries sector. The MMAF has proposed a IDR 1.02 trillion (USD 69 million) stimulus package to aid small-scale fishers and the aquaculture sector in response to the COVID-19 pandemic.[1] Some of the countermeasure programs include the provision of disinfectant stations at central and pioneer ports, health checks for fishers and fishing vessels, as well as programs to increase awareness of the fishers in all fishing ports in Indonesia. At the provincial level several measures have also been put in place. For example, Maluku province supports providing fish feed to aquaculture businesses and free fish for community consumption and connects small-scale fish processing to the online marketplace via an online application. In addition to this, the DKP Maluku distributed 9.7 tonnes of free fuel (premium and petalite) and 708 litres (L) of machine-oil (lubricants) for boats for 59 fisher groups in Ambon and Maluku Tengah using its COVID budget. The estimated total value is around IDR 90 million. In North Sulawesi, the government, through DKP (Dinas Kelautan dan Perikanan/Provincial Marine and Fisheries Department), had two programs supporting the fishing community due to the COVID-19 crisis. The first program specifically provides for fishers with a vessel size below 5 GT. Government gave

[1] See https://www.thejakartapost.com/news/2020/05/28/ministry-proposes-69m-stimulus-for-fisheries-aquaculture.html

a voucher for 50 litres of fuel to these fishers so that they could pay for fuel in any fuel station. DKP allocated 75,000 litres of fuel or equivalent subsidy to 1,500 recipients who were selected by coordination between the DKP and local agencies. The recipient must be registered in a local government database as a fisher, which was verified by ownership of fisher identity cards. The second support is provided to the post-harvest sector. The DKP distributed 434 units of cool boxes to the fishmongers and collectors in order to improve the cool chain implementation.

3.0 Methodological Approach

3.1 Why Is Assessing Fisheries Support Measures Important?

Governments spend significant amounts of money to support their fisheries communities, but not all of this money is delivered in ways that support the long-term sustainability of the sector. While some government interventions in the fisheries sector can play a critical role in achieving key public policy objectives such as poverty alleviation, job creation, or resource management, there is strong evidence that certain forms of support can also contribute to the buildup of excessive fishing capacity and the depletion of fish stocks, by reducing the cost of fishing operations or enhancing revenues (OECD, 2020). Global support to the fishing industry was recently estimated at USD 35.4 billion in 2018, of which around USD 22.2 billion was provided in forms that enhance fishing capacity (Sumaila et al., 2019).

The methodology in this report draws from both economic theory and evidence of support measures in their actual contexts to identify and prioritize any measures that would benefit from further analysis in terms of their socio-economic and environmental impact. Appendix 2 sets out the economic theory and modelling that underpin our approach to this analysis of support measures. Generally, economic theory suggests that support measures that reduce the cost of fishing or increase revenues from fishing operations tend to have a more direct impact on fishing effort and thus on the sustainability of stocks than support that is more decoupled from production, such as management services, R&D, education, or infrastructure. Importantly, however, understanding the impact of specific support measures in the real world does not depend only on the types of incentives they create. It also relies on context-specific variables such as existing fishing capacity or management regimes.

This section explains the analytical process we used to identify support measures and to prioritize them for further analysis, considering both the lessons from economic theory and the evidence available about the real-world context in which the measures are implemented.

3.2 Scope

This report covers support received directly or indirectly by fishers, either individually or collectively, including post-harvest activities such as storage, retail, processing, and marketing. It focuses on marine capture and excludes aquaculture and inland fishing. We track support measures based on a broad interpretation of the term "subsidy" as defined by the Agreement on Subsidies and Countervailing Measures (ASCM) of the WTO. This definition covers any financial contribution—or any form of income or price support—by a government or public body within the territory of a member that confers a benefit. We aimed to capture all types of support measures, including social protection targeted at fishers, spending on infrastructure used by fishers, and the costs of management of fisheries.

We collected data —which can be downloaded in Excel—on support measures from the central level and, due to resource constraints, three provinces: Aceh, Maluku, and North

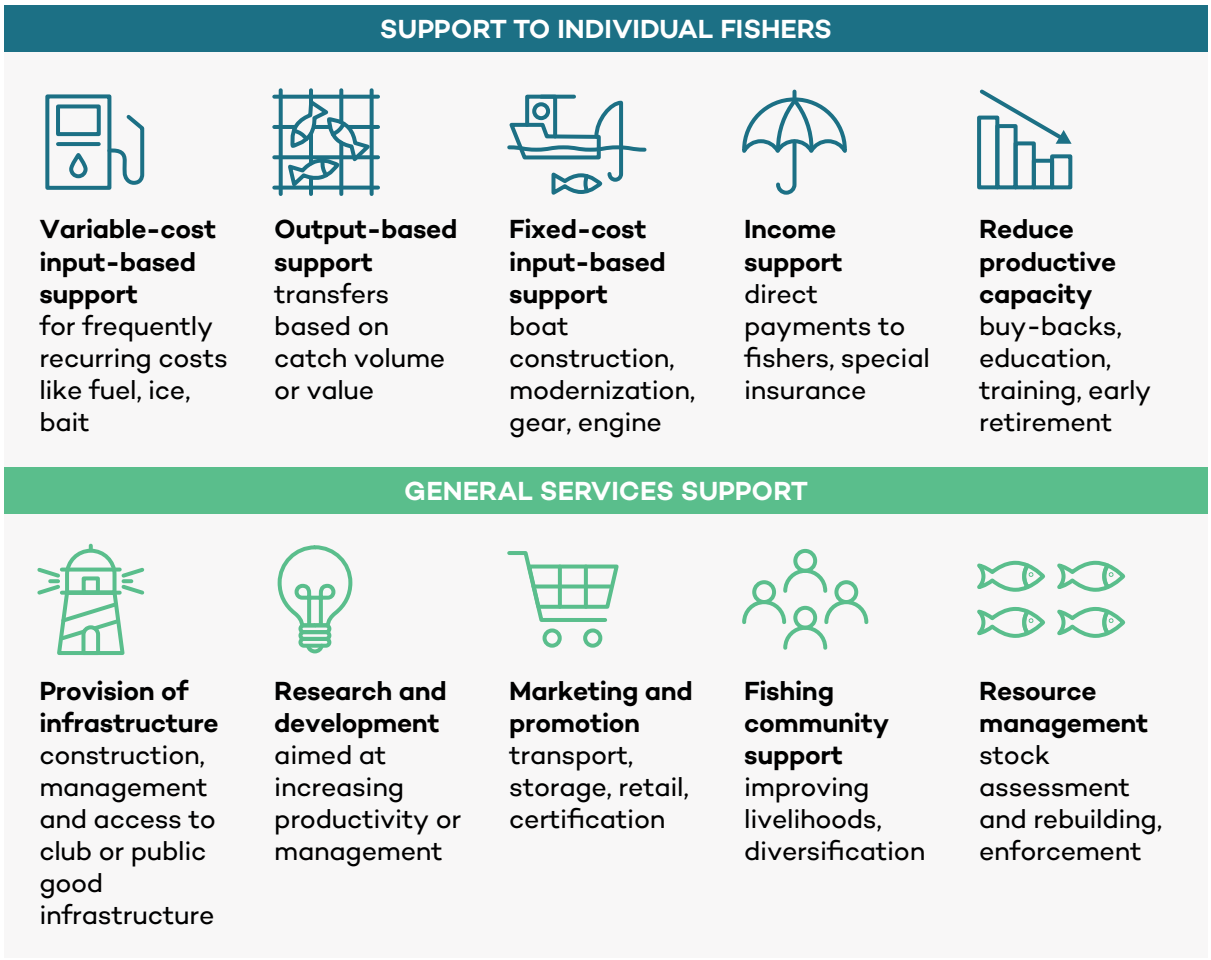
Sulawesi. We chose these three provinces because they included a range of large and small-scale fishing activities covering a wide range of species (including very valuable resources like tuna) and across different geographies. This economic, environmental, and geographic diversity provided a useful range of contexts against which to discuss the possible impact of similar kinds of support measures (e.g., support for fuel).

The data that the project was able to collect for Aceh and Maluku refers to actual expenditures, while for North Sulawesi the only available figures were based on budgeted amounts. Central-level data was taken from an early version of actual expenditures (DIPA/ Daftar Isian Pelaksanaan Anggaran). Where possible, figures were drawn from official sources, such as fisheries ministries' budget documents, policy notes, annual reports, WTO notifications, and other governmental sources, including interviews with officials. Where no official estimates were available, various methods have been used to quantify support, based on standards proposed in the literature (Lang & Wooders, 2010). Full details on the approach are provided in Appendix 1.

3.3 Classification

Our database classifies support measures according to various criteria. A first distinction relates to the mechanisms through which support is provided: (i) direct transfers or potential direct transfers of funds or liabilities; (ii) government revenue foregone; (iii) government provision and purchase; and (iv) income or price support. Second, we classify support policies according to the type of support or the conditions under which support is provided. Such classification allows us to determine how a transfer may affect the behaviour of fishers and gives a first indication of the likely impact of different programs. Building on the classification developed by the OECD (2016), we distinguish between support to individual fishers and general services support targeting the sector as whole. Figure 3 provides an overview of the main categories identified under each group.

Figure 3. Classification of fisheries support measures based on type of support



Source: Authors' diagram.

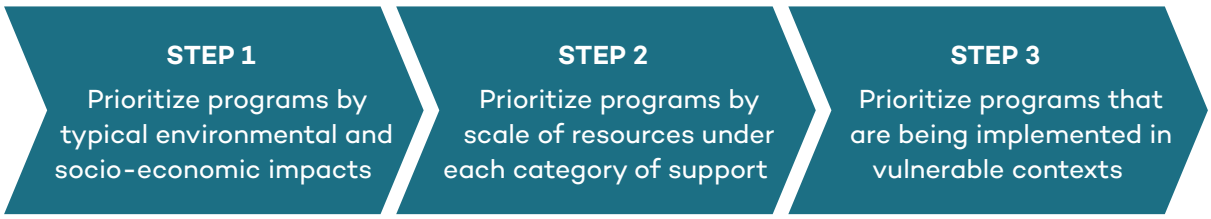
Finally, the classification is complemented by a series of labels providing information on the potential impact of a program, including the extent to which a measure is contingent on production, restrictions to specific species, gears, areas, vessel length, or the type of fishing being supported (e.g., small-scale artisanal vs. industrial fishing). The labels are also used to identify the main beneficiaries of a particular program (e.g., fishers, vessel owners, post-harvest actors). For more details on the methodology, see Appendix 1.

3.4 Prioritization Framework

A database of support measures is only helpful if there is some way to draw meaning from the data and to determine whether support is flowing in the right direction, taking into account national objectives and desired outcomes. This report explores this question using a three-step prioritization framework (further described in Appendix 1). The purpose of this framework is not to decide which policies are good or bad. Rather, it is a tool to help sort through the large number of support measures and identify the ones that are most in need of evaluation, so their impact can be confidently determined and appropriate actions—including possible reform—

can be taken if necessary. Overall, the approach is designed as a three-step filtering exercise to be applied sequentially (see Figure 4).

Figure 4. Three-step prioritization framework of fisheries support measures

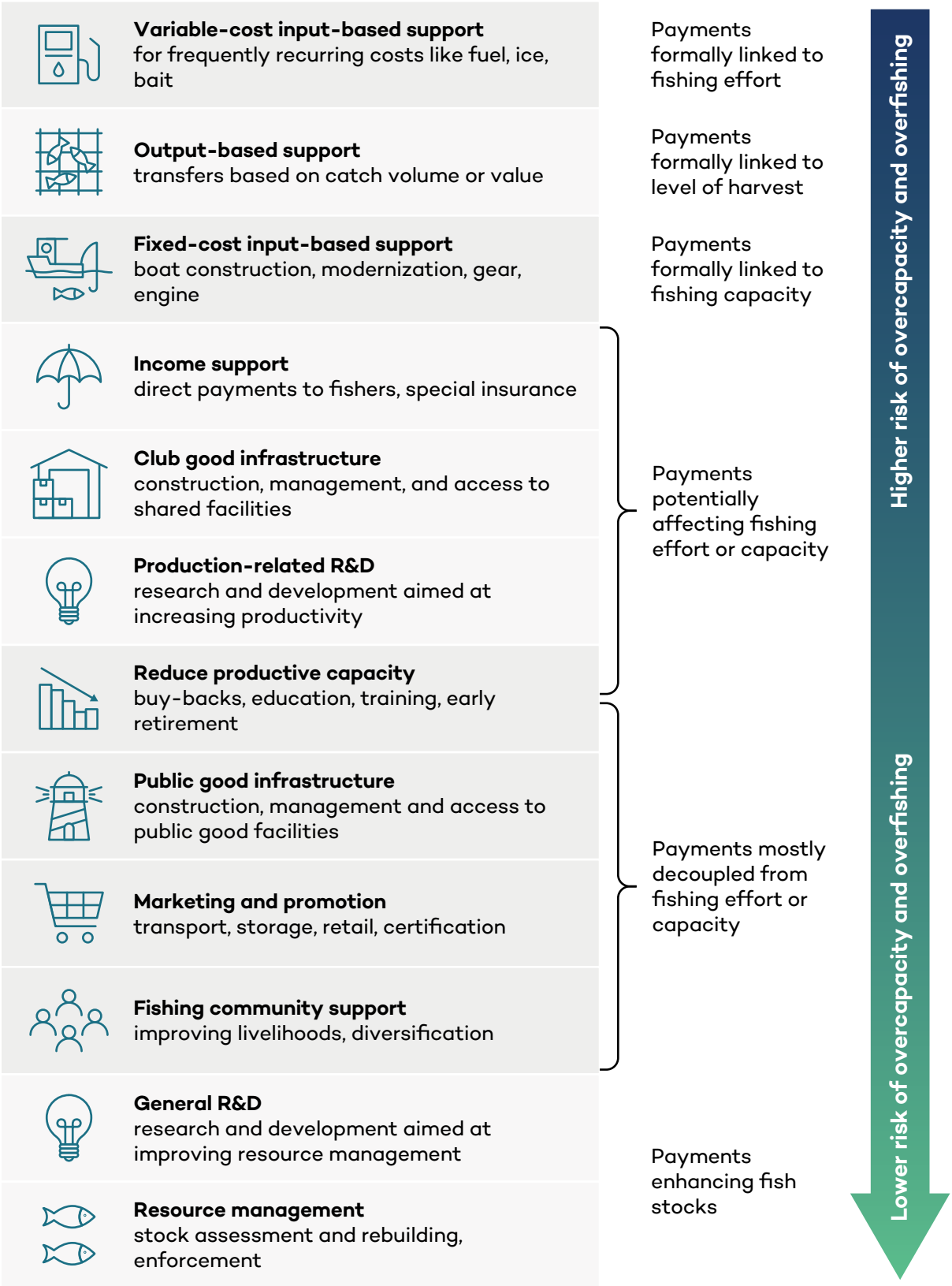


Source: Authors' diagram.

The first step consists of establishing a short list of support categories of subsidies that are the highest priorities for evaluation. This requires sorting support measures by type of support and organizing those categories according to the incentives they create and the environmental and socio-economic impacts that are typically associated with them in the literature.

Figure 5 summarizes the different categories that are used for sorting support measures under the first step. Categories on the left are those that economic theory suggests most directly influence fishing pressure and are associated with the highest risk of adverse environmental and socio-economic impacts due to overcapacity and overfishing. They include support measures targeting individual fishers, such as support that lowers the price of fuel or of buying a new fishing vessel: these are more likely to alter the marginal benefits or costs of fishing than support targeting the sector as a whole. Similarly, programs that are linked to production, including some general services categories like support to R&D to increase fish production or fisheries-related infrastructure, are more likely to incentivize overcapacity and overfishing than those clearly decoupled from production. To the right are categories that economic theory suggests are associated with the least risk. This includes programs that are formally decoupled from production but may have an impact on production, such as marketing and promotion of fish products or support for fishing communities, to programs that have no effect on production or even contribute to enhancing the well-being of stocks, in particular services provided to assess and sustainably manage marine resources.

Figure 5. Prioritizing support by link to fishing effort and capacity and risk for unintended environmental and socio-economic impacts



Source: Authors' diagram.

The second and third steps in the analytical process focus on the real-world context of the various support measures, as a way to prioritize specific measures for deeper analysis.

The second step is that, within the shortlisted categories, we look at the different programs, and sort them by scale of support, on the basis that the amount of support provided will naturally have a bearing on its impact in a fishery. This requires a degree of expert judgment to take into account the ways in which different support measures may naturally be smaller or larger in volume, and how scale relates to likely impact. For example, support for finance is typically smaller than subsidies for direct consumption of fuel but may be just as impactful if it enables the purchase of long-lived fishing vessels. This results in a refined shortlist, consisting of specific support measures.

The third and final step is that data is gathered to understand whether any of the measures on the shortlist appear to be implemented in vulnerable contexts, in particular where the sustainability of the stocks on which the fishery depends appears to be weak. This reflects the views highlighted above that the impact of support for fisheries is highly context-dependent: a measure that is concerning in one location might be less problematic in another. As a result, policy evaluation and potential policy reforms may be most urgent in areas where overfishing is already a problem, and arguably less urgent when support plays a critical role in helping vulnerable segments of the sector. This results in a final list of specific support measures that we recommend should be examined through dedicated evaluations.

4.0 Key Findings: Support to marine capture fishing in Indonesia

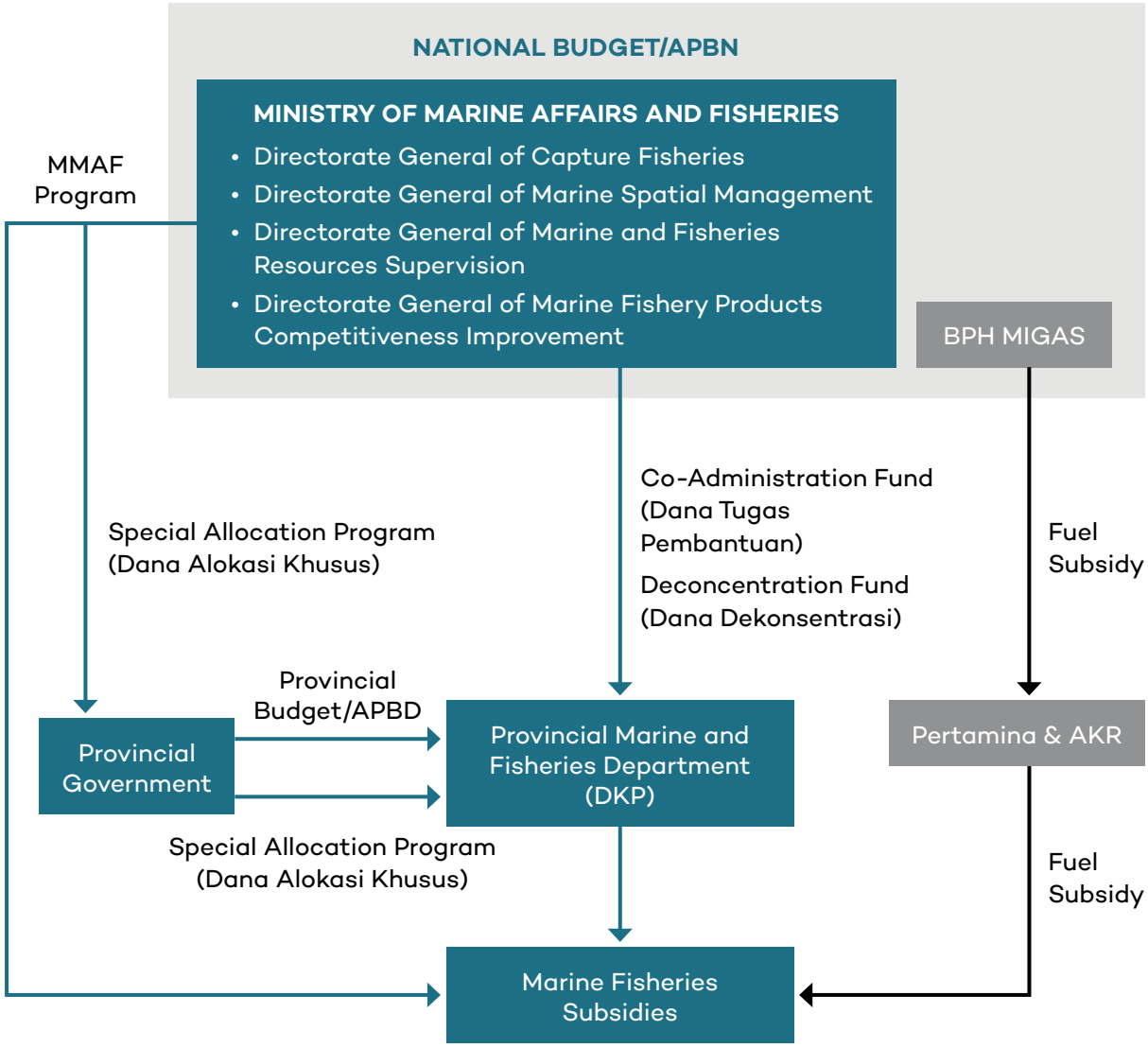
This section provides an overview of the main support measures identified as part of this study. It starts with programs provided by the central government before looking at the three provinces covered under the analysis, namely Aceh, Maluku, and North Sulawesi. The analysis provides a general picture of all the support measures identified. To help readers make sense of the data and to prepare the ground for the application of the prioritization framework in Section 5, programs are classified by type of support, and categories are ordered according to the type of incentives they create and the environmental and socio-economic impacts that are typically associated with them—as described in Figure 4 under the first step of the prioritization framework. Section Five then proceeds with the application of the three steps of the prioritization framework.

The approach taken by this study—looking at both central and provincial support measures—is an important one because it captures the ways in which support for marine fisheries is provided by both provincial and central governments. Figure 6 offers a schematic view of the flow of support measures.

All central-level support measures are distributed through MMAF throughout the four corresponding directorate generals. The study also tried to gather input from the research bodies Research Agency and Human Resources for Marine and Fisheries (BRSDKP) and Fisheries Research Center (Pusriskan) but did not manage to collect information regarding the research programs and to quantify support provided in this area. Therefore, some R&D programs are not included in the inventory.

The central-level support is funded by the national budget (APBN) in the form of a Special Allocation Fund, Deconcentration Fund, and Co-Administration Fund. These funds are distributed through the provincial DKP. The Special Allocation Fund is distributed to the DKP through the APBD (Provincial Budget) mechanism. Support measures for national-level special programs are distributed and managed directly by the MMAF. Provincial fuel support demands are determined in coordination by MMAF and provincial DKP and submitted to BPH Migas (Governing Body for Downstream Oil and Gas). The final provincial fuel allocations are made BPH Migas, and the direct distribution to fishers is done by the appointed distributors (Pertamina and AKR). Provincial governments also have their own support schemes, funded by their own budgets, which are implemented by the provincial DKP.

Figure 6. Flow of government support for marine fisheries in Indonesia



Source: Authors' diagram.

Box 2. Transparency and data availability

For both central-level and provincial data, data on support programs was made available upon request despite the difficult circumstances related to the COVID-19 pandemic. Certain routine administrative permits had to be applied at the start of the research, and although there were some delays mainly attributable to the pandemic situation, the information flow has been ongoing and operational.

However, most of the information is not publicly available, and although some reports and budgets are available online, some datasets are not uploaded completely. As a result, there was a need to look for alternative sources of data through both interviews with officials or other unpublished documents. Transparency could thus be improved at both the central and provincial level by making information on support measures publicly available and data could also be more disaggregated.

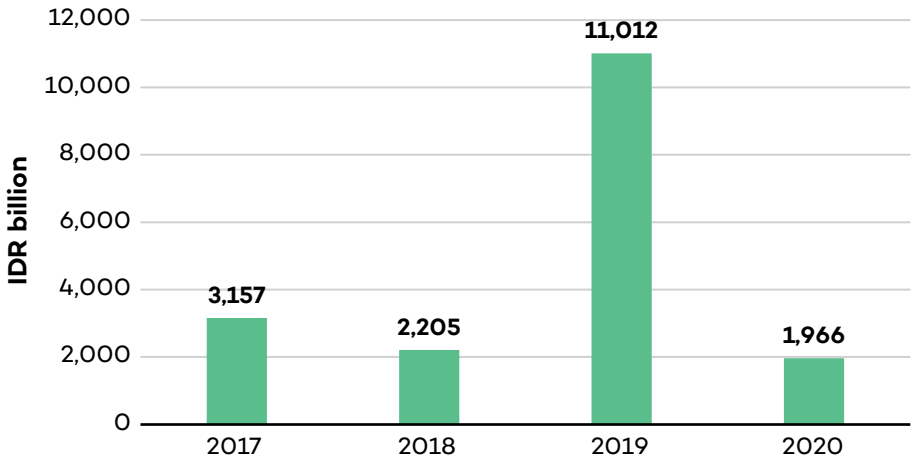
The data for North Sulawesi represents still-planned budget figures and not yet the actual spending, while data for the central level are based on early DIPA (Daftar Isian Pelaksanaan Anggaran/ Budget Execution List) and not yet final DIPA.

4.1 Central-Level Support Measures

4.1.1 Overview of Support Measures

Overall, the total amount of support provided by the central government for marine fisheries varied from IDR billion 2,067.9 (~USD 144 million) in 2018 up to IDR billion 11,012 (~USD 771 million) in 2019, as shown in Figure 7 (MMAF, National Stakeholder Workshop, December 21, 2020). This significant variation is essentially due to large infrastructure projects in 2019 and should thus be interpreted carefully. While the amount is significant, it remains small compared to the amount of support provided by other countries. According to the OECD, from 2016 to 2018, the 39 countries reporting government fisheries support data to the OECD provided average annual support of USD 9.4 billion to the fisheries sector (OECD, 2020). On average, one third of the support went to individual fishers, and two thirds was allocated to general services benefiting the sector as whole. In terms of funding mechanisms, the majority of the support was provided in the form of government provision and purchase, for example to build fishing ports or landing facilities, followed by revenue foregone, for example through fuel tax exemptions for fishers. These numbers are also heavily affected by the same large infrastructure projects in 2019, without which measures that benefit individual fishers and are provided in the form of revenue foregone would constitute the majority of support.

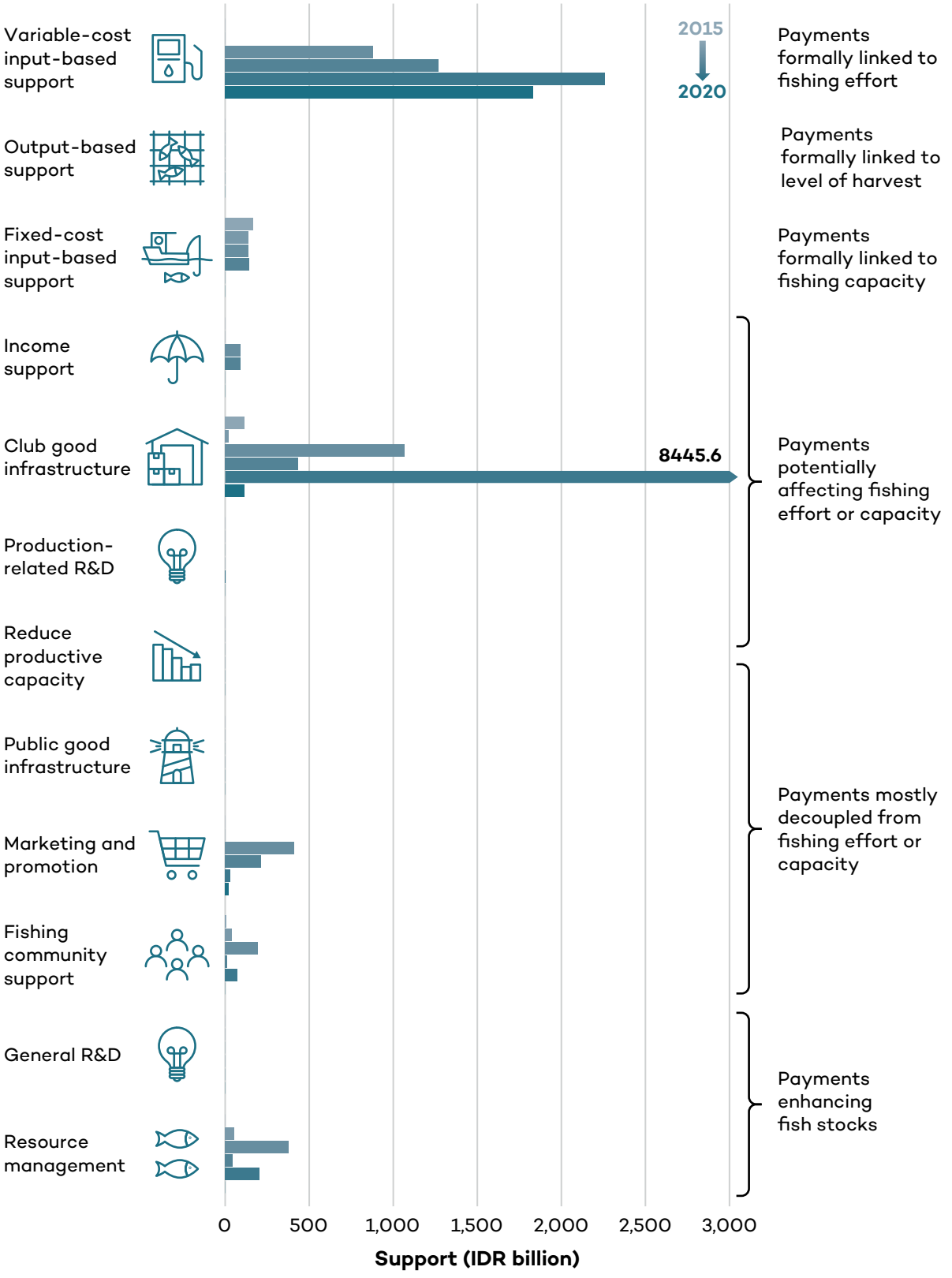
Figure 7. Total marine fisheries support measures at the central level (IDR billion, 2017-2020)



Source: Authors' calculations.

Figure 8 illustrates the distribution of central government support in our database across the different categories of measures based on the type of support and organized according to their likely effect on fishing effort and capacity. It shows that the central government's support for marine fisheries is largely focused on payments linked to fishing effort through variable-cost input-based support measures (e.g., fuel detaxation schemes) and payments potentially affecting fishing effort or capacity such as club good infrastructure spending for construction, management, and access to shared infrastructure facilities. Together, these two categories accounted for roughly 90% of all support between 2017 and 2020. Some smaller amounts are dedicated to fixed-cost input-based support measures (e.g., for vessel construction), which are formally linked to fishing capacity, or to income support, which, like club infrastructure, is not directly linked to fishing effort and capacity but can still influence them. Most of the remaining support measures are either mostly decoupled from production (marketing and promotion or support to fishing communities) or designed to enhance fish stocks (resources management). The following subsections briefly summarize information about each category over the whole spectrum.

Figure 8. Summary of central-level marine fisheries support measures by year and category (IDR billion, 2015–2020)



Source: Authors' calculations.

4.1.2 Payments Formally Linked to Fishing Effort

This category consists of input-based support measures for variable costs such as fuel, ice, bait, or fishing gear. In terms of spending, this is the second largest and most consistent category, accounting for roughly 35% of all central-level expenditures between 2017 and 2020. Apart from the provision of club good infrastructure, it is by far the most important type of support. Payments varied from IDR 877 billion (USD 64.73 million) in 2017 to IDR 2,257 billion (USD 166.59 million) in 2019. All support in that category is related to one single measure: support for fishers with vessels under 30 GT to purchase fuel, allocated by the Ministry of Energy and Mineral Resources. While the amount of fuel provided at a discounted price to fishers has increased only slightly since 2017, the value of the support has risen significantly due to changes in the price of crude oil and the rupiah exchange rate.

4.1.3 Payments Formally Linked to Fishing Capacity

This category refers to measures such as payments for vessel construction and modernization as well as other related machinery and equipment. Programs identified in our inventory under this category include the provision of fishing vessels, ice machines, as well as processing and fish transportation equipment. Overall, the amount of support provided under this category is relatively small, but not insignificant, with an average annual spending of IDR 147 billion (USD 10.64 million) over the 2015–2018 period. One particular program, which provides fishing vessels, machines and fishing gear to small-scale fishers, accounts for the overwhelming majority of support in that category (94% of all support).

4.1.4 Payments Potentially Affecting Both Fishing Effort and Fishing Capacity

The largest category in this group is club good infrastructure spending, which represented 53% of all central-level expenditure between 2017 and 2020. This category covers construction, management and access to shared infrastructure facilities that specifically benefit the fisheries sector, such as marine and fisheries centres (SKPT), fishing ports, and landing facilities. While infrastructure projects are not directly linked to production, they can lead to increased fishing capacity and effort if they allow access to new areas or larger vessels. That said, for an archipelagic country like Indonesia, the development of such fishing infrastructure naturally remains a top priority in marine fisheries development, hence the large budget allocation for infrastructure. However, the large portion of the budget in 2019 seems to coincide with the general elections for council members and the presidential election and may not indicate a stable trend.[2]

Income support measures cover programs that supplement income or revenue, as well as fishers' insurance schemes. The only program identified under this category focuses on fishers' insurance premium assistance, a form of incentive to join the scheme which is only granted during the first year. Payments in 2017 and 2018 remained stable, at around IDR billion 90 (USD 6.42 million), but the value of premium payment in 2019 is not yet known.

[2] As highlighted in Box 2 on transparency, these figures correspond to early data on budget execution, not final expenditure. The exact amount of support may therefore be slightly lower.

The third category under this grouping is support for production-related R&D, which is designed to improve productivity or increased harvesting. Based on the information collected, support in this category is minimal.

4.1.5 Payments Mostly Decoupled From Both Fishing Effort or Capacity

This group of support categories covers support for public good infrastructure, marketing, and promotion, as well as schemes to improve the livelihoods of fisheries communities (e.g., through housing facilities, food aid or education). These forms of support are usually mostly decoupled from production, with limited effect on fishing effort or capacity. Only one program was identified under the marketing and promotion category, namely the marketing facilities and infrastructure development program, aimed at linking fishers with processors. Overall, support related to this category has been experiencing a downward trend from IDR billion 400 (USD 29.52 million) in 2017 to IDR billion 23 (USD 1.58 million) in 2020, partly because the government decided to redirect resources under this budget line to the eradication of illegal fishing. Measures providing support to fishing communities mainly consisted of coastal community empowerment programs aimed at developing alternative livelihoods to reduce pressure on fish resources, including some gender-specific programs. In practice, however, most of the programs targeting coastal communities tend to be provided at the provincial level.

4.1.6 Payments Enhancing Fish Stocks

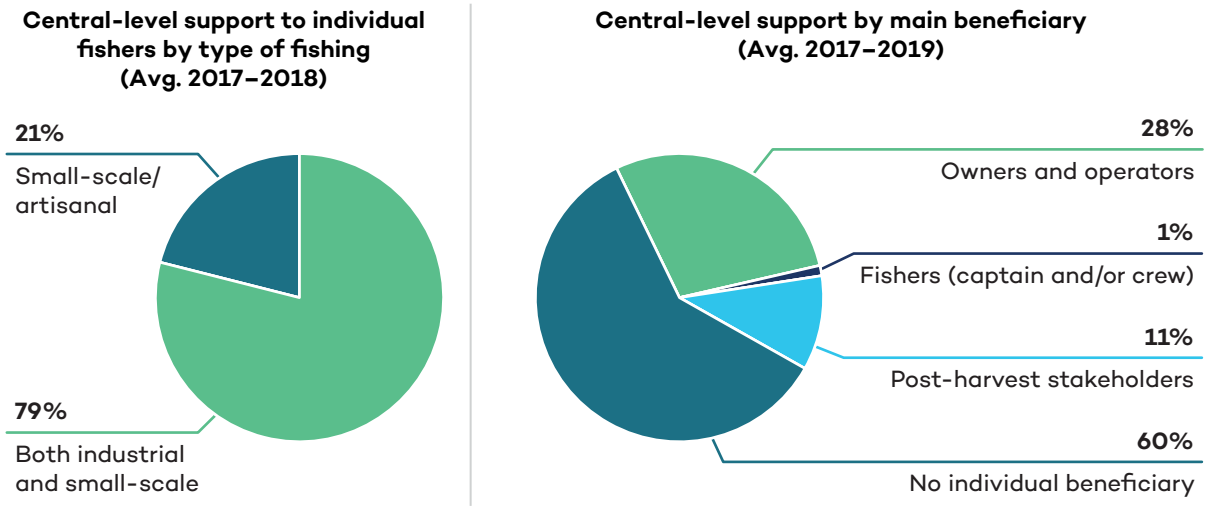
These support categories cover programs aimed at improving the status of stocks through R&D or management services. These payments are virtually always positive from an environmental and socio-economic perspective. With regard to resources management, the programs identified included various support measures to strengthen the monitoring of fish stocks and fishing activity (including through community groups), improve licensing systems, and rehabilitate coastal ecosystems. Several measures were also issued to strengthen enforcement in support of the IUU fishing eradication policy. Support under this category seems to fluctuate, between IDR billion 380 (USD 28.04 million) in 2017 and IDR billion 44 (USD 3.04 million) in 2018.

4.1.7 Support by Type of Fishing and Beneficiaries

Our database also breaks down support measures by type of fishing and beneficiaries. This was done for each policy based on information on the different schemes identified. Regarding the type of fishing, all support measures targeted at vessels under 10 GT were considered as benefiting small-scale and artisanal fishing. In the absence of explicit mention of the type of fishing targeted, or when the limit was set at below 30 GT as in the case of fuel support, the policy was considered as benefiting all types of fishing indiscriminately. In terms of beneficiaries, the database distinguishes between support to owners and operators, fishers, or post-harvest stakeholders. It does this based on the description of support measures but sometimes requires judgment calls based on available information. For example, fuel support, which represents a large share of total support, is considered as benefiting first and foremost

owners and operators as opposed to fishers (Martini & Innes, 2018). Support targeting processing or marketing activities are systematically identified as benefiting post-harvest stakeholders. Finally, all other policies classified as support to general services as defined in Section 3 (e.g., infrastructure, support to fishing communities, R&D, or management) are considered as benefiting the sector as a whole as opposed to individual fishers.

Figure 9. Central-level support measures by type of fishing and beneficiaries (Avg. 2017–2019)



Source: Authors' calculations

On average, between 2017 and 2019, around 60% went to the sector as a whole, mainly in the form of fisheries infrastructure, 11% went to post-harvest activities, 28% benefited mostly vessel owners or operators, and only 1% targeted specifically fishers (Figure 9). Generally, the large share of support to all types of fishing with no individual beneficiary largely reflects the predominance of infrastructure support in Indonesia. When looking at programs supporting individual fishers only (as opposed to general services like infrastructure or management measures), 21% of the support was targeted specifically at small-scale fisheries and 79% indiscriminately aimed at small-scale and industrial fishing. This figure largely reflects the fact that fuel support that is available to all vessels below 30 GT is considered to benefit both small-scale and large-scale fishers, though the large segments usually capture the majority of benefits (Martini & Innes, 2018).

4.2 Provincial-Level Support Measures

This section provides data on support measures to marine fisheries in the provinces of Aceh, Maluku, and North Sulawesi. The data for Aceh and Maluku covers five years from 2015 to 2019 and was obtained from Aceh Province Fisheries and Marine Service and the DKP Maluku. The data from the North Sulawesi DKP office is for the years 2016 to 2019 and only corresponds to budgeted amounts, not actual expenditure.

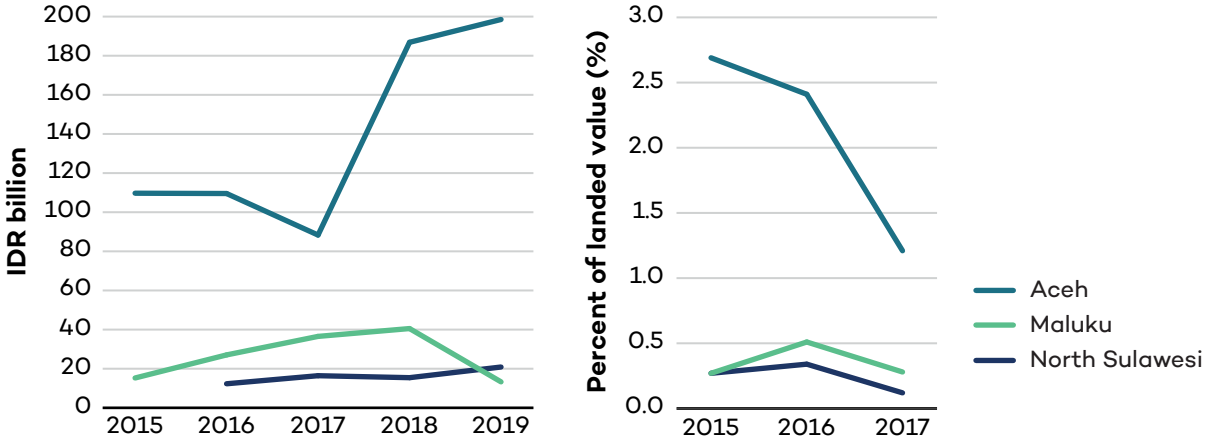
4.2.1 Overview of Support Measures

Figure 10 provides an overview of total support and support intensity allocated to marine capture fisheries, excluding support for aquaculture and inland fisheries. It shows support expressed both in IDR billion from 2015 to 2019 (left axis) and as a percentage of the landed value of production between 2015 and 2017 (right axis). The Aceh province provided by far the largest amount of support, with IDR 692.97 billion (USD 50.10 million) spent over 5 years through government provision and purchase of goods and services, of which over 90% went to general services in the whole fishing sector, largely in the form of infrastructure. This amount represented between 1.7% to 2.7% of the value of production (DKP Aceh, Forum Group Discussion, December 23, 2020).

Maluku provided nearly IDR 120 billion (USD 8.6 million) in support, with 92% of this amount going to support individual fishers in the form of fixed-cost support. The annual amount varied between IDR 13.3 billion (USD 0.95 million) and IDR 40.5 billion (USD 2.79 million); the year 2019 was an anomaly with very low spending. In terms of support intensity, total spending between 2015 and 2017 represented only 0.35% of the landed value (DKP Maluku, Validation Workshop, November 30, 2020).

Finally, in North Sulawesi the total amount of support measures for capture fisheries over the four-year period was IDR 60.9 billion (USD 4.4 million), all in the form of government provision and purchase of goods and services. In total, 60% of this amount was provided as support to individual fishers, which is exclusively targeted at reducing their fixed costs, and 40% as general services, mostly in the form of support for infrastructure. Here again, this amount represented only a small fraction of 0.24% of total landed value between 2015 and 2017 (DKP North Sulawesi, Validation Workshop, November 23, 2020).

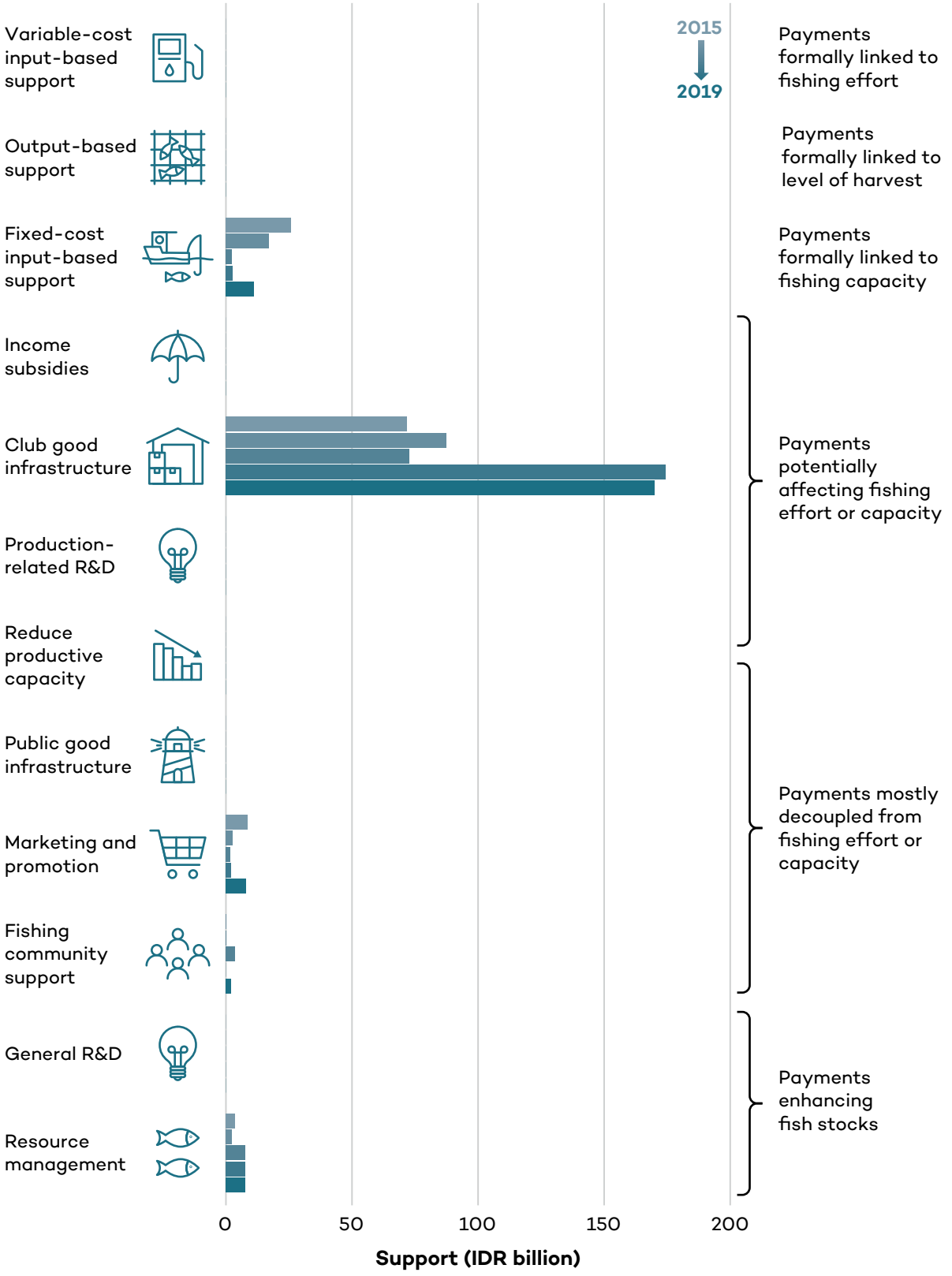
Figure 10. Total marine fisheries support measures in Aceh, Maluku, and North Sulawesi in IDR billion, and as a % of landed value



Source: Authors' calculations.

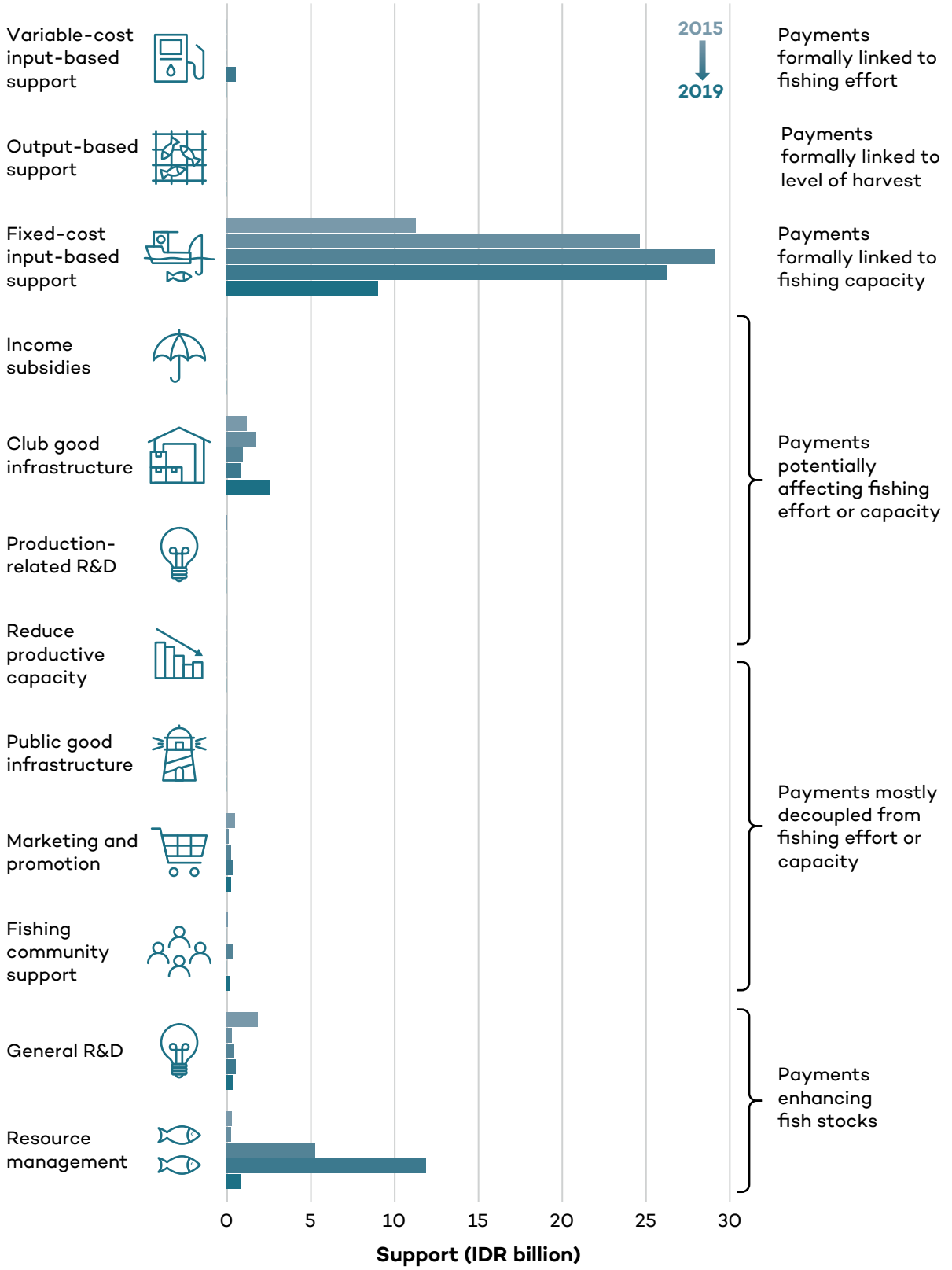
As with central government payments, Figure 11 to Figure 13 arrange the different support measures in different categories based on their potential effect on fishing capacity and effort for the three provinces.

Figure 11. Summary of marine fisheries support measures by year and category in Aceh (IDR billion, 2015–2019)



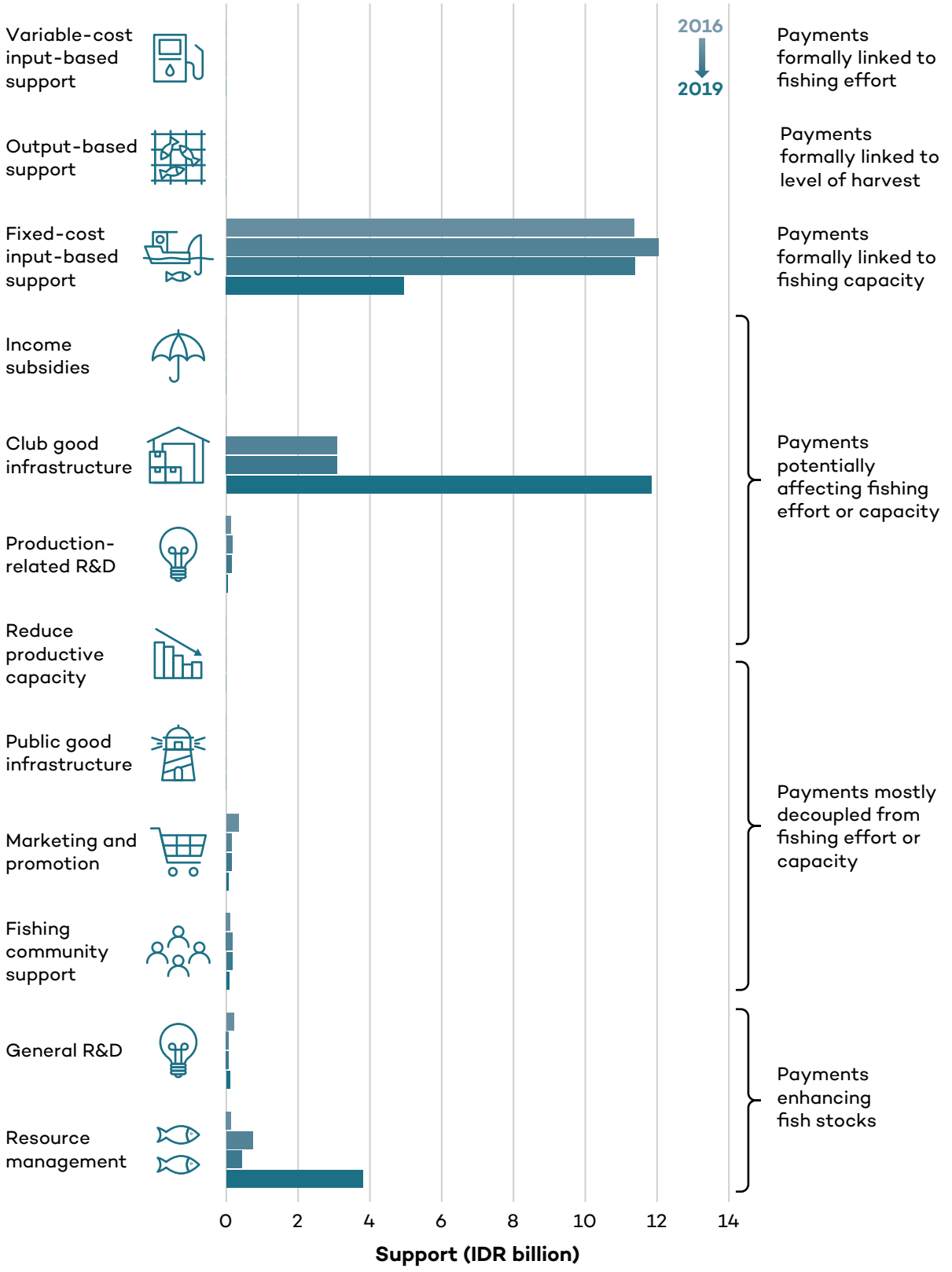
Source: Authors' calculations.

Figure 12. Summary of marine fisheries Support measures in Maluku by year and category (IDR billion, 2015–2019)



Source: Authors' calculations.

Figure 13. Summary of marine fisheries support measures in North Sulawesi by year and category (IDR billion, 2016–2019)



Source: Authors' calculations.

4.2.2 Payments Formally Linked to Fishing Capacity

Fixed-cost input-based support measures such as payments for vessel construction and modernization as well as other related machinery and equipment were particularly prevalent in Maluku and North Sulawesi, where they represented by far the largest spending item, accounting for 80% and 60% respectively of total support measures. In Aceh, this form of support accounted for roughly 8% of total spending but still represented the second largest item after club good infrastructure with over IDR 11 billion (USD 0.79 million) per year on average (DKP Aceh, Forum Group Discussion, December 23, 2020).

In Aceh, support programs under this category included mostly the motorization of fishing fleets and the procurement of fishing boats. In Maluku, the biggest part of this support was for the construction of very small 1.5 GT fishing vessels, which were then transferred to the fishing community (DKP Maluku, Validation Workshop, November 30, 2020).

The second largest amount spent was for the provision of medium-size 15GT boats. Finally, in North Sulawesi, we identified 10 support programs in this category both for small-scale (below 5GT) and for larger vessels (10–30GT). The programs provide fishing vessels and engines, as well as fishing gear and equipment and thus support small-scale fishers to enhance their fishing capabilities (DKP North Sulawesi, Validation Workshop, November 23, 2020).

4.2.3 Payments Potentially Affecting Fishing Effort and Fishing Capacity

Support measures under this grouping focused exclusively on the development, maintenance, and access to fishing infrastructure except in the case of North Sulawesi, where it also includes a production-related R&D program focusing on the development of capture fisheries statistics. With IDR 576 billion over 5 years (USD 41.64 million) club good infrastructure represented by far the largest spending item in the Aceh province, accounting for 80% of total support measures. It also constitutes the second budget item for North Sulawesi and the third for Maluku after management expenditures. In Aceh, the largest budget allocation in 2019 was for the Samudra Lampulo fishing port management program, whereas in previous years, the budget priority was earmarked for the Fish Landing Base Development program. In North Sulawesi, infrastructure projects included the construction of a fishing port and fish auction site (DAU dan DAK) as the single largest budget item for the province.

4.2.4 Payments Mostly Decoupled From Fishing Effort or Capacity

This group of support categories covers programs for marketing and promotion as well as support to fishing communities. Overall, this represented a relatively small amount of support in each of the provinces. In Aceh, support for marketing and promotion aimed at optimizing processing and the marketing of fishery production, and accounted for roughly 3% of all support measures, while support to coastal communities through economic empowerment programs represented another 1%. In Maluku, this support took the form of training for fish processors and support for quality control as well as support to fishing communities targeted at training small-scale businesses to diversify their offer of fish-based products. These measures

were also relatively marginal, accounting for less than 2% of total spending. Finally, under marketing and promotion, North Sulawesi provided assistance to small and medium-sized fish processing enterprises in order to meet food safety and quality certification requirements. Support to fishing communities included training and transfer of traditional fish processing equipment packages to coastal women with the objective of creating alternative livelihoods. However, both these two categories remained limited in size and represented less than 2% of total spending over the 2016–2019 period.

4.2.5 Payments Enhancing Fish Stocks

Finally, payments enhancing fish stocks included annual spending between IDR 2.3 billion (USD 0.16 million) and IDR 7.8 billion (USD 0.56 million) in Aceh for marine and fisheries development planning, rehabilitation, and conservation of marine resources, and supervision and control of IUU fishing (DKP Aceh, Forum Group Discussion, December 23, 2020). In Maluku, this category represented the second largest item. The biggest share went to the procurement of surveillance patrol boats, which reached IDR 16 billion (USD 1.15 million) in total during the 2015–2019 period. Other programs included support for coral rehabilitation, meetings for better surveillance coordination, training for fisheries observers and community patrols, and other fisheries surveillance activities (DKP Maluku, Validation Workshop, November 30, 2020).

There was also a small amount of money spent on general R&D, accounting for around 2.7% of total support over the period. Finally, payments enhancing fish stocks in North Sulawesi included surveillance operations such as support for the purchase of equipment, data collection, and releasing juvenile fish, along with general socialization of sustainable fisheries regulations with the communities. The biggest program that falls under this category is the purchase of two patrol boats in 2019 that reached IDR 2.5 billion (USD 0.17 million) (DKP North Sulawesi, Validation Workshop, November 23, 2020).

5.0 Are Indonesia's Support Measures for Fisheries Aligned With Its Objectives?

This section aims to help identify support measures that should be prioritized for further investigation at a policy level, based on the three-step prioritization framework presented in Section 3. It starts by defining a short list of support categories based on their potential effect on fishing capacity and effort as well as the risk they may pose to environmental and socio-economic sustainability. Within the shortlisted categories, we look at individual programs and sort them by scale of support over time. Based on this refined shortlist, the third step undertakes a context-specific analysis to understand whether any of these measures appears to be implemented in a vulnerable context or generate unintended consequences both from a socio-economic and environmental perspective. This results in a final list of specific support measures that we recommend should be examined through dedicated evaluations.

5.1 Step 1: Prioritizing Support Measures by Likely Impact

Bringing together information presented in Section 4, Appendix 3 provides an overview of the average composition of support measures at the central level and in the three selected provinces between 2017 and 2019—the years for which data was most complete across the board. Based on this overview, we shortlist two categories of support for further analysis: variable-cost input-based support and fixed-cost input-based support. As described in Appendix 2, expert literature generally considers the measures in these two categories to be high risk because they can directly influence increased fishing effort and capacity, and they tend to disproportionately favour large-scale segments of the sector. Variable-cost input-based supports are also known for being relatively inefficient at improving fishers' incomes. Furthermore, these two categories are both significant financially and present every year.

Variable-cost input-based support, which is provided in the form of a fuel discount for fishers, accounted for more than a third of all central government support between 2017 and 2020. Fixed-cost input-based support including vessel construction, modernization, or fishing equipment, on the other hand, is provided both at central and provincial levels. In the absence of comprehensive data covering all Indonesia's provinces, it is difficult to assess the total amount of support allocated to fixed costs at the national level. This form of support nonetheless represents a considerable share of total expenditure in North Sulawesi (60%) and Maluku (80%). In Aceh, the share of total support that targets fixed costs is relatively smaller (8% of the total), but the absolute amount is larger than what is provided in North Sulawesi. If other provinces follow similar patterns, this form of support may well exceed variable-cost support for the country as a whole.

One category that also accounts for large levels of support—but we have not identified as a priority for evaluation—is club good infrastructure, including support for marine and fisheries centres (SKPTs), fishing ports, and landing facilities. While payments under this category are considerable, particularly at the central level, their impacts on fishing capacity and effort are difficult to assess and are likely to be lower than variable and fixed-cost support. In an

archipelagic country like Indonesia, the development of such fishing infrastructure also remains a natural priority in marine fisheries development and addresses critical market failure. Finally, spending under this category has been highly volatile, with a massive peak in 2019 and much lower amounts in previous years, indicating that the recent increase may not represent a long-term trend.

5.2 Step 2: Identifying Specific Support Policies in Priority Categories

5.2.1 Central-Level Fuel Support

Variable-cost input-based support in Indonesia is mostly provided through fuel sold at discounted prices. Based on the information from MMAF, fuel-related support provided by the government to fishers takes the form of:

- Distribution of subsidized fuel (kerosene and diesel) through the Fishers Dealer Solar Package (SPDN) and Fishers' Fuel Filling Station (SPBN).
- Distribution of converter kits to convert gasoline engine systems to LPG.

The figures estimated in this report only cover the first of these measures, namely the provision of subsidized fuel through SPDN and SPBN. Our analysis therefore focuses exclusively on this particular policy. The provision and distribution of the fuel are carried out by business entities (AKR and Pertamina) according to the assigned volume regulated by BPH Migas, the Indonesian downstream oil and gas regulatory body. Fuel subsidies were initially provided for all sizes of fishing vessels, but after the release of Presidential Decree No. 15 of 2012, only fishing vessels under 30 GT are qualified to receive fuel subsidies at the maximum quota of 25 tonnes per month for each vessel. (Government of Indonesia 2012)

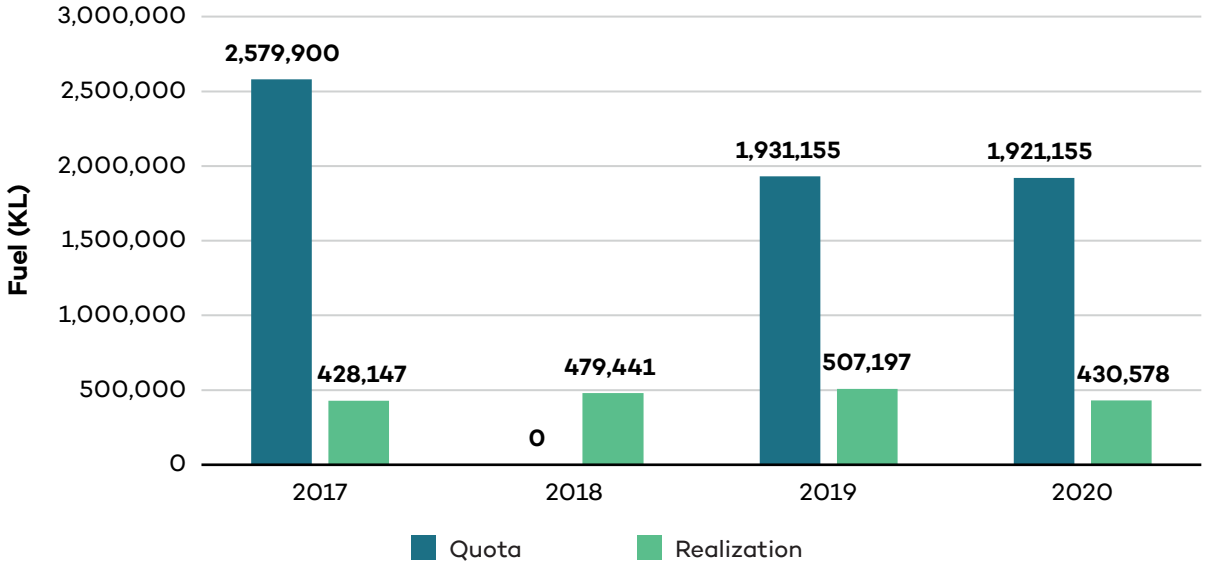
Fishers who want to receive subsidized fuel have to make a request to verify whether the size of their boat is between 10 and 30 GT by attaching their permit and Fishers Identification Card (KUSUKA Card) and taking these to the authorities. After verification, a quota is attributed based on the type of fishing gear and vessel. For example, for ships with passive fishing gear, the fuel received will be less than for ships with active fishing gear. For small-scale vessels under 10 GT, fishers can make a request by attaching their ship registration to the application letter and submitting this to authorities. (MMAF, 2017c)

Based on data obtained from BPH Migas in 2020, Figure 14 shows that the allocation of fuel subsidies for fishers decreased from IDR 2.6 billion litres in 2017 to 1.9 billion litres in 2019.[3] (MMAF, National Stakeholder Workshop, December 21, 2020). Despite a slight increase from 428 million litres in 2017 to 507 million in 2019, the level of fuel support that is actually provided to fishers consistently remains far below the allocated amounts. This might be due to the vast distances fishers have to travel to either obtain a permit for subsidized fuel or to get fuel from the SPDN (fuel station), which makes it difficult for the most remote communities and fishers to benefit from the subsidy. This may cause further socio-economic hardship to

[3] The data for 2020 only covers the period up to October 2020 and is therefore not complete.

vulnerable, small-scale fishers, as subsidies can distort the price of fish and negatively affect their competitiveness. Another explanation could be that the government allocates much more to this program than is required by fishers.

Figure 14. Allocation and realization of fuel support for fishers (kilolitres, 2017–2020)

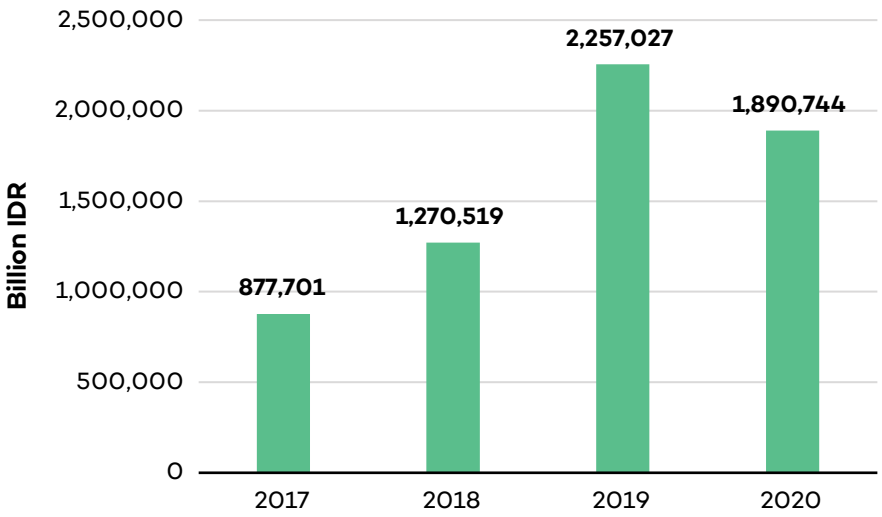


Source: Authors diagram, based on data from (MMAF, National Stakeholder Workshop, December 21, 2020).

Despite the slightly increasing and relatively low level of quota realization, the actual value of the subsidies tends to increase significantly over time (Figure 15).[4] This is most likely due to the increase in the base price of crude oil and the rupiah exchange rate. Based on the significant amounts of fuel support provided and the important share of total support from the central government it constitutes, we suggest the shortlisting of this particular program as a priority for detailed evaluation.

[4] As highlighted above, 2020 figures are available only until October. The total amount for 2020 may therefore be similar to (or even exceed) the total for 2019.

Figure 15. Amount of fuel support 2017–2020



Source: Authors diagram, based on data from (MMAF, National Stakeholder Workshop, December 21, 2020).

5.2.2 Provincial Fixed-Cost Support

Fixed-cost support measures are provided at both the provincial and central levels and mostly target fishers and fishing vessel owners with new fishing capacity (e.g., vessels and engines) as well as fishing gear and auxiliary fishing equipment.

At the central level, support is mostly provided through a single program that accounts for the vast majority of spending. Entitled "Fishing Vessels Construction Program," its main objective is to improve the welfare of small-scale fishers that have limited capital and financing opportunities. The program includes the provision of fishing vessels, machines, and fishing gear. Over the period for which data was available (2015–2018), the average amount of support was IDR 137.5 billion (USD 9.95 million) per year. Given that this central-level program covers all of Indonesia, it is relatively less important in terms of scale than other support measures provided at the provincial level. It also represents a relatively small share of central-level support (see Table 4). For these reasons, the rest of this section focuses on fixed-cost support measures in the three provinces.

The Maluku and North Sulawesi provinces allocated a bigger portion for fixed cost support measures over any other support category. The annual spending of Maluku and North Sulawesi was IDR 20 billion and IDR 7 billion (USD 1.44 million and USD 0.50 million) respectively, accounting for 76% and 58% of their respective total support. While the proportion of fixed-cost support in Aceh is only 8.45% of total support, the absolute amount spent is important, and is in fact higher than in North Sulawesi due to the significant difference in the total amount of support provided (see Table 4).

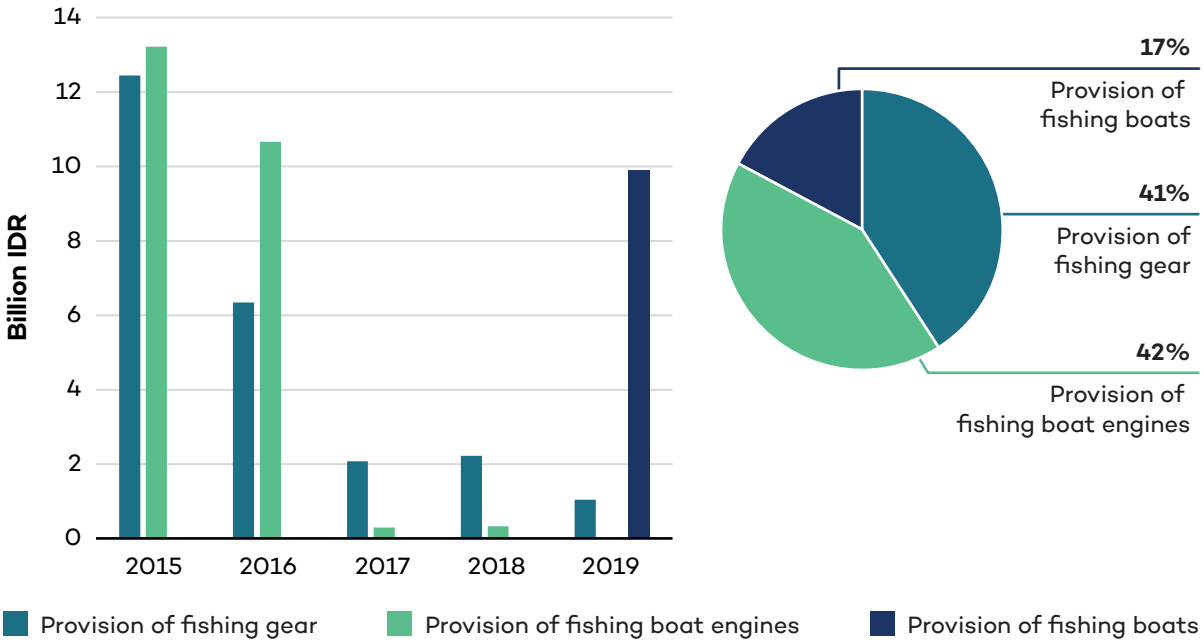
Table 4. Summary indicators about fixed-cost support measures at the central level and in Aceh, Maluku, and North Sulawesi

Authority	Annual average (IDR billion)	Total over the period (IDR billion)	Percentage of total support	Period
Central level	137.5	586,50	3.58%	2015–2019
Aceh	11,71	58,57	8,45%	2015–2019
Maluku	20,08	100,42	75,70%	2015–2019
North Sulawesi	7,12	35,62	58,47%	2016–2019

Source: Authors' calculations.

In Aceh, fixed-cost support consists of three programs: the provision of fishing gear, provision of fishing boat's engines, and provision of fishing boats. The latter two programs share the same percentage and contributed, together, to 83% of the total amount of support in this category over the 2015–2019 period. Interestingly, most of the support was provided in 2015 and 2016. Since 2017, the amount of support dedicated to fishing gear and boat engine has slowly declined and since 2019 seems to have been replaced by support for the procurement of fishing boats.

Figure 16. Fixed-cost support measures in Aceh by year (in IDR billion) and share over 2015–2019

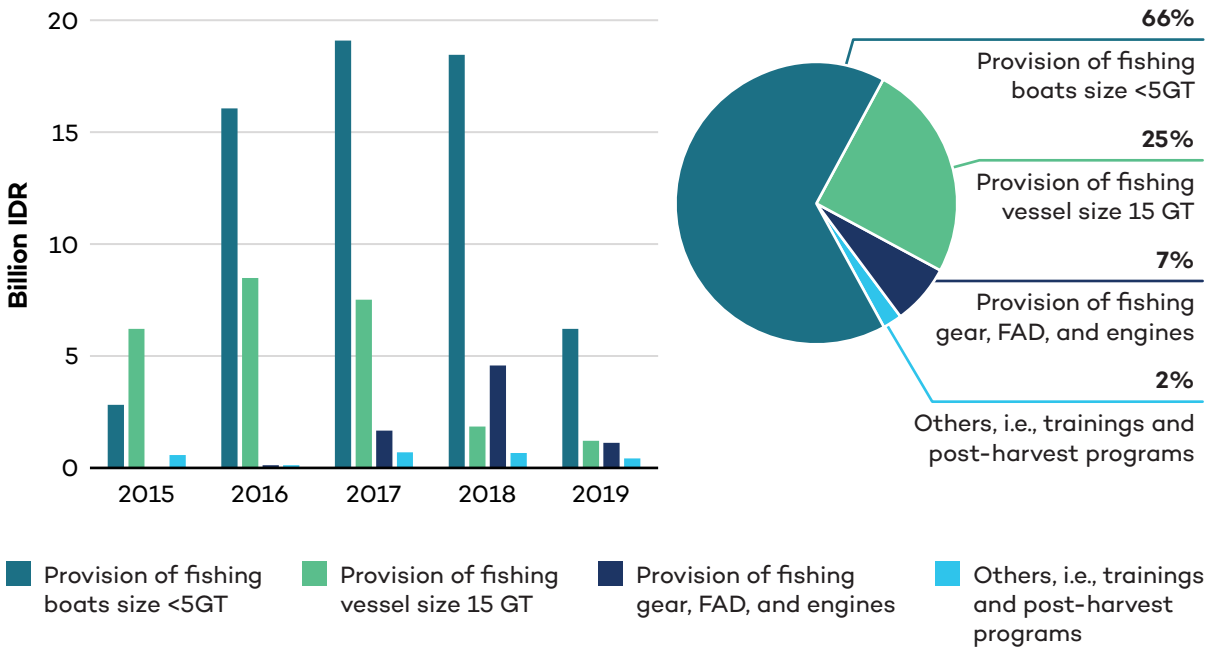


Source: Author's calculations.

In Maluku, a large amount of fixed-cost support was spent on the provision of small fishing boats below 5 GT, which contributed to 66% of total fixed-cost support. These fishing boats

mainly target big pelagic fish such as yellowfin tuna using hand lines. The second largest group of support measures was funding for fishing vessels of around 15 GT targeting small pelagic fish such as mackerel and deho. The remaining programs, accounting for nearly 10% of total fixed cost support, were for fishing tools and engines, as well as for training and support to post-harvest activities. Most of the support was transferred in the period 2016–2018.

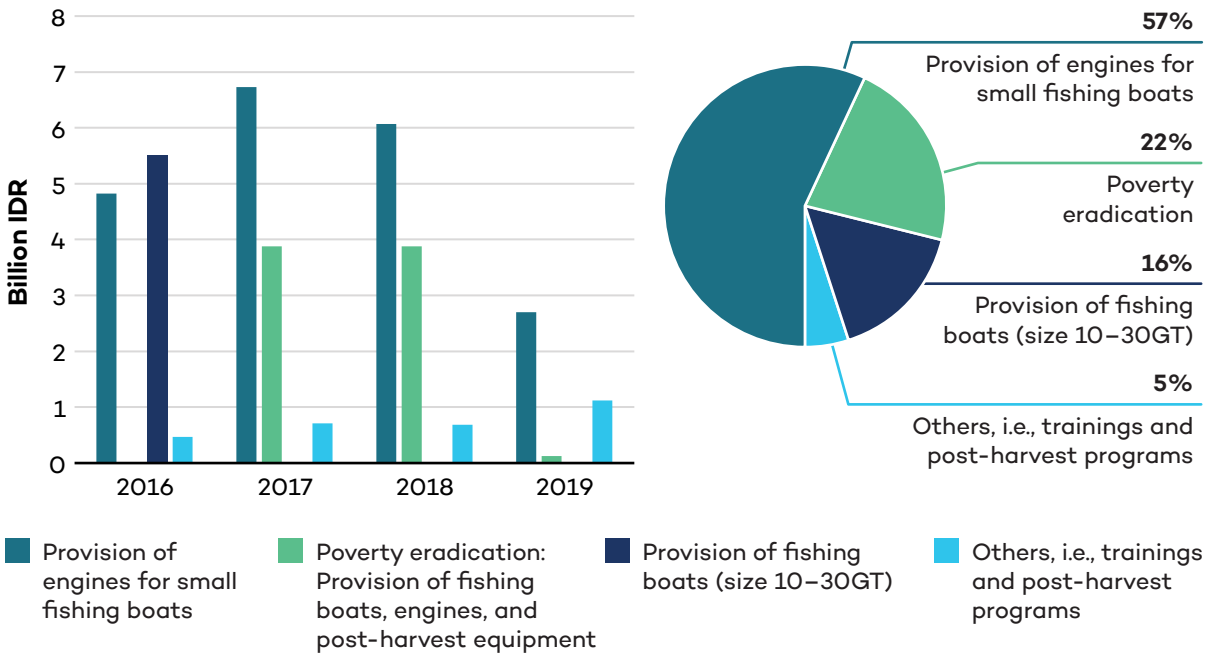
Figure 17. Fixed-cost support measures in Maluku by year (in IDR billion), and share over 2015–2019



Source: Authors' calculations

In North Sulawesi, the largest fixed-cost support measure was aimed at modernizing the non-motorized small fishing boats with engines. As shown in Figure 18, this program contributed 57% of total fixed-cost support. The proportion of this type of support may actually be higher, because the poverty eradication program, which is the second largest program, also includes transfer of engines in addition to transfer of fishing vessels, fishing gear and post-harvest equipment. The next program was for the transfer of fishing boats between 10 and 30 GT, which typically target small pelagic fish using purse seines. This program only took place in 2016 because afterwards the authority to transfer vessels above 10 GT was transferred to the central government. The remaining programs, with relatively small contributions, were training, assistance, and transfer of post-harvest equipment.

Figure 18 . Fixed-cost support measures in North Sulawesi by year (in IDR billion) and share over 2016–2019



Source: Authors' calculations.

In all three provinces, the requirements for receiving fixed cost support and new fishing vessels and equipment are similar. The support is always applied by and distributed through a fishing cooperative, except for the poverty eradication programs in North Sulawesi, whose recipients are individuals who can receive the support without cooperatives. In all three provinces, the majority of the fixed support was directed to small-scale fishers (with vessels <10 GT). A much smaller amount, however, also goes toward medium-sized fishers (with 10–30 GT vessels). Furthermore, there were programs in Maluku and North Sulawesi targeting the post-harvest sector, although the amount remains very small compared to total support for fixed costs, typically less than 5%.

Based on this review, we shortlist five specific policies accounting together for 84% of total support in the three provinces in 2019 and the previous two years. In Aceh, this includes the program for procurement of fishing boats starting in 2019 and overtaking previous fixed cost support measures. In Maluku, our list includes two programs, namely the provision of small-scale boats below 5 GT targeting big pelagic fish such as yellowfin tuna and the provision of fishing vessels of 15 GT for small pelagic fishers. While the amounts allocated to both programs were reduced significantly in 2019, they remain the largest programs, and there are no expectations that they will be discontinued or reduced over the long term. Finally, in North Sulawesi, we suggest focusing on the provision of engines to non-motorized small fishing boats, as well as the poverty eradication program involving transfers of engines in addition to the transfer of fishing vessels, fishing gear, and post-harvest equipment.

5.3 Step 3: Reviewing Shortlisted Policies in Context

We now consider our shortlisted policies in their respective contexts, which is critical to understanding how policy measures are working in practice and assessing whether any improvements might be required to help measures achieve their objectives. Limitations of time and resources mean the analysis done here is necessarily at a high level. The analysis here is limited to a few important elements of context that help provide an initial sense of the possible social and environmental impacts of key support measures.

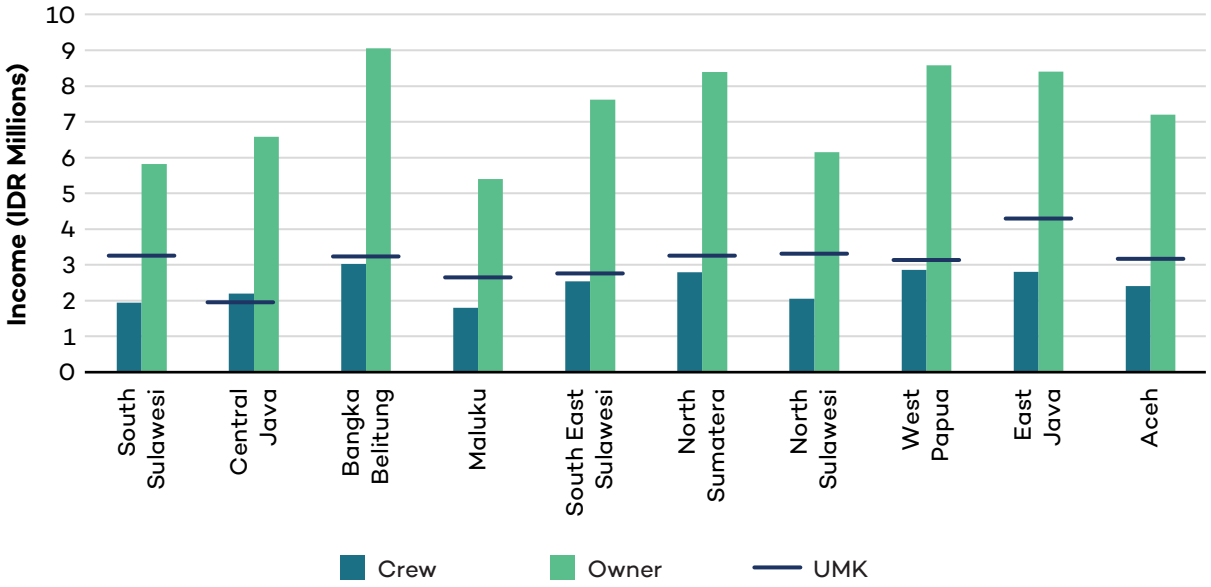
5.3.1 Central Government Fuel Support

SOCIAL IMPACTS

Fishing's high operating costs tend to make an increasing number of Indonesia's fisheries unattractive, in particular for small-scale fishers. This is further exacerbated, in some fisheries, by declining productivity due to overexploitation, which in turn forces fishers to fish in ever-further areas. With fuel accounting for approximately 75% of total energy inputs in fishing activities, fuel support largely contributes to reducing operating costs of fishing and allowing many small-scale fishers to remain in the sector (Tyedmers, 2004). That said, the low realization of fuel support illustrated in Figure 12 seems to indicate that a lot of small fishers with vessels of a capacity of less than 30 GT vessels do not benefit from the program. In other words, the program does not seem to reach all of its intended beneficiaries. Regardless of the access problem, the nature of fuel support is such that the more fuel fishers consume, the more support they receive. As a result, the program is likely to always benefit larger players more than small-scale fishers.

In addition, fuel support is—almost by definition—primarily benefiting boat owners or operators, who are the ones who bear the costs of fuel. There is no evidence to show that these benefits then translate into higher wages for vessel crews. Work by Martini and Innes (2018) at the OECD shows that much of rent is lost to increased fishing effort or is captured by other sector participants (such as those selling fuel). A study on the impact of fisheries subsidies in Indonesia carried out by WWF Indonesia and FPIK-IPB in 2019 found, for example, that the monthly income received by the fishing vessel crews (ABK) is still below regency minimum wage (UMK) in several provinces, as shown in Figure 19 (Bisnis Indonesia, 2019). This is in direct contrast with the income received by boat owners. This indicates that fuel support benefits a category of actors—boat owners—who are already doing relatively well in terms of income and do not seem to lead to any critical improvement for crew members, which constitute the majority of people employed in the sector.

Figure 19. Monthly income of crew and boat owner against minimum wage



Source: Bisnis Indonesia, 2019.

ENVIRONMENTAL IMPACTS

Based on existing literature, fuel support tends to generate the largest increase in fishing effort at a given level of capacity and entails the largest risks for the sustainability of fish stocks (see Appendix 2). As highlighted above, however, those impacts largely depend on existing management regimes, the size of the fleet, and the status of stocks. Contrary to fixed-cost support which tends to be associated with certain species (e.g., large or small pelagic), fuel support, at least in theory, is not restricted to any particular type of fishing even if it is designed to target fishers with vessels below 30 GT, as is the case in Indonesia. The impact is likely to depend on the status of stocks of different species in the various areas of the country, with zones and species already affected by overfishing being more vulnerable. Based on the most recent data about the exploitation status of marine resources in Indonesia's waters, it appears that a majority of fish stocks are already considered fully exploited or overexploited (MMAF, 2017a). In the absence of strictly enforced and sustainable catch limits, fuel support for the fishing of these stocks is particularly risky, as it is likely to further increase fishing pressure, with negative consequences for the sustainability of these resources and the livelihoods of those who depend on them for nutrition, employment, and income.

Besides those broad considerations, there is limited empirical evidence regarding the impact of fuel support on the status of stocks. Looking at the case of anchovy in Payang Gemplo in the Pekalongan Regency, one study found the provision of fuel support through SPDN increased the number of trips from 3,200 trips in 2003 to 4,970 in 2004 (Wikaniati et al., 2011). This contributed to increasing the catch production from 85,185 tonnes in 2003 to 115,535 tonnes in 2004. However, the authors of the study estimate that such support had limited impact, not least because fish stocks were still abundant at that time. Meanwhile, research by Zulham (2005) revealed that subsidized capture fisheries on the North Coast of Java resulted in increased fishing effort and reduced fish stocks but did not always increase fisher's catch or

income. In other words, subsidies did not necessarily result in increased benefits for fishers, particularly for already fully exploited or overexploited stocks.[5]

In summary, fuel support measures do not seem to always reach their intended small-scale beneficiaries, as illustrated by the low realization rates and tend to primarily benefit boat owners. By incentivizing increased fishing effort, fuel support may also contribute to the decline in fish stocks in areas where stocks are fully exploited or overexploited, at the expense of communities that depend on fishing activities for their livelihood. This may call for better targeting of the subsidies toward small-scale fishers and ideally a reorientation of fuel support toward forms of support that are decoupled from fishing effort, such as direct income support. This program is thus a clear priority for a detailed evaluation. As a central-level program, such evaluations should look at differentiated impacts in the various provinces or fishing areas of the country.

5.3.3 Fixed-Cost Support

SOCIAL IMPACTS

Programs targeted at reducing fixed costs for small-scale fishers are intended to support food security and provide livelihoods in areas where very few alternatives exist. However, the requirement of a functional cooperative might be an obstacle for the most vulnerable communities to receive support. A cooperative must be officially registered and validated by the local fisheries extension officer. Furthermore, in most support schemes, the cooperative must submit a proposal to the DKP and are often represented by a member of the House of Representatives (DPRD) at either the local or provincial level during the process. Therefore, the recipients of a subsidy are likely to be those who have decent literacy, the capability to establish and manage an association, and a close relationship to a member of the DPRD. It should also be noted that, in general, there were no additional criteria based on socio-economic conditions or gender used to target the support provided to specific groups.

In North Sulawesi specifically, a lot of support is specifically allocated to the communities living in the outermost and isolated islands and to fishers that do not have motorized boats. In addition, the poverty eradication program provides a package of support measures for boat or engine acquisition, fish processing, and aquaculture packages. The recipient list is provided by the social agency of the province, which means only those living under the poverty line can access the subsidy (DKP North Sulawesi, Validation Workshop, November 23, 2020).

In general, vessels with engines provide safer fishing methods for fishers than non-motorized paddle boats, which can be dangerous. The loss of life of a fisher at sea is not only tragic, but leaves the families vulnerable to poverty in the absence of effective social safety nets. Engines also assist the fishers in expanding the fishing ground and species the fisher is able to reach, which can increase catches as result of the investment, provided it does not lead to stocks being fished beyond sustainable limits.

[5] See Zulham (2005).

Given the fisheries targeted by these support measures, it is likely that only men can receive the support. There are virtually no female fishers and boat owners in this type of fishery (tuna and pelagic). Women usually play a role in post-harvest activities and the marketing of the products. This is likely due to traditional gender roles rather than government policy. In North Sulawesi, however, there was one particular post-harvest support measure targeted specifically at women, which included the provision of traditional fish processing equipment and related training.

For the larger vessels (>10 GT) in all provinces, it is the vessel owner (who can also be a captain, or simply a businessperson) who receives the support and who then employs individual fishers to work on their vessels. Hence the subsidy supports the vessel owners, not fishers, directly, but they are then able to employ fishing crew on their vessels. Overall, the shortlisted programs seem to perform an important role in supporting poor fishing communities even if the most marginalized segments of the sector may face difficulties in accessing those benefits.

ENVIRONMENTAL IMPACTS

The MMAF and DKP guidance for budgeting support for fixed costs includes considerations for stock status in the granting of support measures. Based on our findings, the fishing sub-sectors that received most of the fixed-cost subsidies under the shortlisted programs in the three provinces are small- and medium-scale fishers and vessels that catch pelagic fish (mainly skipjack and yellowfin tuna and a variety of small pelagic fishes) using either mini-purse seine or handline fishing gears.

All the fixed-cost support measures examined (aside from one program for the provision of gillnets) mention a focus on vessels that target pelagic fish. It is not clear if the vessels are given to replace old vessels of similar size or if these vessels introduce new fishing capacity into the fishery. The only requirement mentioned to be able to benefit from the support was that the fisher be active in a cooperative verified by the Kabupaten (regency/district) or DKP Representative in the area. In practice, the fishing community makes the proposal to get vessel support and chooses boats that reflect their traditional fishing activities. Therefore, it is difficult to verify if all of the vessels are used for pelagic fishing, despite this being the stated objective.

Vessels below 10 GT are meant to fish within the 12 nautical miles of the territorial sea, but frequently fish further out in the EEZ. The larger vessels (above 10 GT) are meant to fish outside of the 12 nautical miles zone. The number of vessels benefiting from the support or their catches in the fishery is not precisely known, especially in the small-scale segment of the sector, as most vessels do not obtain adequate vessel registration, and their catches are unreported. A recent study estimated that 95% of the small-scale vessels in Indonesia were unreported (The PEW Charitable Trusts, 2019). The above-10 GT vessel category is somewhat better managed, in that vessels have to comply with registration, licensing, and other permitting and reporting requirements (The PEW Charitable Trusts 2019). However, even for these vessels, the logbook data is still of questionable quality. In general, IUU fishing activities in these sectors are related to smaller compliance issues with regard to various regulations, rather than outright illegal fishing.

In Indonesia, there are no actively enforced catch limits and no active efforts to manage fishing capacity and effort at sustainable levels through capacity or effort controls. The country is in the process of designing a harvest strategy for tuna fisheries in the archipelagic waters that cover all the waters of North-Sulawesi and Maluku, but it is not yet implemented, leaving weak management practices in place. Aceh province will not fall under the harvest strategy. Given the management context, it can be risky to have capacity-enhancing support programs that can put fish stocks at risk and go toward lowering the catch per unit effort, undermining the sustainability of the fishery.

Several small-scale tuna handline fisheries in Indonesia have been working toward Marine Stewardship Council (MSC) certification, which was awarded to some fisheries in Maluku in early 2021 (targeting yellowfin tuna). Some of these fisheries have already obtained Fair Trade certification (FAO, 2018). As part of the fishery improvements required for certification, fishers need to officially register and provide catch data as well as other legality, sustainability, and quality improvements.

Given that fixed-cost support in general is mostly intended to assist the tuna and small pelagic fishing sectors, it is these species' stock status that is the most important to look at. Most of the Maluku waters fall under fisheries management area (FMA) 714 and some under FMA 715 and FMA 718; North Sulawesi's water area falls under FMA 716 and 715; and Aceh under Indian Ocean FMA 571 and 572. All of Indonesia's small pelagic fisheries are considered as data poor, and the rudimentary stock assessments conducted for these stocks indicate that most stocks are either fully or over-exploited across the country(MMAF, 2017a). For large pelagic fish such as skipjack, bigeye and yellowfin tuna, the Western and Central Pacific tuna stocks (FMA 714, 716, 715, and 718) are currently not overfished and are not experiencing overfishing (TunaPacific, 2020). In the Indian Ocean (FMA 571 and 572), while some tuna stocks (skipjack) are considered to be exploited sustainably, others are subject to overfishing (albacore, bigeye tuna), or both subject to overfishing and in an overfished condition (yellowfin tuna, longtail tuna, narrow-barred Spanish mackerel) (Indian Ocean Tuna Commission, 2019).

This means that providing fixed-cost support for tuna fisheries targeting big pelagic stocks in the FMA 714, 715, 716, and 718, may be more acceptable than doing it in the FMA 571 and 572, where the stock status of several species is already a concern. However, support measures that generate additional fishing capacity in fisheries that are already close to—or approaching—their maximum sustainable level of exploitation, but are not yet overexploited, also entail significant risk of contributing to overfishing unless effective management is in place. The support measures given to fleets fishing for small pelagics across the country are also risky due to the apparent current level of exploitation, the data-poor nature of these fisheries, and their large role in food security in general, which makes them a priority for precautionary management. Finally, as noted previously, a significant number of group species are already considered overexploited in Indonesia's waters, including the waters of our three focus provinces. These include some stocks of reef fishes, shrimp, lobster, mud crab, and cephalopods (MMAF, 2017a). To the extent that fixed-cost support may end up increasing fishing capacity in these fisheries, it could have a particularly negative impact on their sustainability and contribute to the stocks' further depletion, which calls for careful evaluation.

Law No.45 of 2009, KKP defines the potential and allocation of fish resources in the Fisheries Management Area (FMA/WPP) of the Republic of Indonesia. This information covers eight important species groups, namely demersal, reef fish, shrimp, lobster, small pelagic, squid, tuna, and large pelagic non-tuna. This information may be used in the future to inform the allocation of support to marine fisheries by taking into account the potential and the amount of catch allowed for fisheries groups that exist in each FMA.

6.0 Conclusions and Recommendations

Indonesia's fisheries sector is an important source of nutrition, income and employment for the country's population. The Indonesian government, both at central and at provincial levels, rightly places a priority on supporting the sector. This report has sought to understand how that support is provided and, through a process of prioritization, to identify any programs which, in their specific contexts, may require further analysis to ensure they are supporting the long-term sustainability of the fishing communities they target.

Indonesia's support to fisheries is significant in absolute terms, at around IDR billion 2,067.9 (~USD 144 million) in 2018 up to IDR billion 11,012 (~USD 771 million) in 2019, although it remains relatively limited given the size of the sector, which is worth around USD 12.5 billion. The central government's support is largely focused on fuel-support schemes and spending for the construction and management of—and access to—shared infrastructure facilities. Together, these two categories accounted for roughly 90% of all support between 2017 and 2020. Smaller amounts are also dedicated to vessel construction, income support, marketing and promotion, support to fishing communities, or fisheries management. By contrast, provincial-level support focused largely on vessel construction, modernization, and related machinery and equipment. In Maluku and North Sulawesi, this form of support accounted for 60% to 80% of total spending. In Aceh, by contrast, 80% of support measures went to infrastructure.

Overall support measures, such as support to fishing infrastructure, marketing, and promotion or fishing community are either fully or partially delinked from production and entail limited risks of encouraging overfishing and overcapacity. Other programs, in particular support to fuel and support to fixed costs of vessels and engines, appear to be provided in potentially vulnerable contexts, where fisheries are fully exploited or where data on stock status is poor.

6.1 Priority Measures for In-Depth Assessments

Based on the information collected, this report identifies five specific support measures that would benefit from in-depth assessment of their socio-economic and sustainability impacts. These are:

CENTRAL-LEVEL PROGRAMS

- The distribution of subsidized fuel (kerosene and diesel) through the Fisher Dealer Solar Package (SPDN) and Fishers' Fuel Filling Station (SPBN)

ACEH PROVINCE

- Support for vessel construction provided under the program for procurement of fishing boats

MALUKU PROVINCE

- Support for vessel construction provided under the program for procurement of small-scale boats below 5 GT targeting large pelagic fisheries
- Support for vessel construction provided under the program for procurement of fishing vessels of 15 GT for small pelagic fisheries

NORTH SULAWESI

- Support the provision of engines to non-motorized small fishing boats
- The poverty eradication program involving transfers of engines, transfer of fishing vessels, fishing gear, and post-harvest equipment.

The current system of distribution of fuel support may encourage excessive levels of fishing for resources that are already fished beyond sustainable levels or approaching that point. This would appear to be a real risk for many fisheries where the support is available, as, according to government data, the majority of fish stocks are fully or overexploited. Preliminary evidence also suggests fuel support appears to provide a greater benefit to boat owners than to fishers, the intended beneficiaries of the program. An in-depth assessment could examine whether the fuel support system could be better targeted, both to fisheries where effort can be safely increased or to small-scale fishers. It could also examine whether alternative forms of support would be more effective at supporting fishers' incomes without encouraging additional fishing pressure.

While fixed-cost support measures can contribute to poverty reduction and livelihood security, they also tend to increase fishing capacity and could involve some risks when applied to stocks that are already overfished. More specifically, there is evidence that some fixed-cost support measures, which are mostly targeted at pelagic fisheries, are not always aligned with efforts to ensure these valuable fisheries remain sustainable sources of income and food security. For example, all of Indonesia's small pelagic fisheries are considered data poor, and existing assessments indicate that most stocks are either fully or over exploited. For large pelagics, while certain tuna stocks in the Western and Central Pacific are currently not experiencing overfishing, yellowfin tuna stocks in the Indian Ocean are considered overfished. The possibility that some of this fixed-cost support may also benefit other non-pelagic fisheries, some of which are overexploited, is an additional and important risk.

Some specific support measures for fishing engines appear to warrant further investigation because of their potential negative impacts on the long-term sustainability of the fisheries they target. Measures supplying auxiliary gear (e.g., fish aggregating devices) to increase catches in small pelagic fisheries warrant further investigation, in particular because of the fully exploited and data-poor status of these fisheries. The provision of gillnets in many provinces also raises particular sustainability concerns, as this fishing technique is unselective and can impact both juvenile fish and endangered, threatened, or protected species.

Finally, there appears to be uncertainty around the effectiveness and equity of the distribution of some support for fixed costs. Of the provinces studied, only North Sulawesi has special programs that target remote outer islands and people identified as living in poverty. In all other cases, support was distributed through a local cooperative, which can be subject to

local politics and biases when they represent the interests of individuals with high capacity to engage in administrative processes. As with the fuel support program, an in-depth assessment of these fixed-cost support programs could examine how they could be better targeted to increase fishing capacity only in fisheries where this was sustainable, but more generally to assess whether alternative forms of support could be provided that would be effective in supporting fishers' incomes without increasing fishing capacity in fully exploited fisheries.

6.2 Monitor for Inclusive, Sustainable Profitability

The in-depth assessments suggested above could be complemented with ongoing monitoring (perhaps over a timeframe that resources allow) of the effectiveness of Indonesia's fisheries support measures. To be most effective, this monitoring could take a broader perspective than currently appears to be used in policy evaluation in the sector. Many authorities in Indonesia tend to use the level of fish production as the sole indicator of success in evaluating support programs to fisheries. With production in the short term as the main policy objective, providing fuel or boats directly to the community is seen as the best policy option, although this may come at the expense of other priorities like sustainability or post-harvest support.

This focus on short-term growth may even be counterproductive to production in the longer term. To the extent that support measures encourage excessive fishing pressure on stocks that are already fished at or beyond maximum sustainable levels, they could end up undermining the productivity and profitability of these fisheries, together with negative consequences for all those who depend on them for their nutrition and livelihoods. Official assessments of fisheries support measures could begin to consider a broader range of factors relevant to inclusive and sustainable profitability, such as the status of stocks or the degree to which support reaches target groups.

6.3 Improve Transparency of Official Data

The in-depth and more general assessments of the measures above would be greatly facilitated by more transparent official data. While some information regarding budget allocation and realization is available through government publications or dedicated websites in certain provinces, most public data is either incomplete or is highly aggregated. As a result, much of the data used in this report was sourced directly from government agencies. Collating and making available online key statistics about Indonesia's fisheries, including the state of stocks, production, and socio-economic indicators, as well as the support measures provided (both budgeted and actual expenditure) would greatly facilitate both independent and internal government monitoring and analysis of the sector. It would also promote more informed policy monitoring and discussion at the national level. In this respect, there may be scope for international cooperation with international institutions (e.g., FAO or OECD) in data collection and analysis (e.g., indicators).

Fishing is both a cultural and an economic mainstay of Indonesian life. The fact that many of the country's most valuable fish stocks are already fully or over exploited points to the potential vulnerability of the ecology underlying this very important sector, and, consequently, the vulnerability of the livelihoods it supports. In-depth and more general assessments of

specific fisheries support policies in their contexts, improved transparency of national data on fisheries and the support they enjoy, and a reconsideration of policy evaluation metrics toward assessing the sustainable profitability of the sector will help ensure Indonesia's policies support fishing livelihoods for decades to come.

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Appendix 1. Details on Subsidy Methodology and Calculations

This appendix provides a description of the methodological approach adopted in the production of IISD national inventories of fisheries support measures. It covers four main aspects namely (i) the definition of support, (ii) the classification or categorization of support programs (iii) methods for quantifying support and (iv) a framework to identify priorities for action.

Defining Support to the Fishery Sector

IISD's inventories adopt a broad concept of support measures based on the definition of a subsidy provided in Article 1.1. of the WTO's ASCM (1994). This internationally agreed definition covers a wide range of support measures encompassing any financial contribution—or any form of income or price support—by a government or public body within the territory of a member, that confers a benefit (see Box A1). A financial contribution entails either a direct transfer of fund, revenue foregone, the provision of goods or services or the purchase of goods.

Box A1. Article 1.1 of the WTO's ASCM

"1.1 For the purpose of this Agreement, a subsidy shall be deemed to exist if:

(a)(1) there is a financial contribution by a government or any public body within the territory of a Member (referred to in this Agreement as "government"), i.e. where:

i. a government practice involves a direct transfer of funds (e.g. grants, loans, and equity infusion), potential direct transfers of funds or liabilities (e.g. loan guarantees);

ii. government revenue that is otherwise due is foregone or not collected (e.g. fiscal incentives such as tax credits);

iii. a government provides goods or services other than general infrastructure, or purchases goods;

iv. a government makes payments to a funding mechanism, or entrusts or directs a private body to carry out one or more of the type of functions illustrated in (i) to (iii) above which would normally be vested in the government and the practice, in no real sense, differs from practices normally followed by governments;

or

(a)(2) there is any form of income or price support in the sense of Article XVI of GATT 1994;

and

(b) a benefit is thereby conferred."

It may be important to note that, compared to other approaches found in the literature, this definition does not cover the following elements:

1. Governments to government transfers (e.g., development cooperation or government to government access fees).
2. Rents generated from fisheries management policies (e.g., the value of fishing quotas).
3. Transfers resulting from regulations (e.g., environmental programs, protection from competition from foreign fleets).
4. The "lack of interventions" as a result of government inaction (e.g., free access to fishing grounds, lack of pollution control, or non-implementation of existing regulations).
5. Externalities and public goods (e.g., damages to marine ecosystems).

In accordance with Article 1.1. (iii), general infrastructure available or accessible to all or nearly all entities in the economy are not included in the present inventories. However, infrastructure provided to or for the advantage of only a limited group of entities such as fishing landing zones or storage and marketing facilities have been included following WTO's jurisprudence.[6] Similarly, fundamental research activities independently conducted by higher education or research establishments are not considered as a subsidy provided that they are not linked to industrial or commercial objectives.[7] By contrast, R&D spending aimed at enhancing productivity of the fisheries sector or the management of marine resources are covered.

In terms of scope, the present inventory is circumscribed to support measures that target the fisheries sector as opposed to measures benefiting multiple sectors or the economy at large. It is, furthermore, limited to marine captures, excluding support provided to aquaculture production and inland fishing. Within those limitations, the analysis covers all support measures received by fishers, either individually or collectively as well as support provided to post-harvest operations such as storage, processing, marketing, and promotion of fish products. When support measures target post-harvest activities, however, the amount of support is adjusted to reflect the share that goes to marine capture as opposed to inland fisheries or aquaculture (see Section 3 below).

In practice, delineating the boundary between support measures that are specific to the fisheries sector and those that are not can be challenging not least because support can come from programs that also apply to other sectors. For example, fishers may benefit from horizontal safety net programs such as general social security benefits. Here, the inventory adopts a two-step approach. First the relevant program must clearly identify the sector as a beneficiary of the policy. Second, the rate of support must be different from other sectors. In other words, a social program is included if it provides a specific treatment and a differentiated benefit to fishing communities. Finally, a similar situation may occur with horizontal programs that are more directly linked to production, such as fuel de-taxation schemes. While some may directly target the fisheries sector, others can be part of broader energy policies that

[6] See WTO Panel Report, EC and certain member States – Large Civil Aircraft, paras. 7.1036-7.1037(WTO, 2019).

[7] See ASCM, Article 8.2 (a), footnote 26. (WTO 1994).

distinguish between different groups of users.[8] Given their potentially large impact on production, these programs are nonetheless included in our calculations even if they may not be considered as specific to the fisheries sector *stricto sensu*.

The Classification of Fisheries Support Measures

Support measures covered in the inventory are compiled in a preliminary database and organized according to different criteria. A first classification is based on the mechanism through which support is provided. This is the approach envisaged in the ASCM, which makes a distinction between direct transfers or potential direct transfers of funds or liabilities; government revenue foregone; government provision and purchase; and income or price support. In our database, these categories are further disaggregated in subgroups as illustrated in Table A1.

Table A1. Classification based on the mechanism through which the support is provided

Direct transfer of funds	Grants and other direct transfers of fund
	Credit-related subsidies • Interest rate subsidies • Preferential loans • Debt forgiveness • Export insurances • Loan guarantees and insurance programs
	Government equity participation
Revenue foregone or note collected	Accelerated depreciation and other tax deferrals
	Credits, refunds, and exemptions from income tax
	Exemptions and relief from indirect taxes
Government provisions and purchase	Government provisions of goods and services
	Government purchase of goods
Income or price support	

A second classification is based on the type of support. For a given program, the type of support is defined as the conditions under which the support is provided to fishers or the sector as a whole. Such classification allows the determination of how a particular transfer may affect the behaviour of fishers and gives a first indication on the likely impact of different programs on the resource. Building on the classification developed by the OECD (2016), we distinguish between support to individual fishers and general services support

[8] For example, an excise tax can be specifically directed at road infrastructure with all fuel purchased for off-road use (e.g., agriculture, mining, fisheries) being excluded.

targeting the sector as whole. Table A2 provides a detailed overview of the different types of support applied in our inventories and a short description of each type of support.

Table A2. Classification based on type of support

Type of Support	Description
A. Support to Individual Fishers	
A.1 Variable-cost input-based support	Transfers reducing the cost of variable inputs such as fuel, ice, bait, etc.
A.2 Output-based support	
A.2 (i) Direct or indirect transfers based on marine capture	Transfers to fishers arising that increase in magnitude depending on marine capture
A.2 (ii) Induced transfers through market price support	Transfers arising from policy measures that affect the level of domestic prices
A.3 Fixed-cost input-based support	
A.3 (i) Vessel construction/ purchase	Support for acquisition or construction of new vessels
A.3 (ii) Support to modernization	Support covering the cost of modernization of old vessels
A.3 (iii) Support to other fixed costs	Other capital costs, including human capital but also equipment such as gear, engine, processing machinery, fish-finding technology, etc.
A.4 Income support	
A.4 (i) Income support	Transfers that supplement income or revenue, including direct payments to vessel owners or crew
A.4 (ii) Special insurance for fishers	Measures reducing employers' social security contributions and insurance schemes for fishers (e.g., health insurance and pension schemes)
A.5 Reduction of productive capacity	Payments conditioned on the fact that the recipient must reduce their capacity to fish either temporarily or permanently
A.5 (i) Transfers aimed at reducing fixed/variable costs	Vessels buybacks and buyouts of quotas
A.5 (ii) Transfers aimed at reducing labour	Transfers financing training, education, early retirement plans and other transition costs to promote economic diversification
A.6 Miscellaneous transfers to fishers	Transfers to fishers that cannot be allocated to the above categories (e.g., due to a lack of information)

Type of Support	Description
B. General Services Support	
B.1 Access to other countries' waters	Payment for access to other countries' waters (e.g., government-to-government payments for the right of access, for a country's fishing fleet, to operate in another country' EEZ)
B.2 Provision of infrastructure	
B.2(a) Provision of infrastructure for club goods	Payments supporting the construction, management, and access to shared facilities (when not providing exclusively public goods)
B.2(a)(i) Capital expenditures	Injection of capital in the construction and maintenance of infrastructure
B.2(a) (ii) Access to infrastructure	Support to reduce the cost of accessing and using infrastructure
B.2(b) Provision of infrastructure for public goods	Payments supporting the construction, management and access to shared facilities (when providing exclusively public goods e.g., lighthouse)
B.2(b)(i) Capital expenditures	Injection of capital in the construction and maintenance of infrastructure
B.2(b) (ii) Access to infrastructure	Support to reduce the cost of accessing and using infrastructure
B.3 R&D	
B.3(i) Production-related R&D	Transfer for R&D expenditure in the fishery sector aimed at increasing productivity of fishing
B.3(ii) Management related R&D	Transfer for R&D expenditure in the fishery sector, if aimed at improving resource management
B.4 Marketing and promotion	Transfers financing services to marketing and promotion of fish product
B.5 Support to fishing communities	Transfers supporting improvements of livelihoods and economic diversification in fishing communities e.g., housing facilities, food aid, education and training, new village infrastructure, IT
B.6 Management of resources	
B.6 (i) Management expenditures	Expenditures associated with resource management programs
B.6 (ii) Stock enhancement programs	Expenditure associated with fish stock rebuilding

Type of Support	Description
B.6 (iii) Enforcement expenditures	Expenditure associated with enforcement of management measures
B.7 Miscellaneous transfers to general services	Financing other general services that cannot be disaggregated and allocated to the above categories (e.g., due to a lack of information)

Finally, the classification of support measures is complemented by a series of additional information about the programs to be included in the database through a system of labels. As illustrated in Table A3, some of these labels contain critical information to assess the potential impact of a program, like the link to production, the restrictions to specific species, gears, or areas or the type of fishing (e.g., small-scale, artisanal vs. large-scale industrial).

Table A3. Names and definitions of labels

Type of label	Description	Objective
Production-linked	Indicates if the payment increases with the level of harvest.	Shows if a support measure can potentially impact effort or harvest.
Type of fishing	Indicates if the support is limited to subsistence / artisanal fishing, to industrial fishing or to both.	Provides additional details on the type of fishing that is supported and the potential impact of support measures.
Restricted to specific species or gear or area	Indicates if the support is conditioned on targeting a specific species, using a specific gear or if it is available only in a geographically limited area.	As behaviour constraints, this can inform regarding the potential impact of the transfer.
Vessel length limits	When support focuses on a specific vessel length class, the minimum or maximum vessel length.	Provides information on the incidence and distribution of a transfer.
Kind of recipient	Identifies the recipients of the transfer: fishers, owners of fishing vessels, or actors involved in post-harvest activities.	Informs regarding distribution of benefits of a transfer.

Methods for Support Estimation

Support measures have been compiled based on government sources and reliable public data including WTO subsidy notifications, fishery department budget documents, policy notes, annual reports, and other government sources. Amounts correspond to expenses effectively

incurred as opposed to budgeted resources. Overall, the value of direct transfers of fund or government purchase of goods and services is usually available through budgetary spending. However, other forms of support such as price transfers or support based on revenue foregone sometimes need to be estimated. At a broad level, Article 14 of the ASCM establishes the methodology to be followed for some forms of support. Beyond these broad guidelines, IISD's GSI produced in 2010 a survey of current practices for subsidy estimations(Steenblik at al., 2010). This manual serves as a guide for calculating the value of support measures identified in the inventory.

Prioritization Framework

While the support estimates under the present inventory are useful in their own right, they may not be sufficient to help promote an informed national discussion about which type of support may be undermining or advancing sustainability. To address this concern, while acknowledging the need to base such analysis on solid empirical evidence, IISD has developed a prioritization framework aimed at:

1. Identifying policies that are more likely to undermine sustainability and which should be targeted as a priority for further **evaluation**, so that governments have better evidence on their economic, social, and environmental impacts.
2. Identifying the forms of support that are typically **more effective** from a sustainability perspective, considering economic, social, and environmental objectives.

Ultimately, this framework should help governments identify policies to be prioritized for reform, after a thorough evaluation—ideally by a national institution—has confirmed the need for redesign, replacement, or removal. Overall, the approach is designed as a three-step filtering exercise to be applied sequentially.

The first step consists in prioritizing policies according to the incentives they create and the environmental and socio-economic impacts that are typically associated with them based on empirical analysis by the OECD,[9] UNEP,[10] and Sumaila et al.[11] The ranking does not reflect an absolute or definitive value judgment on each type of policy, but rather an indication of the overall level of **risk** associated with different types of programs. It starts from the assumption that support measures targeting individual fishers are more likely to alter the marginal benefits or costs of fishing than support targeting the sector as a whole. Similarly, support programs that are closely linked to production are more likely to incentivize overcapacity and overfishing than those clearly decoupled from production. Building on the classification of support measures described above, Table A4 divides programs between support for individual fishers or companies (Category A) and general services (Category B). Under both columns, programs are ranked vertically according to their link to production, starting from support that increases according to the level of capture or inputs used, through programs that are formally decoupled from production but may have an impact on production, to programs that have no effect

[9] See OECD (2017) and Martini & Innes (2018).

[10] See UNEP (2017).

[11] See Sumaila et al. (2019).

on production or even contribute to enhancing the size of stocks. In short, programs falling under the top left part of the table are likely to have more direct effects on fishing capacity and effort than those in the bottom right part of the table. Programs in between may have more ambiguous effects, depending on how they are designed.

Table A4. Categories for prioritizing different types of fisheries support measures for evaluation

	Beneficiaries	
Link to production	**Category A: Support for individual fishers or companies**	**Category B: General services**
Payments linked to fishing effort	A.1 Variable-cost input-based support	
Payments linked to the level of harvest	A.2 Output-based support	B.1 Access to other countries' waters
Payments linked to fishing capacity	A.3 Fixed-cost input-based support	
Payments potentially affecting the level of fishing effort or fishing capacity	A.4 Income support A.5 (i) Transfers aimed at reducing fixed/variable costs	B.2(a) Provision of infrastructure for club goods B.3(i) Production-related R&D
Payments mostly decoupled from fishing effort or fishing capacity	A.5 (ii) Transfers aimed at reducing labour	B.2(b) Provision of infrastructure for public goods B.4 Marketing and promotion B.5 Support to fishing communities
Payments contributing to enhancing fish stocks		B.3(ii) Management-related R&D B.6 Management of resources

Input- and output-based supports in Category A are ranked most highly because they typically incentivize fishing capacity and fishing efforts and are relatively inefficient in improving fishers' incomes. They also tend to disproportionately favour large-scale segments of the sector, at the expense of small-scale artisanal fishing(Martini & Innes, 2018). Support to vessels and other fixed costs are next in order of priority because they can contribute to long-term overcapacity. While such policies can be designed to support small-scale fisheries, in practice many of them predominantly benefit large-scale vessels.[12] Income support can be essential for safeguarding the welfare of poor and vulnerable populations and tend to benefit most small-scale operators and owners,[13] but such policies can still be harmful for resource sustainability if they

[12] *Ibid.*

[13] *Ibid.*

discourage exit from the industry, when a resource has been overexploited. The lowest-ranked policy type in Category A is support to reduce productive capacity, in the form of training, education, or early retirement schemes.

Under Category B, payments to access other countries' waters are clearly linked to production. They almost exclusively benefit large-scale industrial fishing and directly contribute to increasing fishing effort. Infrastructure payments and R&D support may have impacts on production depending on how they are designed. For example, some elements of fisheries infrastructure (such as lighthouses or navigation equipment) provide relatively pure public goods, while others, like landing facilities, are more excludable and therefore more like club goods. R&D to improve bottom trawling (for example) may be more harmful than research aimed at improving resource management. Transfers, financing, marketing and promotion services and support to the livelihood of fisheries communities (e.g., through housing facilities, food aid, or education) are usually clearly decoupled from production. Finally, management services are virtually always positive from environmental and socio-economic perspectives, not least by improving the status of stocks.

The second step consists of prioritizing programs that represent a large absolute amount or a significant share of national, state-level support. Small programs may have important impacts in specific contexts, but if analytical and policy resources are scarce, it is important to prioritize support measures that have larger and more widespread impacts. In practice, certain forms of support are likely to involve more resources than others. Typically, large infrastructure projects or income support targeting a high number of recipients will tend to be very significant. On the other hand, support linked to investment decisions in the form of low-cost loans may involve smaller amounts but have significant impacts in attracting additional private capital. In other words, comparing absolute amounts across different categories of support may be misleading. To address this concern, step two should identify the largest programs under key categories separately. The exact threshold for inclusion under each category will depend on the data collected. It could be expressed in such a way so as to cover a certain percentage of all support programs or of the value or volume of total wild marine capture.

Finally, the third step consists of prioritizing programs that are being implemented in vulnerable contexts. It is based on the assumption that the impact of support measures depends not only on the types of incentives they create but also on context-specific variables such as the existing capacity of a particular fleet or the management regime in place.[14] In other words, policy evaluation and potential policy reforms may be most urgent in areas where overfishing is already a problem, and arguably less urgent when support plays a critical role in helping vulnerable segments of the sector.

From an environmental perspective, we define “vulnerable contexts” as jurisdictions or fisheries where:

- Fish stocks are already overexploited, or projected to be so soon

[14] For example, an under-exploited stock might withstand increased harvesting for a while, whereas an already over-exploited stock will rapidly become depleted as a result of support policies. Similarly, effective management measures can moderate the capacity enhancing effect of support by controlling catches and limiting effort.

- Fishing capacity is already fully or over-developed, or projected to be so soon
- Management measures do not explicitly include enforceable and sustainable catch limits.

Where official government data exist on stocks, capacity, and management regimes, these are used as a primary information source. Where these sources are not available, we rely on proxy indicators such as the evolution of catches over time or fleet data. Other context-specific elements include the extent to which the support is more or less concentrated on vulnerable segments of the sector, with the assumption that policies heavily skewed toward large-scale industrial fishers are less likely to be contributing to essential needs and poverty reduction for the most vulnerable and marginalized. Indicators to take this dimension into account include the information gathered using labels described in Table A3.

Appendix 2. The Various Impacts of Support Measures Under Different Management Regimes

IISD's proposed framework for the assessment of fisheries support measures is based on a review of key publications in expert literature. These sources provide the theoretical underpinning for any analysis of support measures by explaining how different forms of support create different types of incentives which in turn will have different effects on fishing activity and, depending on the management measures in place, different effects on the sustainability of the resource (UNEP, 2017).

The first graph of Figure A1 below presents the theoretical basis for analysing the impact of subsidies; a bioeconomic model of fisheries known as the Gordon-Shaefer model. If access to fishing resources is unrestricted, increase in fishing effort will initially result in an increase in total revenue from fishing, but only up to a certain point, after which extraction rates exceed the ability of the stocks to recover and catches decline with additional effort. In such an open-access scenario, fishing effort will continue to increase up to the point where the total cost of fishing equals revenue (E3).

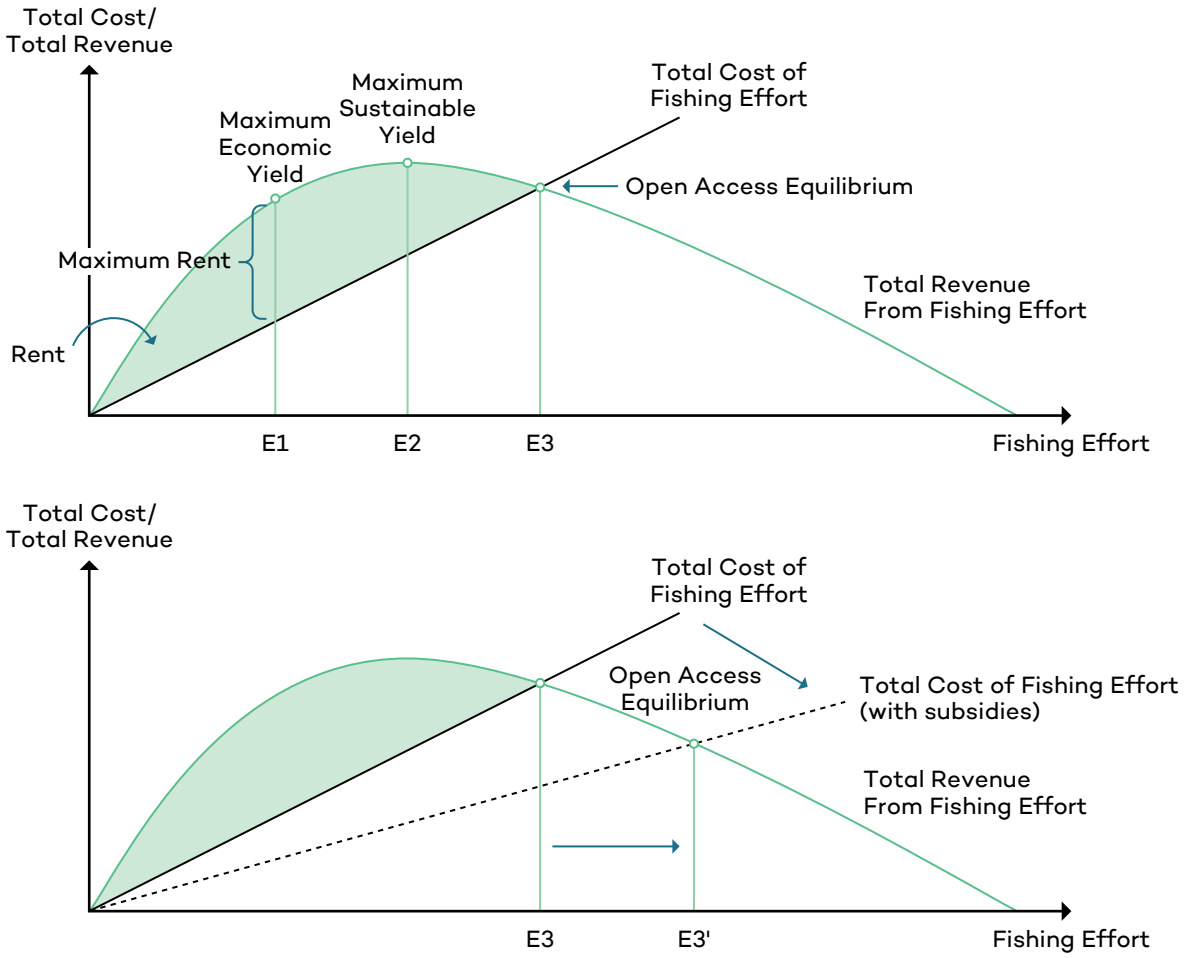
A different outcome may be achieved if management measures limit total fishing efforts to the desired harvest level. For example, if the objective is to maximize rent from fishing, the target fishing effort should be established at the level of maximum economic yield (MEY – E1)—i.e., where the difference between the revenue and the cost of fishing is the largest. If the objective is to maximize capture, management effort should target the maximum sustainable yield (MSY – E2)—i.e., the largest amount of fish that can be sustainably harvested from a particular stock. In the absence of such management measures however, the point where total costs equal total revenues usually corresponds to a level of fishing effort that exceeds MSY.

The second graph illustrates how the granting of support that reduces the cost of fishing further exacerbates this problem because the support moves the cost of fishing curve downwards. This results in a new open access equilibrium, corresponding to a higher level of fishing effort (E3'). While initially this may allow more fishers to enter the sector, the wrong kind of support can ultimately reduce revenues generated by fishing and further contribute to depleting stocks on which fishing communities rely for their livelihood.

This explains why support measures whose effect is to reduce the cost of fishing or increase revenues from fishing operations tend to have a more direct impact on the sustainability of stocks than support that is more decoupled from production, such as management services, R&D, education or infrastructure. That said, the impact of support measures does not depend solely on the types of incentives they create. It also relies on context-specific variables such as existing fishing capacity or management regimes. For example, an under-exploited stock might withstand increased harvesting for a while, whereas an already overexploited stock will further deplete if subsidization leads to increased fishing pressure. Similarly, effective management measures can moderate the capacity enhancing effect of support measures by controlling

catches and limiting effort. In other words, any assessment of the impact of fisheries support is, by definition, highly context specific.

Figure A1. The Gordon-Schaefer Bioeconomic Model in Open Access Fisheries



Source: Adapted from Sumaila et al., 2013.

In a 2018 analysis, the OECD has attempted to understand how different forms of support generate different effects under different management regimes (Martini & Innes, 2018).

The authors focused on six types of subsidies:

1. Fuel subsidies
2. Subsidies to other input use such as gear, bait, or ice
3. Output subsidies (i.e., transfers made on the basis of the price or volume of fish)
4. Payments based on fishers' income such as employment insurance, disaster relief, or wage subsidies
5. Vessel construction or modernization
6. Other investment in fishing operations including business and human capital.

Using a bioeconomic model of the global fishery, they then modelled how an additional USD 5 billion of support through each one of the above subsidy types separately would affect:

1. Fishing effort (e.g., hours trawled per day, or number of hooks set per day)
2. Fishing capacity (i.e., the size of the fleet)
3. Fishers' income
4. Stock depletion.

In doing so, the analysis looks at two possible management scenarios: a situation of open access; and a situation of effective TAC. The results of this analysis are summarized in Figure A2. Support measures were ranked from 1 to 6, based on their contribution to a given impact, with 1 representing the highest impact and 6 the lowest. The colour codes indicate the relative impacts of each policy category, expressed as a proportion of the effect of the policy with the largest impact. For example, support for fisher's income was estimated to have between 60%–79% of the effect on fishing effort as input-based support. Overall, Figure A2 shows that all six forms of support have the potential to provoke overfishing, increase fleet capacity or lead to fish stocks being depleted, but their effects can vary significantly. The fisheries management system can mitigate some of these impacts but not eliminate them entirely.

The OECD work also offers insights into which types of support have the greatest impacts. Support that reduces the cost of inputs purchased by fishers—including fuel—and output support generates the largest increase in fishing effort, and risks on fish stocks. They also contribute the least to enhancing fishers' income. Vessel support contributes most directly to increased fishing capacity, but has relatively less impact on stocks or fishing effort. Under open-access conditions it also contributes most to fishers' income. Payments based on improving fishers' human capital and income subsidies provide the greatest benefit to fishers and have relatively less tendency to increase fishing effort.

Figure A2. Relative performance of the fisheries subsidies by impact

	Impact on fishing effort		Impact on fishing capacity (size of fleet)		Impact on increasing fishers' income		Impact on reducing the size of the stocks	
Subsidy	**Open Access**	**TAC**	**Open Access**	**TAC**	**Open Access**	**TAC**	**Open Access**	**TAC**
Input use	1	1	5	6	5	5	1	1
Output	2	3	3	3	4	3	2	3
Fuel use	3	2	4	5	6	6	3	2
Fisher's income	4	4	2	2	3	1	4	4
Fisher's capital	5	6	6	4	2	4	5	6
Vessels	6	5	1	1	1	2	6	5

Percent impact: -20–0% | 1–19% | 20–39% | 40–59% | 60–79% | 80–99% | 100%

Note: The number indicates the ranking, with 1 being the type of subsidy with the highest impact and 6 being the type of subsidy with the lowest impact.

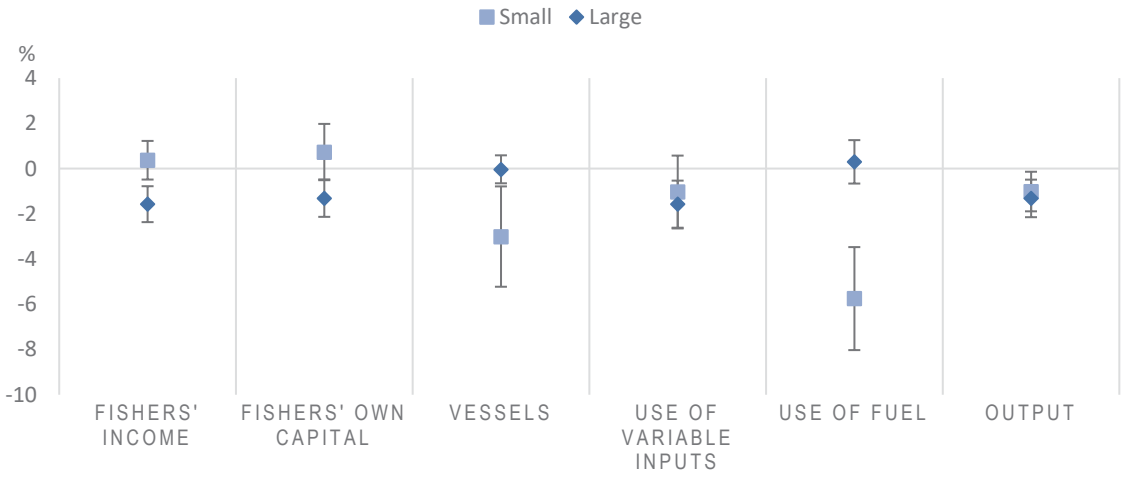
Source: Adapted from Martini & Innes, 2018.

The same OECD study also models how these measures affect different segments of the industry, including small scale and large-scale fishers. Figure A3 shows how the same USD 5 billion increase in support would affect harvest under an open-access regime, depending on which of the six subsidy categories were adopted. It projects that fuel subsidies allow large-scale fishers to increase their catches, but largely at the expense of small-scale fishers, who see their catches reduced because of overfishing. Similarly, small-scale fishers suffer most directly from overfishing induced by an increase in subsidies to vessels. By contrast, subsidies to income or business and human capital enable small-scale fishers to increase their catches at the expense of large-scale fishers.

Disaggregating the results further, Figure A4 shows how different forms of support affect income under an open-access regime among different beneficiaries including owner, crews, or operators, both in the large-scale and small-scale segment. The results show how fuel, inputs, and output subsidies contribute the least to increasing income. In the case of fuel subsidies, they even result in lower revenues for small-scale owners and operators. By contrast, support for vessels contributes the most to increasing income, but distribution of benefits is highly skewed in favour of vessel owners, sometimes at the expense of small-scale operators. The second largest contribution to income comes from support to business and human capital.

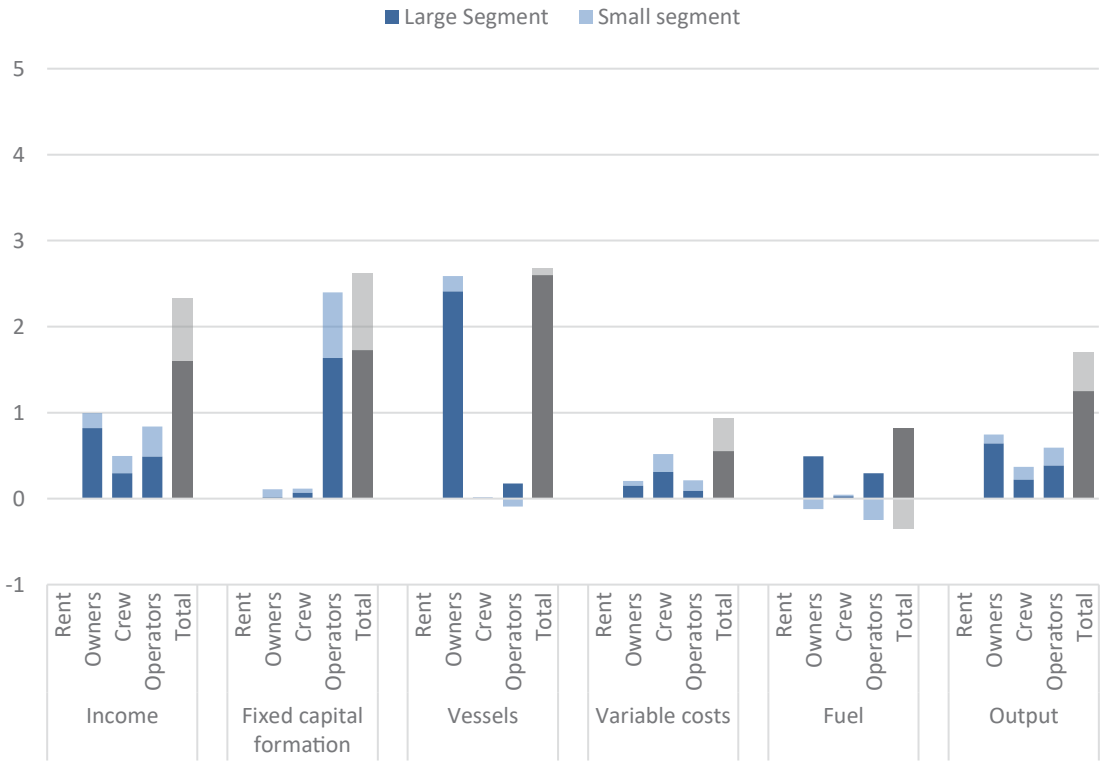
In this case however, most beneficiaries are operators. Finally, income support benefits more evenly all different kinds of beneficiaries.

Figure A3. Change in harvest in open-access regime by segment, percentage (%)



Source: Martini & Innes, 2018.

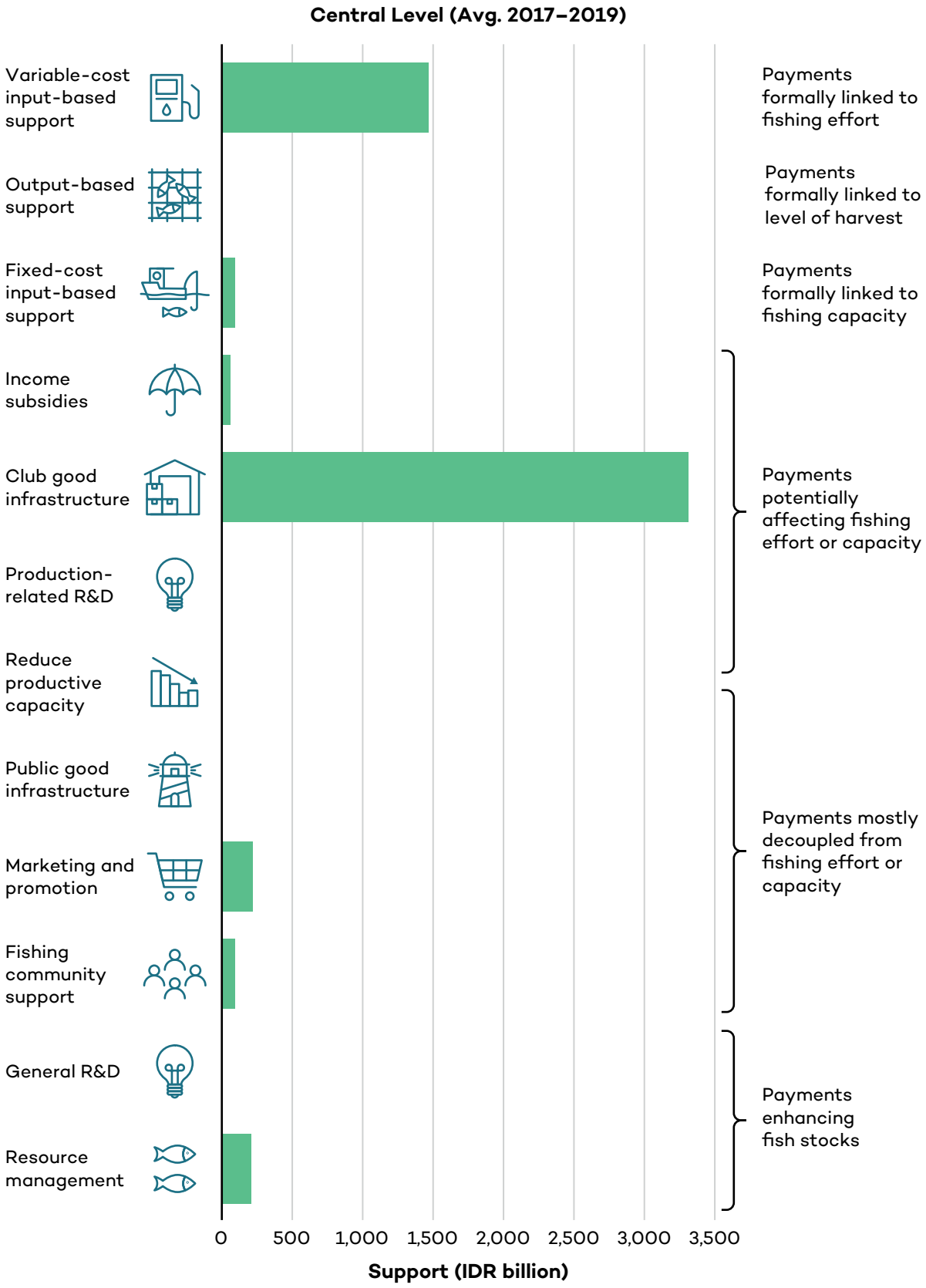
Figure A4. Change in income under open-access regime by beneficiary and segment, USD billions

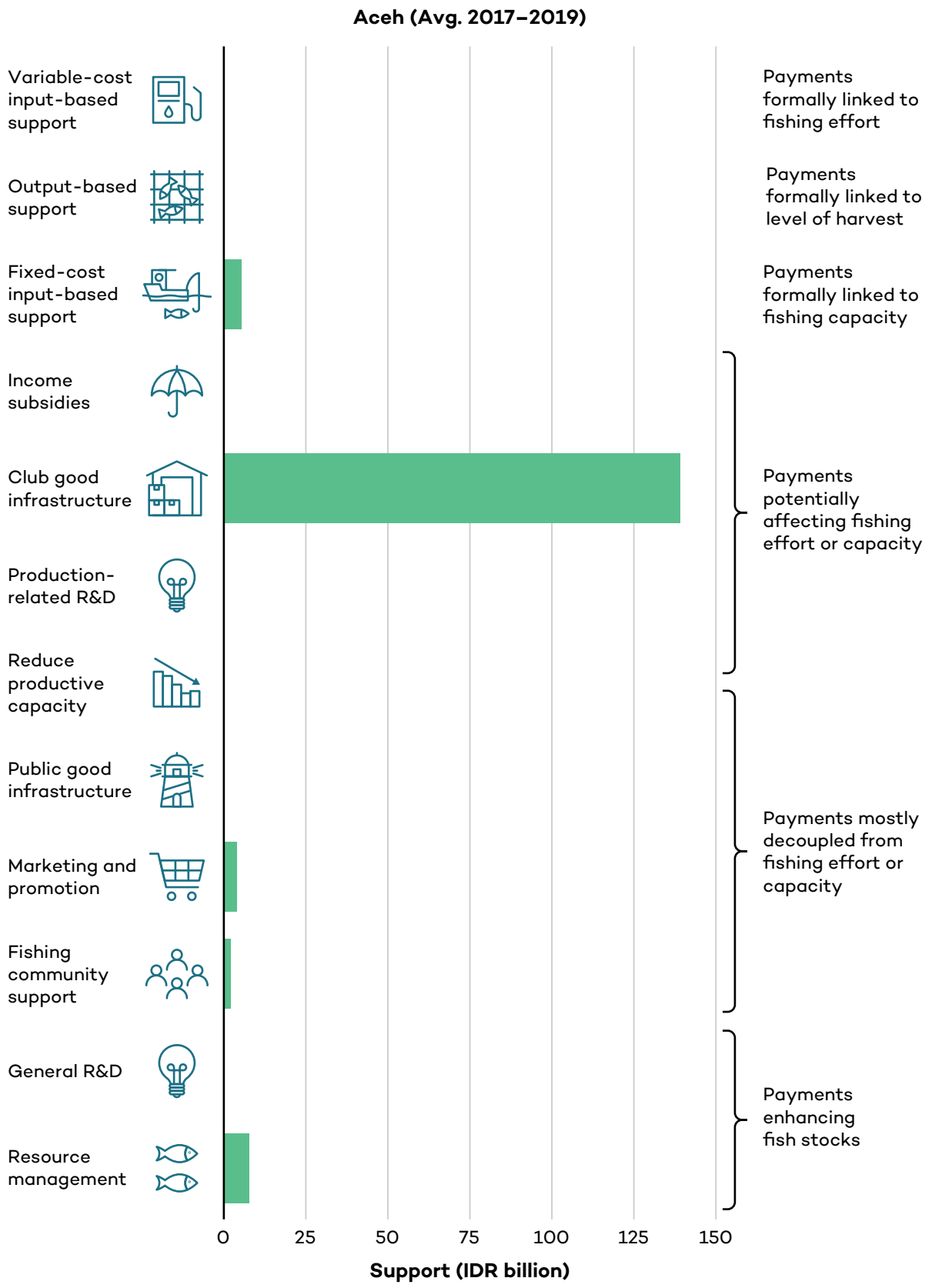


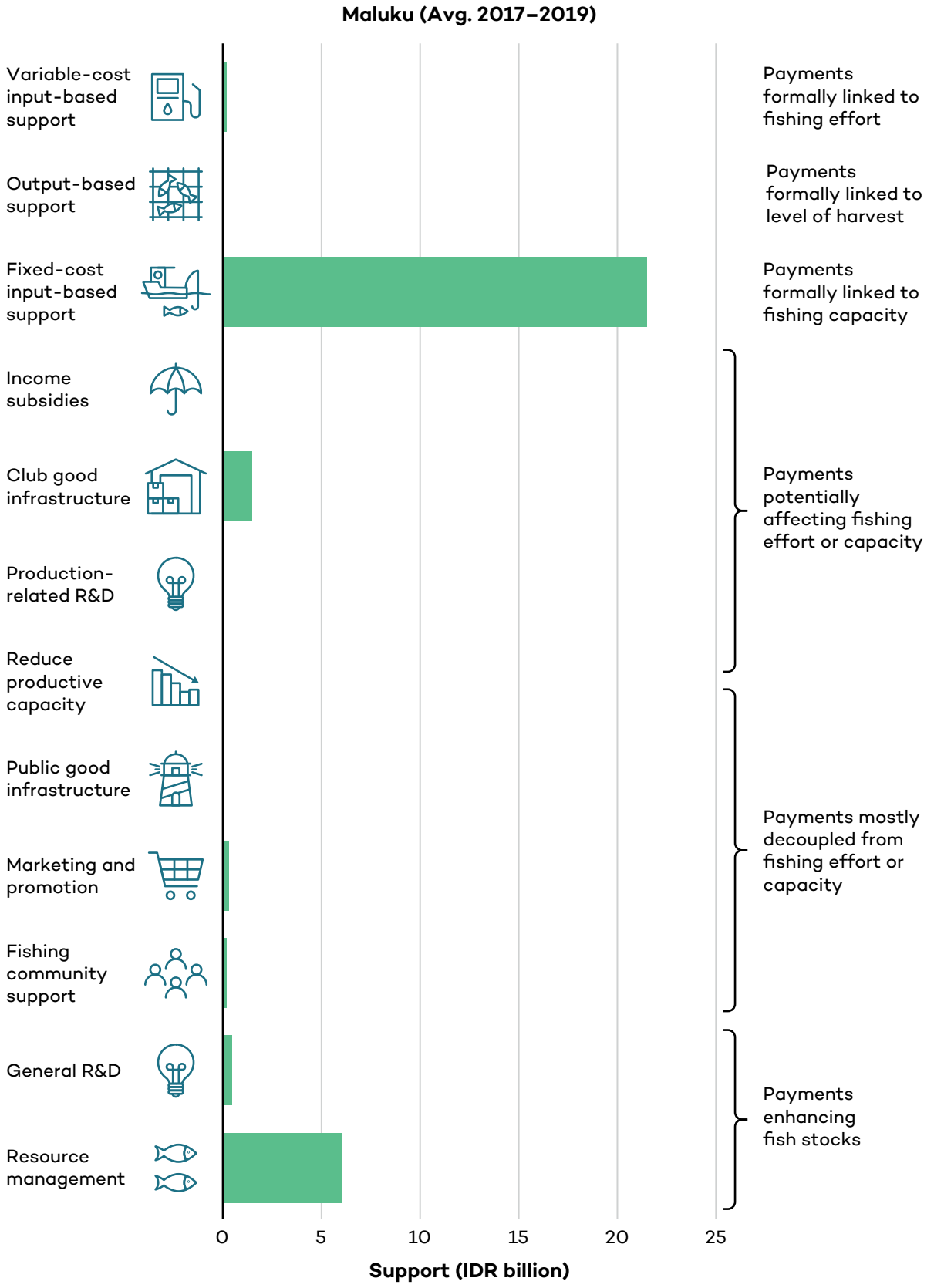
Notes: With reference to the additional USD 5 billion of support, a value of 5 indicates 100% transfer efficiency, while 4 would be 80% and so on. Under open access, no resource rents are generated by the fishery. Payments based on fishers' income are assumed to benefit owners, operators and crew while payments based on fishers' own capital benefit operators and payments based on vessels benefit owners.

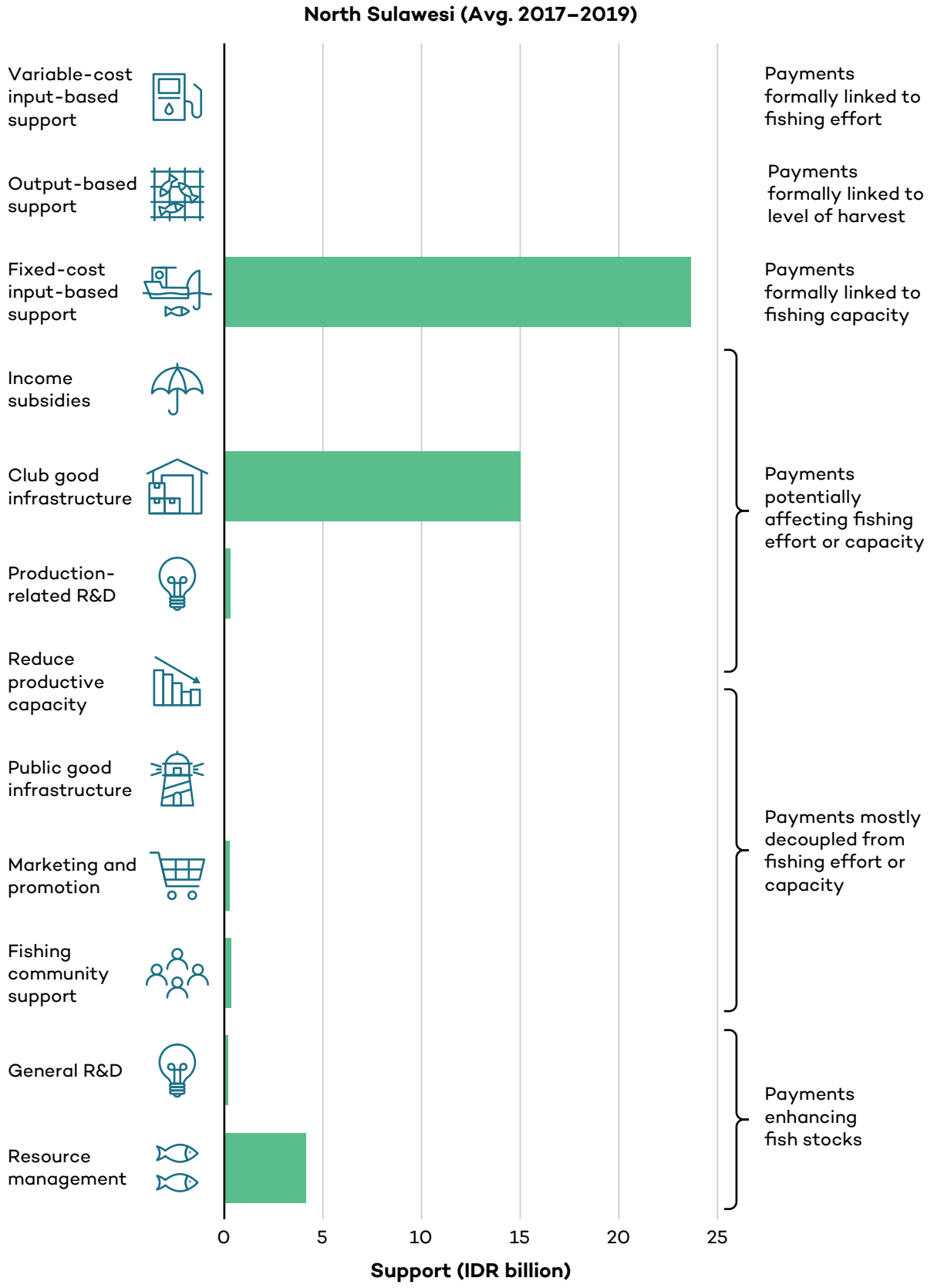
Source: Martini & Innes, 2018.

Appendix 3. Average Support by Categories at the Central and Provincial Levels




Aceh (Avg. 2017–2019)
Variable-cost input-based support
Output-based support
Fixed-cost input-based support
Income subsidies
Club good infrastructure
Production-related R&D
Reduce productive capacity
Public good infrastructure
Marketing and promotion
Fishing community support
General R&D
Resource management
Payments formally linked to fishing effort
Payments formally linked to level of harvest
Payments formally linked to fishing capacity
Payments potentially affecting fishing effort or capacity
Payments mostly decoupled from fishing effort or capacity
Payments enhancing fish stocks
0
25
50
75
100
125
150
Support (IDR billion)


Maluku (Avg. 2017–2019)
Variable-cost input-based support
Output-based support
Fixed-cost input-based support
Income subsidies
Club good infrastructure
Production-related R&D
Reduce productive capacity
Public good infrastructure
Marketing and promotion
Fishing community support
General R&D
Resource management
Payments formally linked to fishing effort
Payments formally linked to level of harvest
Payments formally linked to fishing capacity
Payments potentially affecting fishing effort or capacity
Payments mostly decoupled from fishing effort or capacity
Payments enhancing fish stocks
0
5
10
15
20
25
Support (IDR billion)


North Sulawesi (Avg. 2017–2019)
Variable-cost input-based support
Output-based support
Fixed-cost input-based support
Income subsidies
Club good infrastructure
Production-related R&D
Reduce productive capacity
Public good infrastructure
Marketing and promotion
Fishing community support
General R&D
Resource management
Payments formally linked to fishing effort
Payments formally linked to level of harvest
Payments formally linked to fishing capacity
Payments potentially affecting fishing effort or capacity
Payments mostly decoupled from fishing effort or capacity
Payments enhancing fish stocks
0
5
10
15
20
25
Support (IDR billion)

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