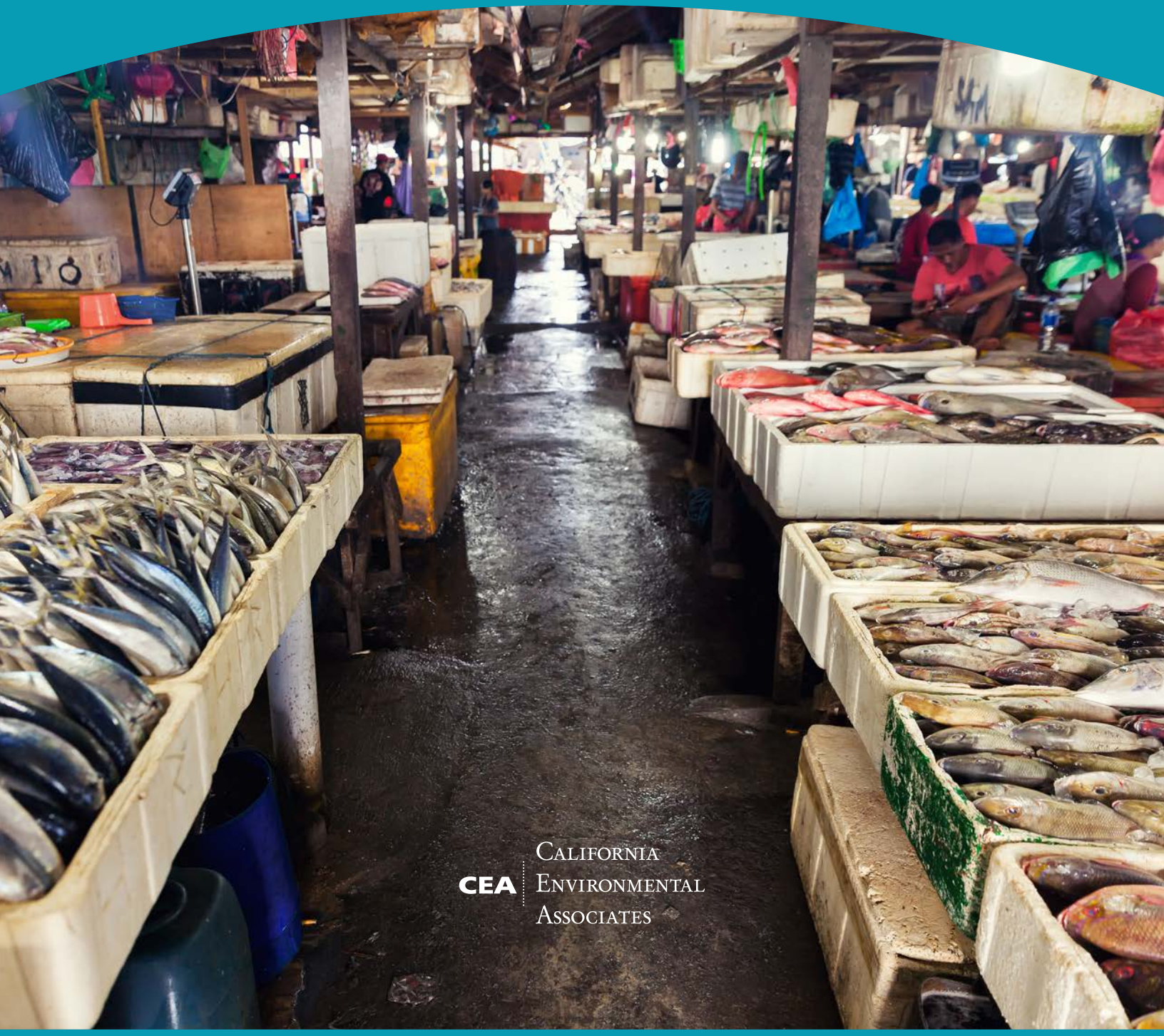
Trends in Marine Resources and Fisheries Management in Indonesia

A 2018 REVIEW

CEA California Environmental Associates



CEA | California Environmental Associates

California Environmental Associates. 2018.
"Trends in Marine Resources and Fisheries Management in Indonesia: A 2018 Review"

Prepared with the support of the David and Lucile Packard Foundation.

Design: Weirdesign.com

Trends in Marine Resources and Fisheries Management in Indonesia

A 2018 REVIEW

Acronyms and Terms

AIS	Automatic Identification System
APRI	*Asosiasi Pengelolaan Rajungan Indonesia* (BSC industry association)
BAPPENAS	Ministry of National Development Planning
BKPM	*Badan Koordinasi Penanaman Modal* (Investment Coordinating Board)
BPS	*Badan Pusat Statistik* (Statistics Indonesia)
BSC	Blue swimming crab
CDS	Catch documentation scheme
CMMA	Coordinating Ministry for Maritime Affairs
CRS	Creditor Reporting System
DCA	Development Credit Authority of USAID
DG	Directorate General
EEZ	Exclusive economic zone
FAD	Fish-attracting device
FAO	Food and Agriculture Organization of the United Nations
FinTech	Financial technology
FIP	Fishery improvement project
FDI	Foreign direct investment
GDP	Gross domestic product
GFW	Global Fishing Watch
GSRI	Global Sharks and Rays Initiative
GT	Gross ton
IMO	International Maritime Organization
IUCN	International Union for Conservation of Nature
IUU fishing	Illegal, unreported, and unregulated fishing
KI	Kiloliter
KUR	*Kredit Usaha Rakyat*
LPMUKP	*Lembaga Pengelola Modal Usaha Kelautan dan Perikanan* (Institute for Capital Management of Maritime and Fishery Enterprises)
MEF	Ministry of Environment and Forestry
MMAF	Ministry of Maritime Affairs and Fisheries
MPA	Marine protected area
MSC	Marine Stewardship Council
MSME	Micro, small, and medium enterprises
MSY	Maximum sustainable yield
NGO	Nongovernmental organization
NPL	Non-performing loan
ODA	Official development assistance
OECD	The Organisation for Economic Co-operation and Development
OJK	*Otoritas Jasa Keuangan* (Financial Services Authority)
PKB	*Partai Kebangkitan Bangsa* (National Awakening Party)
PNBP	Non-tax state revenue
RFMO	Regional fisheries management organization
SFP	Sustainable Fisheries Partnership
SKPT	Integrated Fisheries Centers
SME	Small and medium enterprise
SPR	Spawning potential ratio
TNC	The Nature Conservancy
TAC	Total allowable catch
TOC	Transnational organized crime
USAID	United States Agency for International Development
VMS	Vessel Monitoring System
WCPFC	Western and Central Pacific Fisheries Commission
WCS	Wildlife Conservation Society
WPP	*Wilayah Pengelolaan Perikanan* (fishery management units)
WTO	World Trade Organization
WWF	World Wildlife Fund

Table of contents

About this report

Several factors make the provision of both up-to-date and accurate information a challenge in Indonesia. Straddling the equator, the sprawling archipelago of roughly 18,000 islands encompasses the sixth-largest exclusive economic zone in the world. The remote location of numerous coastal fishing communities can make it difficult for managers in national and regional capitals to comprehensively record data and trends at the community level. Limited resources and systems for catch reporting constrain the development of informed stock assessments, which in turn hampers effective fishery management. From an institutional point of view, decentralization can blur jurisdictional authority, leading to confusion as to which level of government is in charge of gathering data and enforcing fisheries management measures.

The importance of sound data was the impetus for the David and Lucile Packard Foundation to commission this report. The Packard Foundation has been engaged in marine conservation grantmaking in Indonesia since 1999. Through two decades of in-country experience, it has observed the role of sound data in informing decision-making. A fishery management agency tracking the stock status of a species; an NGO prioritizing its spatial protection efforts to optimize fisheries management; a private company assessing opportunities to invest in the transition to sustainable fisheries; or a government ministry setting annual fisheries production targets—each of these stakeholders requires up-to-date and validated data to guide decision-making. It is increasingly valuable for stakeholders to reference the same set of data (which is verified and regularly updated) in order to draw upon a consistent information base. This resource seeks to respond to that shared need.

This report seeks to aggregate the best available data and provide light analysis on marine fisheries statistics and trends in politics, policy, and government priorities to provide an evidence base for stakeholders. In 2016, the Packard Foundation issued the baseline report, “Indonesia Fisheries: 2015 Review.” Through its commitment to continuous learning, the Packard Foundation now shares this second edition with all stakeholders who may benefit from a consolidated resource that tracks changes in the status of marine resources and fisheries management in Indonesia. Having access to regularly updated, valid information not only facilitates decision-making but also can help to streamline collaboration across partners. The authors acknowledge that this report is a “living document” in that policies, politics, and statistics are evolving in real-time, particularly in a country as dynamic as Indonesia. Thus, this report collates information as a snapshot in time, which stakeholders can use as a reference to understand the evolution of trends.

This report is structured into the following chapters:

- **Executive summary:** a synthesis of takeaways for each chapter
- **Situation analysis:** a review of the broader political environment in Indonesia, beyond that of fisheries
- **Political trends:** a synthesis of policy trends and political priorities for the maritime sector, with a focus on marine and fisheries issues
- **Political moments:** a timeline listing key political events
- **Wild fisheries and aquaculture:** a summary of key trends for wild fisheries and aquaculture, including landings, exports, sector employment, and fisheries management
- **Public revenue and funding:** a review of tax and non-tax revenue from the fisheries sector and an examination of key elements of government support for the sector
- **Private sector investments:** a synopsis of private investment in the fisheries sector, including investment funds focused on the transition to sustainable fisheries
- **Marine conservation funding:** a scan of marine conservation-oriented funding from philanthropic foundations and development agencies
- **Marine reserves:** a status update on marine reserves in Indonesia and progress toward national commitments
- **Media coverage:** a tracking of trends in media coverage on marine fisheries issues and a review of prominent social media influencers

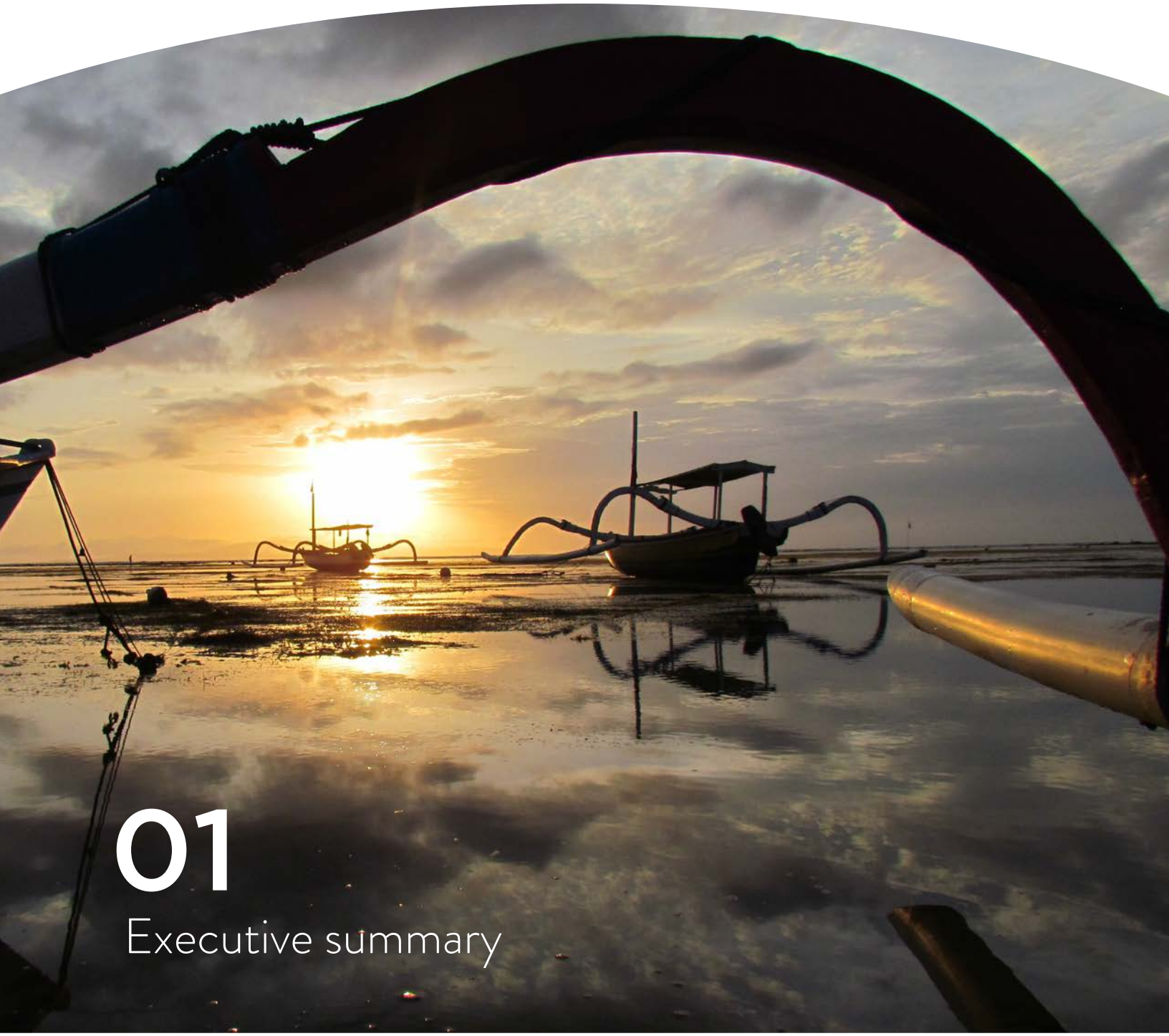
Generally speaking, this report covers data and trends from 2016 to 2018. In terms of the specific timeline for data coverage, this report includes data for the year that is most recently available; this timeline varies slightly by chapter. For instance, data for fisheries production and ocean conservation funding is generally delayed by two to three years, so in some cases the most recent data is from 2015. For other chapters such as political trends and moments, the focus is placed on events in 2017; however, some details from 2016 and early 2018 are provided for context.

The Packard Foundation commissioned California Environmental Associates (CEA) to assemble this report. CEA collaborated with several in-country partners and experts to help produce this report; these individuals and institutions are gratefully acknowledged below. CEA takes full accountability for any errors or omissions in the report.

This report was made possible by the following individuals who provided direct contributions to the report: Rhett Butler (Mongabay), Sarah Conway (independent consultant), Robert Delfs, Noah Greenberg, and Isti Hanifa (Starling Resources), Stuart J. Green (Blue-Green Advisors UK Ltd.), Peter Mous (The Nature Conservancy), and Lida Pet (PT Hatfield).

The following expert reviewers also provided valuable input through their time, feedback, and provision of data: Gabby Ahmadia (World Wildlife Fund), Pamela Baker (Environmental Defense Fund), Hollie Booth and Kenneth Kassem (Wildlife Conservation Society), Matthew Burton and Celly Catharina (USAID), John Claussen and Chase Jaz (Packard Foundation), Heather D'Agnes (Walton Family Foundation), Ginette Chapman (independent consultant), Rili Djohani (Coral Triangle Center), Dominic Elson and Adrian Wells (SeventyThree, Ltd.), Rezal Kusumaatmadja (PT Rimba Makmur Utama), Avi Mahaningtyas (independent consultant), Molly Mayo (Meridian Institute), Ketu Putri (Conservation International), Abraham Sianipar (Conservation International), and Ade Wahyudi (KataData).

The Packard Foundation is pleased to share this report with the field and views this second edition as a discussion piece. It extends an open invitation to partners for feedback to improve and enhance the report year after year.



01
Executive summary

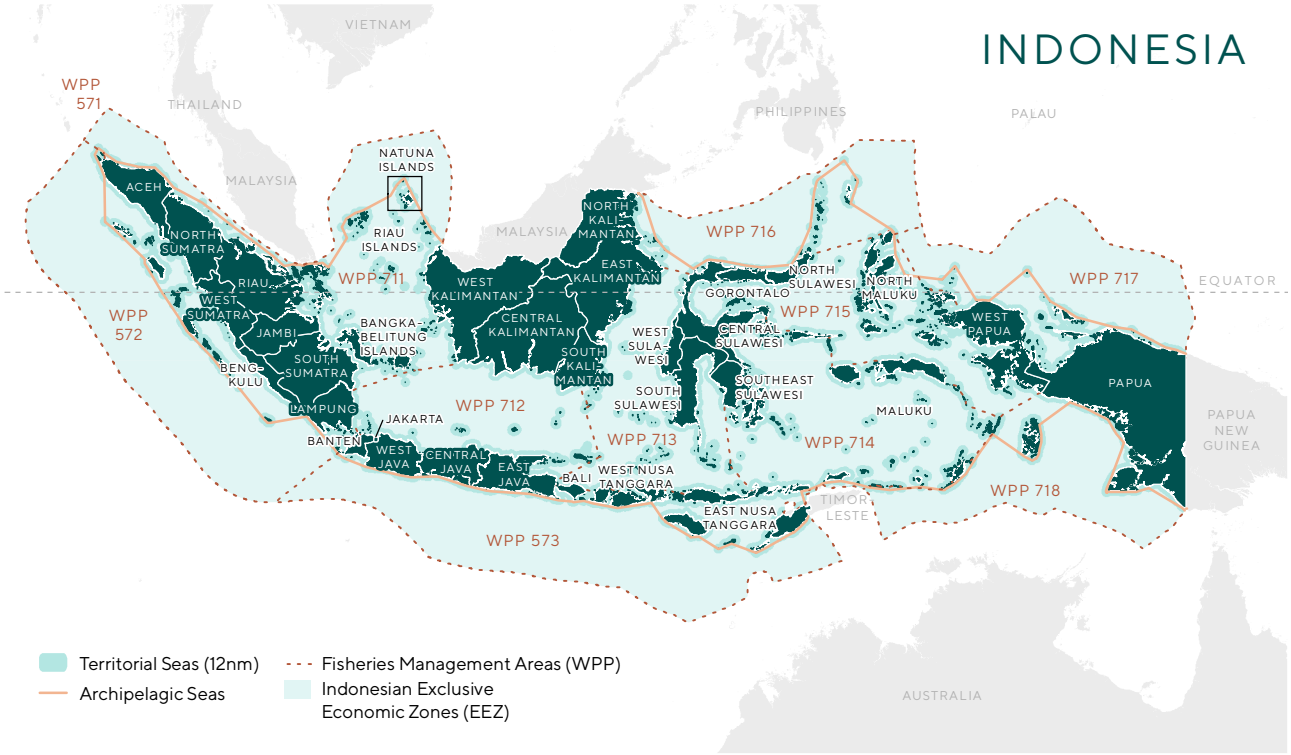
Executive summary

A country bridging two oceans

As the world's largest archipelagic state, the ocean plays an undeniably central role in Indonesia. With a water area that is nearly four times larger than its land area (Fig.1), the country derives pivotal benefits from the sea for its economy, geopolitics, culture, and natural environment. Situated at the center of major maritime trade routes, its seas are a gateway linking Europe, the Middle East, Africa, and South Asia. Its coastal and marine waters make up one of the most fertile fishing grounds in the world: Indonesia is the second largest fish producer in the world, second only to China. Roughly 55 percent of this production comes from coastal areas, particularly from seagrass beds, mangroves, coral reefs, and estuaries. The country has the world's largest area of mangrove forests which cover about 3 million hectares and contain five times as much carbon per hectare as tropical forests. A global hotspot and priority for conservation, Indonesia has one of the highest levels of marine biodiversity in the world and is home to world-renown marine reserves such as the Bird's Head Seascape and Sunda Banda Seascape.

While these resources present an abundance of natural capital, there are also material challenges in managing them effectively. Like many other countries, Indonesia's marine and fisheries sector faces urgent pressures, most notably overfishing, climate change, coastal development, and pollution. From a political perspective, there is intrinsic complexity in maintaining political unity and economic vitality for the country's population of 261 million people (Fig. 2) across dispersed islands (roughly 6,000 of the country's 18,000 islands are inhabited). Likewise, managing natural resources across such a vast expanse also presents its own complexities. This report seeks to provide an information base to better understand the current context in Indonesia, particularly as it relates to the marine and fisheries sector. The following Executive Summary presents a high-level preview of the individual chapters which follow.

Figure 1. Map of Indonesia's Territorial Waters and Fisheries Management Areas (WPP)



Map amended in August 2018.

Situational analysis

As the first president from outside the political or military elite, Joko Widodo's (Jokowi) election in 2014 represented something of a turning point. President Jokowi's small-town origins and man-of-the-people persona, combined with his success in improving bureaucratic efficiency first as mayor of Surakarta and then as governor of Jakarta, helped to foment a groundswell of support, particularly among rank-and-file Indonesians.

Figure 2. Indonesia - General Geographic and Economic Data[i,1]

Total area	1,904,569 km²
Land area	1,811,569 km²
Inland water area	93,000 km²
Length of coastline	54,716 km (2nd longest in world)
EEZ area	6,159,032 km²
Population (2017)	261 million (4th largest in world)
Urban population (2017)	55.2% of total population
GDP, official exchange rate (2017 est.)	USD 1.011 trillion
GDP per capita (2017 est.)	$12,400
GDP – composition by sector of origin (2017 est.)	Agriculture: 13.9% Industry: 40.3% Services: 45.9% (2017 est.)
Fisheries sector contribution to national GDP (2016)[3]	2.56% (current prices)
Wild capture fisheries production (2016)[4]	5.9 million tons (2nd largest in world)
Aquaculture production (2016)[5]	4.4 million tons (3rd largest in world)
Seaweed production (2016)[6]	11.3 million tons (2nd largest in world)
Value of wild capture/aquaculture exports (2017)[7]	USD 3.17-4.09 billion*

*Ranges are due to conflicting data sources; differences may be due to exchange rate assumptions.

President Jokowi's political pragmatism and strength of vision were in evidence when he appointed the dynamic and unconventional Susi Pudjiastuti as Minister of the Ministry of Maritime Affairs and Fisheries (MMAF), instead of using the position for a political appointee that would strengthen his coalition.

Despite the political and economic ramifications, evidence is mounting that many of the recent MMAF's policies are having positive impacts. One study estimates that a 90 percent reduction in foreign fishing boats in Indonesia has translated into a 25-35 percent reduction in total fishing effort, and many, including Minister Pudjiastuti, have cited significant increases in catch in recent years. However, authoritative data are scarce, and the actual state of fisheries remains unclear. What remains missing, from the government's laudable efforts is the recognition that even legal fishing can deplete fish resources if unmanaged.

The primacy of economic development in the MMAF's current strategic plan is, of course, warranted and expected, particularly in a middle-income country context. However, without a more rigorous approach to management, including a reorientation of government agencies and staff towards sustainability rather than revenue maximization, gains are likely to be short term in nature. Despite the important victory of the campaign against IUU fishing by foreign boats, Indonesia's existing fisheries management regime has so far shown only limited success in halting destructive fishing practices (including trawling) and limiting fishing effort fueled by the expanding physical resources and capacity devoted to lucrative wild capture fisheries.

In terms of the projected expansion of aquaculture in Indonesia, further growth will require addressing financial, logistical, and capacity challenges, such as those associated with poor transportation infrastructure, variability in seed quality, and substandard practices. There appears to be no comprehensive approach to aligning production growth targets for aquaculture with approaches to managing the environmental impacts of such growth, including those surrounding land use, carbon emissions, feedstocks, and freshwater use. This will require increased and urgent attention from regulators to drive the required changes from current practices and approaches.

[i]Unless otherwise noted, figures in this table are drawn from the CIA Factbook.

Political trends


©Krishadiyanto/ via REUTERS

©(JG Photo/Yudha Baskoro)

One of the priority maritime issues for the Jokowi Administration relates to sovereignty. In 2017, President Jokowi issued a Presidential Decree asserting sovereignty over 111 islands, revising a 2005 decree that only mentioned 92 islands. According to MMAF Minister Susi Pudjiastuti, the decree was enacted "to prevent issues of occupation or claims of possession by other nations." The islands of Natuna, which lie in the South China Sea within Indonesia's exclusive economic zone (EEZ), have also been subject to long-standing conflict with China. In July 2017, in an effort to safeguard its claim over the area and to underline its long-held resistance to China's expansive claims over the South China Sea, Indonesia renamed the northern area around its Natuna Islands as the North Natuna Sea. China opposes the change.

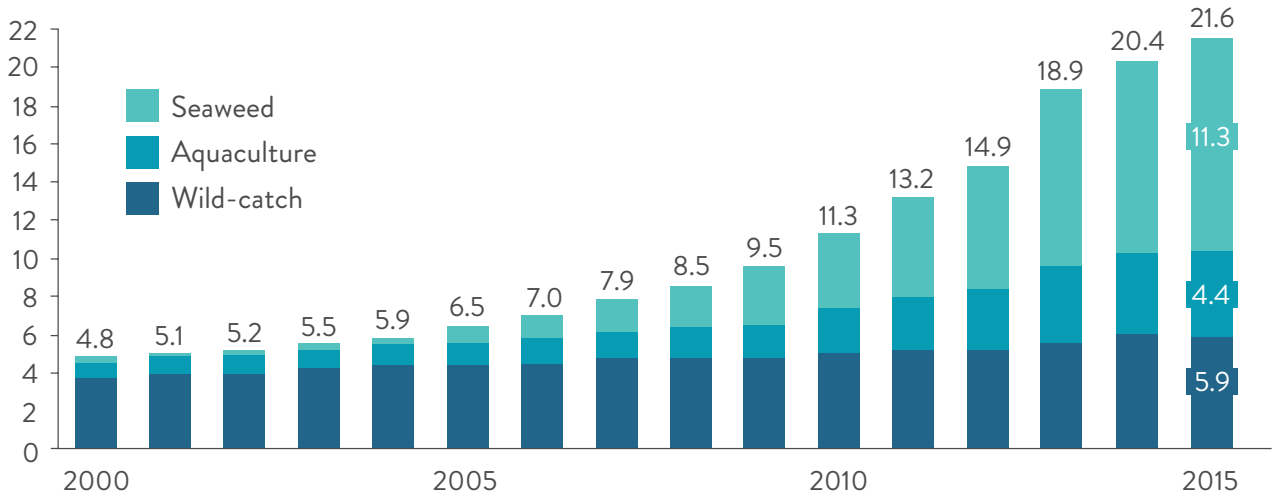
In terms of fisheries-specific priorities, MMAF's core policies under Minister Pudjiastuti have been guided by the three pillars of the agency's mission: sovereignty, sustainability, and prosperity. One of Minister Pudjiastuti's first regulations, Ministerial Regulation No. 2/2015, banned all types of fishing trawl and seine nets effective January 1, 2017. This policy in particular has been the subject of debate and controversy, even though the use of cantrang, a kind of Danish seine net, damages coral reefs and the seabed ecosystem and even though trawl nets were banned on boats greater than 5 GT more than 35 years ago through Presidential Decree No. 39/1980. Faced with strong resistance to the ban, President Jokowi has delayed implementing the regulation several times. On January 17, 2018, following a meeting at the State Palace in Jakarta between President Jokowi and representatives of thousands of protestors purporting to be fishers from the northern Java coast, Minister Pudjiastuti announced that implementation of the ban would be extended indefinitely, but only for fishers operating off the coast of North Java. It is unclear whether the ban will be enforced elsewhere, and there is no firm indication as to when (if ever) the North Java exemption will end.

Minister Pudjiastuti's most visible and hardline pursuit has related to tackling IUU fishing by foreign vessels in Indonesia's EEZ. Under the "sink the vessels" policy, Indonesia instituted a publicly visible approach to implementing Law 45/2009, Article 69(4), which allows foreign-flagged vessels to be burned or sunk based on sufficient initial evidence. More than 360 vessels have been scuttled or destroyed, including 87 vessels in 2017 alone. In an effort to enhance transparency, in July 2017 Indonesia became the first country to share its vessel monitoring system data, with support from Global Fishing Watch. While the government's focus on IUU by foreign vessels is notable, little attention has been directed to IUU fishing by Indonesian boats in domestic or foreign waters. Given that IUU fishing by foreign vessels has essentially been eliminated, a key question is whether MMAF will be able to design and implement effective measures to limit illegal fishing by Indonesian vessels and also enact preconditions for sustainable management of legal domestic fishing.

Wild fisheries and aquaculture

Indonesia is the second-largest fish producer in the world after China, with wild capture fisheries and aquaculture production of 5.9 and 4.4 million tons, respectively, in 2015.[10] Similar to global trends, wild catch in Indonesia has plateaued in recent decades, while aquaculture production has expanded at a rapid rate. However, the rate of aquaculture growth in Indonesia has been even more staggering than the global average, as it has more than quadrupled from 2000 to 2015. Capture fisheries production showed a growth rate of less than 1 percent from 2014 to 2015, while aquaculture production increased by 9 percent (Fig. 3).[11] Excluding seaweed, aquaculture currently accounts for roughly 42 percent of fisheries production in the country.[12]

Figure 3. Volume of seafood production in Indonesia (2000-2015)



The fisheries sector is an important contributor to national food security and employment in Indonesia. A recent study ranked Indonesia as the eighth-most fish-dependent nation in the world, measured by dependence on fish-derived animal protein. In terms of livelihoods, the wild capture fisheries and aquaculture sectors employ approximately 2.7 million and 3.3 million workers, respectively. Additionally, over 1 million workers are involved in the processing and marketing of fisheries products. The majority of Indonesian fishers are small-scale fishers, with vessels under 10 gross tons (GT). The fisheries sector plays a particularly valuable role in coastal communities, where people are likely to engage in fishing as a form of subsistence and as a primary or secondary source of employment. However, the ability of capture fisheries to contribute to food security and nutrition security in Indonesia could become significantly compromised by overfishing, the ranging impacts of climate change on the ocean, and associated declines in fish catch.

Reliable data on stock status for capture fisheries in Indonesia are relatively scarce. Research suggests that the majority of targeted fish stocks in Indonesia are fully or over-exploited. Nearly half of Indonesia's wild capture fish stocks are overexploited, and at least seven out of Indonesia's 11 WPPs show no opportunities for immediate expansion of production. The total allowable catch (TAC) for all WPPs combined in 2017 was approximately 12.5 million tons, which the government uses to inform annual production targets. The government has set a fisheries production target for MMAF of 17.6 MT in 2018 and 22.32 MT in 2019. Additional increases of these levels will have significant and deleterious impacts on the future fisheries potential of the country.

Indonesia is second only to China as the largest aquaculture producer in the world. Although the country's aquaculture sector is forecast to overtake wild capture fisheries in next 10 to 15 years, its future sustainable growth is not considered secure. While aquaculture production can be ecologically efficient theoretically, its sustainability is dependent on species, production systems, and the intensity of production methods.

The national government has placed a high priority on aquaculture's development to drive increases in overall seafood production. Independent analysis has found that current aquaculture production targets set by the government are close to impossible to achieve due to lack of space on an already crowded and fast growing coastal zone that lacks comprehensive spatial management plans and zoning. Furthermore, this growth (if realized) would carry overwhelming environmental costs that would also bring immediate and long-term economic, social, and cultural costs. Investments and public policies designed to mitigate these environmental impacts will be essential to facilitate the sector's growth at the desired rate and scale.

As capture fisheries face increasing threats and likely declines from overfishing, the government must balance both aquaculture growth along with concerted efforts to improve capture fisheries management. The intersection of several issues—spatial planning, coastal zoning, livelihoods diversification, economic development, and food security—underscores the need for government programs and development agendas to marry the constraints and opportunities facing marine aquaculture and marine capture fisheries, along with that of freshwater aquaculture and freshwater fisheries management. Ensuring that these sectors work in harmony with each other, rather than in silos or in conflict with each other, will be essential to the sustainable growth of Indonesia's fisheries in the future.

Public revenue and funding

Indonesia's fisheries sector, as measured by gross domestic product (GDP), grew 7.3 percent in 2014 and 6.8 percent in 2017 (through Q3 2017). That said, the sector's contribution to GDP has remained small and relatively flat over the past several years, averaging about 2.0 to 2.5 percent (Table 1). Put differently, the fisheries sector has exhibited growth in recent years, but it has not been a growth sector itself. Of course, the sector's value to Indonesia extends well beyond its direct contribution to GDP; fisheries also contribute to food security and enable enterprises in supporting sectors such as energy, telecommunications, logistics, and ecotourism.

Table 1. Fisheries Sector Contribution to National GDP

	2010	2011	2012	2013	2014	2015	2016
Constant prices	2.09	2.12	2.13	2.16	2.21	2.27	2.27
Current prices	2.12	2.09	2.14	2.21	2.32	2.51	2.56

There are two sources of government revenue from the fisheries sector: non-tax state revenue (Penerimaan Negara Bukan Pajak, or PNBP) and tax revenue. In 2015, MMAF issued Regulation No. 75/2015 to increase PNBP tariffs. As a result, fisheries sector PNBP from the MMAF Directorate General (DG) Capture Fisheries, DG Aquaculture, and DG Business Competitiveness rose from USD 5.86 million in 2015 to USD 26.82 million in 2016. In 2016, USD 26.80 million, or 99.9 percent of the total, originated from DG Capture Fisheries. In 2017, fisheries PNBP amounted to USD 36.38 million, the highest level in the last ten years. While the increase in fisheries sector PNBP is notable, the fisheries sector's contribution to overall PNBP remains very low compared to other sectors. It increased from 0.03 percent of total PNBP in 2015 to 0.14 percent in 2016.

In terms of tax revenue, as of March 2017 there were only 3,910 listed taxpayers in the fisheries sector, and approximately 2.7 million fishers. Tax revenue from the fisheries sector is quite small; in 2016, approximately USD 62.19 million was collected from the sector, with a subsector breakdown of 5.84 percent from capture fisheries, 9.15 percent from aquaculture, and 85.01 percent from others (e.g., fish processing and trading). In 2017, tax revenues from the fisheries sector amounted to USD 80.15 million. As a result of the low tax collection, the fisheries sector tax-to-GDP ratio is significantly below the national level. From 2011 to 2016, the average national tax-to-GDP ratio was 11 percent, while the average fisheries sector tax-to-GDP ratio was 0.26 percent. This means that the tax collected from the sector did not even extend to 1 percent of the overall sector, as measured by GDP.

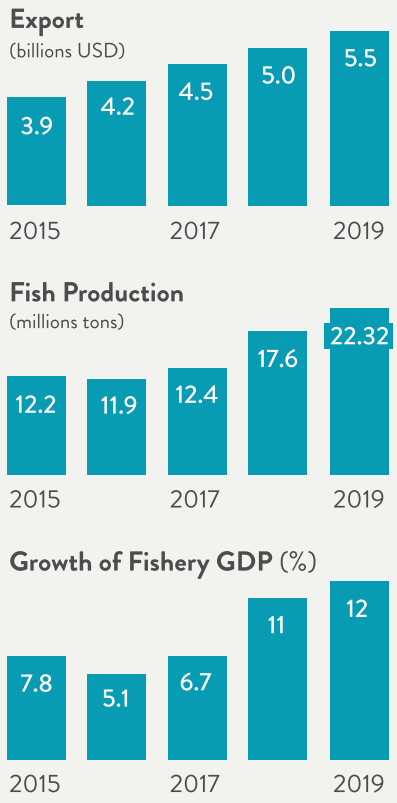
The Government of Indonesia provides support to the fisheries sector via a number of channels. The main ones include MMAF, the Ministry of Environment and Forestry (MEF), and loan subsidy programs. The initial budget plan for the last several years shows declines in MMAF's allocation: the allocation was USD 790.56 million in 2015, USD 786.28 million in 2016, USD 688.87 million in 2017, and USD 539.83 million in 2018. Taken alone, this trend would imply a de-prioritization of the fisheries sector, but it is not that simple.

One issue is that MMAF was unable to spend its allocated budget in prior years, resulting in a ratcheting down of its planned budget over time. For example, in 2016, actual spending amounted to only 61 percent of the planned budget. In terms of spending, goods for communities and regional government amounted to nearly USD 100 million in 2016. This is about USD 70 million less than in 2015, but still constitutes a (significant portion of the overall MMAF budget and represents a large and important source of funding for communities. Most, if not all, of this funding was provided in the form of capital assets (e.g., boats) as opposed to funds for developing governance systems or other sustainable fisheries management components.

The MEF, which holds management authority for all of the national parks (Balai Taman Nasional) in Indonesia, spent USD 42.28 million for management of national parks in 2016, or about half of the Natural Resources and Ecosystem Conservation Program expenditures of USD 83.47 million. This included USD 8.29 million for the ten national parks with significant marine areas.

To facilitate access to finance for micro, small, and medium enterprises, which represent more than 60 percent of Indonesia's GDP and employ over 114 million people (approximately 97 percent of total private sector employment), the Indonesian government operates a number of credit guarantee and loan subsidy programs. The main ones relevant to the fisheries sector are the People's Business Credit Program, the Ultra-micro Credit Program, and The Institute for Capital Management of Maritime and Fishery Enterprises. At present, none of these programs link stock health or sustainability of fisheries practices to loan amounts or interest rates.

Figure 4. MMAF Targets (2015-2019)



Note: 2017 figures indicate actual values, measured in Q3 2017.

Private sector investments

In 2016, the government of Indonesia adjusted the areas in which foreign direct investment (FDI) can be made into the fisheries sector. Most notably, 100 percent FDI is now allowed for cold storage and processing, while wild capture fishing was added to the Negative Investment List, which restricted investment in boats and harvesting to domestic sources only. Reported foreign and domestic private investment in the Indonesian fisheries sector amounted to approximately USD 406.4 million in 2016: USD 164.9 million in new loans and USD 241.4 million in new equity investments. These figures likely underestimate the actual scale of investments into the fisheries sector; some investments are likely not reported and/or are made outside of the formal system (e.g., by middlemen or boat owners to fishers). In terms of the subsector breakdown, more than half of all investment was made in the processing industry.

Despite efforts to increase private sector investment into the fisheries sector, as of June 30, 2017, loans outstanding to the fisheries sector by domestic banks amounted to only USD 1.93 billion. This represents 0.58 percent of the USD 332.67 billion in total loans outstanding by all banks to all sectors. Similarly, efforts to increase the export value have come up short. Indonesia targeted an export value of USD 7.62 billion of fish and other sea catch in 2017 (Table 2), an ambitious target given an actual export value of about USD 3.8-4.2 billion in 2016, and ultimately only exported USD 3.2-4.1 billion in 2017 (Fig. 4).

Table 2. Indonesia Fisheries Export Value Targets Versus Actual (USD billion)[20]

	2015	2016	2017
Target	5.86	6.82	7.62
Actual	3.95	3.78-4.17*	3.17-4.09*
% of Target	67.4%	55.4-61.1%	41.6-53.7%

*Ranges are due to conflicting data sources; differences may be due to exchange rate assumptions.

Note: 2017 figures indicate actual values, measured in Q3 2017.

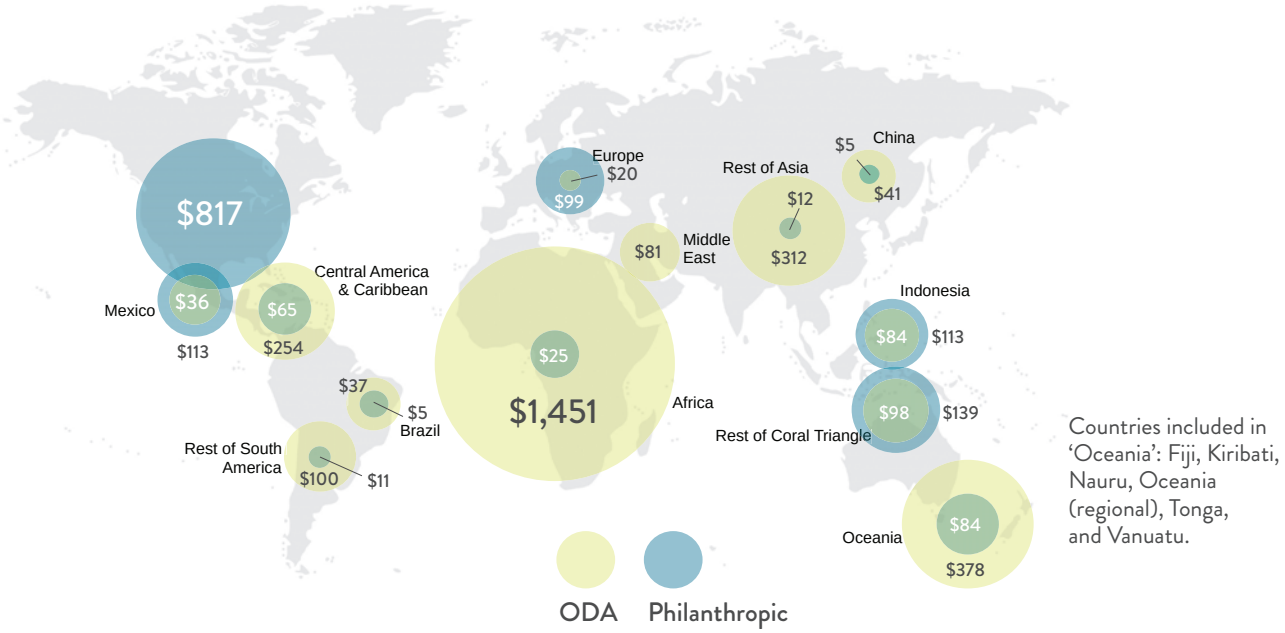
Of course, it is not the size of the investment flows but what that investment actually does that matters for the creation of sustainable and productive fisheries. Nearly half of Indonesia's wild capture fish stocks are overexploited, and at least seven out of Indonesia's eleven fishery management units (WPPs) show no opportunities for immediate expansion of production.

A number of important investment funds are specifically targeting investment in Indonesian "sustainable" fisheries. The Althelia Sustainable Ocean Fund and the Meloy Fund are the two main impact investment vehicles currently doing so. Successful outcomes from these investments will be important to demonstrate that sustainable fisheries can yield positive social, environmental, and financial outcomes. However, these funds are likely to encounter a number of challenges (e.g., limited investment pipeline, borrower risk aversion to foreign-currency denominated loans, and impact constraints due to treatment of the ocean as de facto open access). These funds may also be dwarfed by investments into the sector that do not factor in sustainability considerations. For the fisheries sector to successfully transition to sustainability, all debt and equity investments must be made with similar objectives in mind. As of now, there are no formal mechanisms or government institutions that track, prioritize, or incentivize investment in sustainably managed fisheries.

Marine conservation funding

Aside from public funding and private sector investments, private foundations and development aid organizations (which includes both bilateral and multilateral donors) also provide an important source of funding for marine and fisheries issues in Indonesia. Between 2007 and 2015, the philanthropic sector provided USD 113 million in funding and the development aid sector provided USD 84 million in ocean-related grants in Indonesia (Fig. 5).

Figure 5. Total Oceans-Related Grants from Philanthropic Versus ODA Funding, 2007-2015



Countries included in 'Oceania': Fiji, Kiribati, Nauru, Oceania (regional), Tonga, and Vanuatu.

Foundation grantmaking for marine-related issues in Indonesia has risen substantially in recent years. Between 2007 and 2016, grantmaking has increased by more than 300 percent—from USD 12.5 million in 2007 to more than USD 34 million in 2015. These increases are driven primarily by large commitments from long-standing funders as well as the entrance of new funders to the field (e.g., Oceans 5, Vulcan Philanthropy, and Leonardo DiCaprio Foundation). The Indonesia Marine Funders Collaborative (IMFC)—an initiative of foundations that share a vision of restoring and protecting coastal and marine resources while enhancing fisheries management in Indonesia—has been a key exchange for facilitating donor coordination and alignment among foundations.

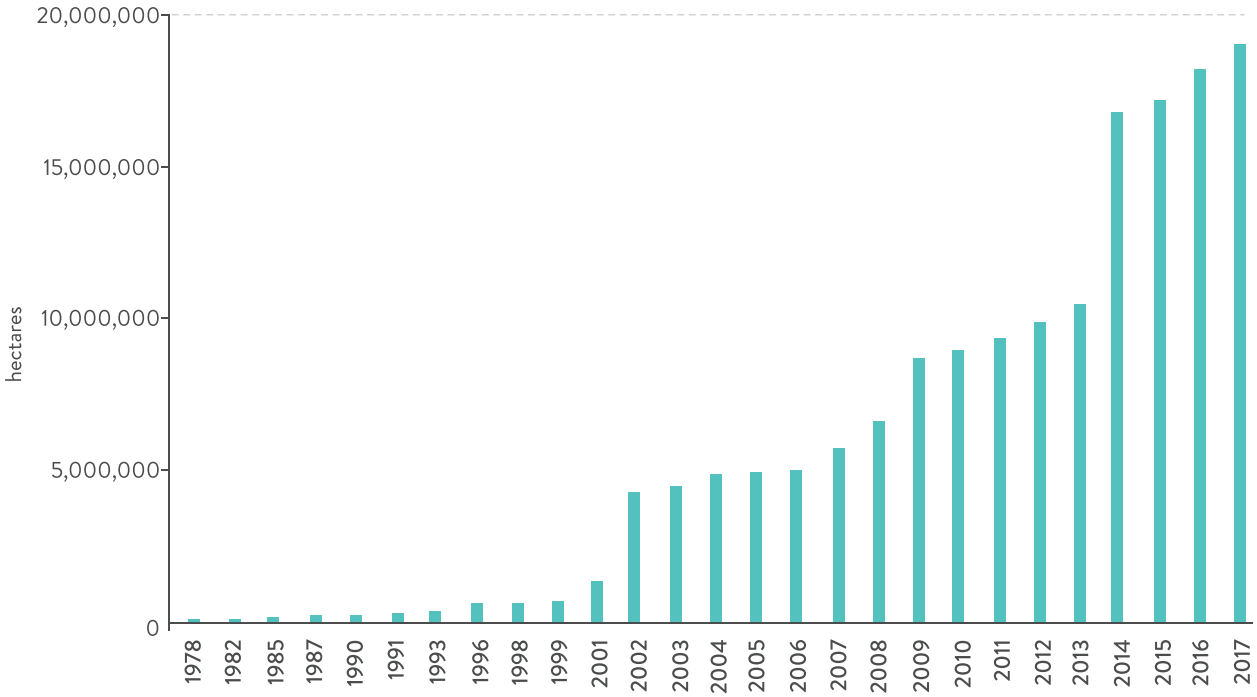
Between 2007 and 2016, Indonesia received USD 459 million in marine-related official development assistance (ODA) funding. By category, infrastructure received 36 percent of this funding, while fisheries received 34 percent. The remaining share was allocated to science and conservation categories. By flow type, roughly 60 percent of the total amount was in the form of grants and the remaining 40 percent came from an equal proportion of loans and non-export credits.

Considering marine-related ODA grants alone (with a fisheries or conservation focus and excluding infrastructure-related projects), Indonesia received approximately USD 150 million in grants between 2007 and 2016. The top grantmakers during this timeframe included Japan, Germany, and the United States.

Marine reserves

At the Coral Triangle Initiative Summit in 2009, then-President Susilo Bambang Yudhoyono declared a commitment to protect 20 million hectares of MPA in Indonesia by 2020. Based on a trendline of steadily increasing MPA designations in recent years, Indonesia appears to be on track to achieve its MPA target of 20 million hectares by 2020. According to MMAF data, the country had set aside 19.14 million hectares of MPAs as of 2017. Of particular note is the steady increase in MPA coverage following the announcement in 2009 to achieve 20 million hectares of coverage by 2020 (Fig. 6).

Figure 6. MPA Coverage in Indonesia, 1978-2017



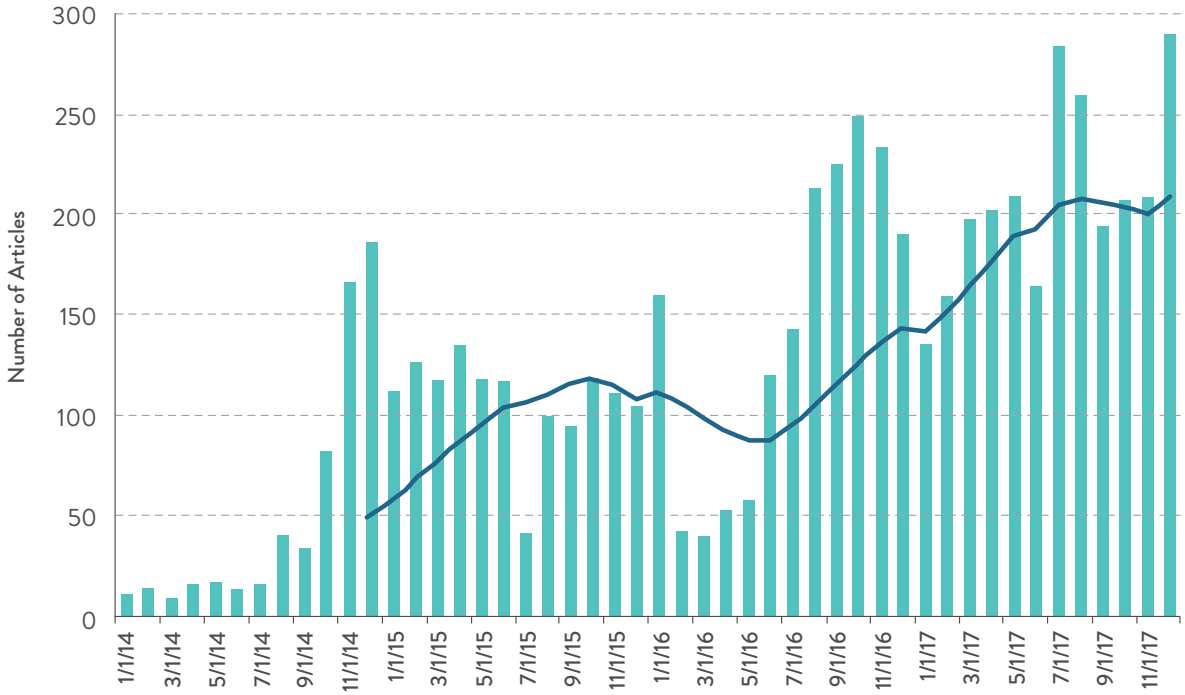
While Indonesia has set aside notable expanses of marine and coastal areas for protection in recent decades, recent research has underscored the role of complementary factors—adequate staff and budget capacity, in particular—to make ocean protection work. A recent study found that globally, staff capacity and budget were the strongest predictors of fish population outcomes—even after accounting for factors such as MPA size, longevity, and presence or absence of fishing. MPAs with adequate staff and budget capacity had fish recoveries which were three times as large as those without adequate capacity.

MPA investments have produced noteworthy results—socially, ecologically, and economically—both globally and in Indonesia. However, the rapid expansion of MPAs without a parallel increase in investment (particularly for staff and budget capacity) has the potential to undermine MPA performance. Considering approaches for integrating MPA spatial management with fisheries resource management will be a key challenge and opportunity for stakeholders in Indonesia going forward. Designing MPAs with adaptive capacity will also be critical to support these systems in confronting emerging stressors, such as climate change, ocean acidification, and pollution.

Media coverage

Media coverage of fisheries issues in Indonesia has risen year-over-year, according to multiple measures (Fig. 7). The number of articles mentioning fisheries management or marine conservation in Indonesia's top media outlets increased each year from 2015 through 2017. An analysis of media coverage shows that across ten focal Indonesian outlets, over 1,300 fisheries stories were produced in 2017, which is more than double the number in 2016. Despite an increase in the number of articles mentioning fisheries issues, most of this coverage consisted of brief news articles rather than in-depth analysis or feature coverage. Few stories addressed solutions for sustainable fisheries management.

Figure 7. News Articles in Bahasa Indonesia Mentioning Indonesian Fisheries Management Issues (January 2014-December 2017)



Public interest in fisheries management issues in Indonesia also appears to be increasing in Indonesia-language queries, as indicated by a growing number of searches on various terms related to fisheries and marine conservation. One hypothesis is that the strong personality of Minister Pudjiastuti and recent MMAF policies—which have been both lauded and criticized—have elevated the profile of marine and fisheries issues. Historically, there has not been such significant interest in the MMAF minister or policies.

In Indonesia, social media play an important role in influencing public opinion. The most prominent social media influencer who regularly discusses marine conservation issues in Indonesia is Minister Pudjiastuti, who is active on Twitter, Instagram, and Facebook. No individual approaches Minister Pudjiastuti's reach in terms of following or user engagement. At the organizational level, WWF Indonesia, Greenpeace Indonesia, WALHI, TNC Indonesia, and SaveSharks have the largest following among Indonesian NGOs engaged in marine issues. International NGOs have a significantly larger following but lack an exclusive focus on Indonesia.

02
Situational analysis

Indonesian politics and governance, 2014-2017 –a marine perspective

Prepared by **Starling Resources**

This review provides a brief and broad scan of Indonesian politics and governance, as it pertains to marine-related issues, from 2014 to 2017. The chapter first takes stock of some of the general political dynamics at play in Indonesia during this period and then dives deeper into the unique relevance of marine resource and maritime issues. It goes on to briefly review significant programs and developments over the past three to four years and wraps up by looking ahead to the 2019 presidential election. This chapter utilizes a higher level of interpretation and synthesis than the rest of the report in order to quickly and effectively provide the broad political context for the remaining chapters.

The evolving promise of President Jokowi

As the first president from outside the political or military elite, Joko Widodo's (Jokowi) election in 2014 represented something of a turning point. President Jokowi's small-town origins and man-of-the-people persona, combined with his success in improving bureaucratic efficiency first as mayor of Surakarta and then as governor of Jakarta, helped to foment a groundswell of support, particularly among rank-and-file Indonesians. President Jokowi won office with 53 percent of the vote, despite attempts by his opponents to brand him a religious and cultural outsider.

Direct elections in Indonesia, first conducted 2004, made possible Jokowi's rise from local business man to president. However, President Jokowi inherited the old oligarchic power structures and, perhaps in part due to his non-elite status, entered office with little of the political capital required to effectively navigate those structures. President Jokowi ran for office on the ticket of the Indonesian Democratic Party of Struggle (PDI-P). The decision of party chairwoman, Megawati Sukarnoputri, to place President Jokowi on the ticket, as well as her status as former President, and daughter of founding father Sukarno, left President Jokowi indebted and beholden. This dynamic was made clear soon after President Jokowi's inauguration when the Corruption Eradication Commission (KPK) challenged the nomination of one of Megawati's confidantes for the position of National Police Chief. By refusing to step in and support the KPK, President Jokowi was able to manage the crisis without any bearing any significant political damage, while the two top leaders of the KPK were sacked, further weakening the nation's most popular institution.

A more recent and significant challenge to President Jokowi's political power has been the rise of sectarian politics and related attacks on President Jokowi and his protégé Basuki "Ahok" Tjahaja Purnama. These culminated in several demonstrations, including one of the largest mass gatherings in Indonesian history. The protests took place against a backdrop of increasing repression of alternative Islamic and non-Islamic religious expression in recent years,[1] despite a new landmark law recognizing indigenous faiths.[2] While President Jokowi and his inner circle explicitly questioned the role of "political actors" in stoking the protests,[3] the president promptly began reaching out to Islamic organizations and called for an expeditious prosecution of Ahok, which eventually led to a two-year prison sentence for the ex-governor. President Jokowi later followed up with a controversial decree making it easier to forcibly disband religious and civil society organizations, again showing President Jokowi's sense of political expediency.

President Jokowi's deft political touch has enabled him to successfully surmount these and many other challenges, and he has solidified his base with several opposition parties eventually opting to join his coalition. However, as illustrated above, the political balancing act has required sacrifices. Looking back on this pattern over the past four years, it seems that the election of President Jokowi may not have signified a broader political shift or reform movement in Indonesia as some may have assumed. Rather than transformational, the promise of the Jokowi administration may in fact be incremental.

Indonesia's emergence as a regional maritime power

President Jokowi's strong political positioning has in some part been built on his ability to project leadership through a set of strategic priorities. This has included, among others, an assertion of Indonesia's sovereign control over its own maritime space and its geopolitical importance as an emerging global maritime power.

After being founded as a network of territories separated by international waters, Indonesia has, over its history, consistently strengthened its claims to maritime authority. The Djuanda Declaration in 1957 was Indonesia's first assertion of sovereignty over its inter-island seas. The declaration faced strong international resistance, but steady diplomatic efforts eventually led to international recognition of Indonesia as the first "archipelagic state" in the 1982 UN Convention of the Law of the Sea (UNCLOS).

Upon taking office, President Jokowi called for Indonesia to restore its fundamental character as an ocean-oriented power and put forth a maritime doctrine consisting of "five pillars:"

- Restore Indonesia's maritime culture;
- Protect and manage marine resources, including sustainable fishing industries;
- Prioritize maritime infrastructure, including seaports, shipping, and maritime tourism;
- Engage diplomatically to reduce conflicts, to resolve border claims, and to halt illegal fishing, marine piracy, and pollution;
- Strengthen naval defense capabilities.

As a non-aligned country,[i] Indonesia does not engage in mutual defense treaties with foreign nations. Moreover, though it is the largest archipelagic state in the world, Indonesia's naval capabilities lag behind those of many of its neighbors. The militarization of maritime space in both the Pacific and Indian Oceans, and particularly China's more aggressive assertion over territory up to its "nine-dash-line" in the South China Sea, which overlaps with Indonesia's Natuna Islands and Indonesia's EEZ, have made the task of strengthening the Indonesian Navy even more urgent.

After China highlighted "overlapping claims" in the South China Sea in 2016, President Jokowi reacted quickly, holding a cabinet meeting aboard a navy ship in the Natuna Islands and then ordering military exercises there in 2016 and 2017. Complementing this stance, President Jokowi has continued to increase Indonesia's defense spending, now at IDR 107 trillion (USD 7.6 billion) and is working to attract more foreign investment in maritime infrastructure and defense, including the recent signing of a billion-dollar deal to acquire eleven Sukhoi Su-35 fighter jets from Russia.

However, Indonesia still has much work to do to improve the effectiveness and efficiency of maritime law enforcement agencies. The Maritime Security Agency (Bakamla) was established in 2014 to play a critical role as a civilian enforcement agency. However, Bakamla has faced numerous challenges, including inadequate financial and human resources. With 22 ships, for example, Bakamla is far short of the 225 ships its requires, according to its chief.[4] A more central issue for Bakamla, and for Indonesia's maritime enforcement regime overall, has been the challenge of coordinating 12 enforcement-related agencies, including MMAF, the Ministry of Transportation, the Ministry of Finance (customs), the water police, immigration agency enforcement, and the Ministry of Foreign Affairs,[5] as well as the Indonesian Navy, which, in practice, sees itself as the primary marine law enforcement body.[6]

The creation of Bakamla came on the heels of several attempts to establish an Indonesian coast guard under the Ministry of Transportation. While these attempts failed due to conflicts between the myriad agencies with authority at sea, some argue that a coast guard would be better suited to the task of civil maritime law enforcement in a context where sub-standard vessels and crews may be the greater threat to domestic interests.[7]

In any case, improved financial, human, and institutional capacities, as well as clarity in roles would greatly improve Indonesia's ability to effectively and efficiently implement maritime law enforcement and patrol. Better articulating the role for a civilian enforcement agency would, in addition, be a useful shift toward non-military forces and could reduce the risk of inadvertent military escalation in disputed areas.

[i] A non-aligned country is not formally aligned with or against any major power bloc.

Challenges and opportunities for Indonesia's fisheries

President Jokowi's political pragmatism and strength of vision were in evidence when he appointed the dynamic and unconventional Susi Pudjiastuti as Minister of MMAF, instead of using the position for a political appointee that would strengthen his ruling coalition. Minister Pudjiastuti's brash style and straight talk has endeared her to the nation at large, and she has become a hero to many,[8] while at times her controversial policies have brought the administration strong political blowback.

Early in her tenure, Minister Pudjiastuti embraced the idea that Indonesia, the world's most important tuna producer and second-largest wild-capture fish producer, was losing billions of dollars from illegal, unreported, and unregulated fishing (IUU). One study estimated losses at roughly USD 4 billion a year, while senior government officials put the number closer to USD 20 billion per year.[9]

The government responded by establishing the National IUU Task Force, and Minister Pudjiastuti initiated a further series of policies to combat IUU fishing. Her decision to blow up foreign vessels caught operating illegally in Indonesian waters has not only deterred potential violators but also raised the issue of IUU internationally and positioned her and President Jokowi as strong leaders in the region. A moratorium on foreign-owned and -built boats and a prohibition on transshipments have perhaps had even greater impact, reducing foreign fishing boats in Indonesian waters by 90 percent.[10] However, the moratoria on foreign boats and transshipments have been met with stiff political opposition, particularly from industry groups who claim, with some justification, that these policies have handicapped the fishing industry and eliminated jobs.[11]

A distinct but overlapping issue surrounding IUU is that of human rights violations in the fisheries industry. The International Organization for Migration, in collaboration with MMAF, began working in Indonesia with victims of human trafficking that were freed following MMAF's moratorium on foreign owned and built vessels. This work resulted in a report issued in 2016, cosigned by Minister Pudjiastuti. Several high-profile news outlets further elevated the issue in 2015 and 2016.[ii] Indonesia reacted quickly to the increased scrutiny, first ratifying the International Labour Organization's 2006 Maritime Labour Convention by a unanimous vote of the House of Representatives in September of 2016.[12] Soon thereafter, the MMAF issued Ministerial Decree No. 2/2017 which created the basis for human rights certification in the fisheries industry.[13] This decree was further followed by the Ministry's procurement of life insurance policies for hundreds of thousands of fishers.

The most controversial of Minister Pudjiastuti's policies, however, may have been a ban on trawling. The policy has led to frequent protests and leaders of major Islamic organizations, congressional groups, human rights commissions, and political parties have taken up the mantle of aggrieved local fishers and voiced their opposition.[14] Some political observers have suggested, however, that the pushback represents larger political and business interests, while smaller-scale local fishers have benefited from the policy.[15] Regardless, the political pressure has yielded results, and an exemption to the trawl ban has been provided for fishers from the north coast of Java, pending government efforts to provide alternative fishing gear.

The establishment of a new Coordinating Ministry for Maritime Affairs (CMMA) tasked with aligning all maritime-related ministries reflects President Jokowi's strategic prioritization of maritime issues and leadership. However, overlapping mandates and increased visibility of marine-related issues have created political challenges that have, in part, led to turnover in CMMA leadership. The current appointee, the ministry's third, is Jokowi confidant and former general Luhut Binsar Pandjaitan. While Minister Pandjaitan has brought stability to the CMMA, President Jokowi has still felt the need to intervene directly into MMAF policymaking, most recently on the controversial trawl ban, discussed above.

Despite the political and economic ramifications, evidence is mounting that these policies are having positive impacts. One study estimates that a 90 percent reduction in foreign fishing boats in Indonesia has translated into a 25-35 percent reduction in total fishing effort,[16] and many, including Minister Pudjiastuti, have cited significant increases in catch in recent years[17] authoritative data are scarce and the actual state of fisheries remains unclear.

[ii] Among others, the *New York Times*' six-part series "The Outlaw Ocean" and the *Associated Press*'s 14-part Pulitzer Prize-winning series "Seafood from Slaves."

Minister Pudjiastuti now hopes to capitalize on the budding success of these policies and drive economic returns by investing in industry and infrastructure. The government plans to develop 12 integrated maritime and fisheries centers (SKPT),[18] providing fishing boats and gear; storage and cold chain infrastructure; and floating docks and other facilities.[19] Minister Pudjiastuti has stated that the program is a concrete realization of President Jokowi's vision to "develop Indonesia starting from its peripheries by strengthening villages and areas within the framework of the Unitary State of the Republic of Indonesia." More than 10 percent of MMAF's expenditures in 2016 was allocated to "goods for communities/regional government"[iii] further illustrating the government's focus on capital expenditures and support to local communities and governments.

What remains missing, however, from the government's laudable efforts, is the recognition that even legal fishing can deplete fish resources if unmanaged and there are few national programs to coherently and effectively manage the many disparate fisheries across the archipelago. While cursory attention has been paid to fishery management, namely through the drafting of an architecture to underpin the nation's fishery management areas (*Wilayah Pengelolaan Perikanan* (WPP), there has been little sign of earnest intention to invest in, or grapple with, the complexities of effective fisheries management. The top-down structure of the current ministry-led fisheries management, through Indonesia's 11 WPPs, does not adequately address the need to engage stakeholders across sectors in evidence-based, adaptive management at appropriate geographic scales. It also fails to recognize provincial authority over the area 0-12 nautical miles from shore, enshrined in Law 23 of 2014.

The MMAF's 2015-2019 strategic plan highlights sustainability, sovereignty, and prosperity as its three major pillars. However, the highest-level strategic objectives pertain to growth, rather than the more nuanced set of metrics that would be required to balance growth and sustainability. Decisions to invest in new fleets, gear, and export centers do not take into the account the need to also rationalize existing processing capacity in line with measures of maximum sustainable yield (MSY), and so risk locking in a strong structural driver to overfish.

The primacy of economic development is, of course, warranted and expected, particularly in a middle-income country context. However, without a more rigorous approach to management, including a reorientation of government agencies and staff towards sustainability rather than revenue maximization, gains are likely to be short term in nature. Despite the important victory of the campaign against IUU fishing by foreign boats, Indonesia's existing fisheries management regime has so far shown only limited success in halting destructive fishing practices (including trawling) and limiting fishing effort fueled by the expanding financial resources and capacity devoted to lucrative wild capture fisheries.

Aquaculture is also a central area of concern. Indonesia is currently the second largest aquaculture producer in the world, having quadrupled production between 2000 and 2015. Aquaculture is now a larger job creator than wild capture fisheries and is expected to surpass wild capture fisheries in terms of production before 2030. Growth in aquaculture is critical to meeting national goals for the development of local livelihoods and food security. However, further growth will require addressing financial, logistical, and capacity challenges, such as those associated with poor transportation infrastructure, variability in seed quality, and substandard practices.[20] Moreover, there appears to be no comprehensive approach to aligning production growth targets for aquaculture with approaches to managing the environmental impacts of such growth, including those surrounding land use, carbon emissions, feedstocks, and freshwater use. Increased and urgent attention from regulators will be required to drive the required changes from current practices and approaches.

Programs, populism, and governance

President Jokowi brought a promise of bureaucratic effectiveness to the presidency, built on his tenure in Surakarta and Jakarta. During his campaign he proposed appointing only bureaucrats, rather than politicians, to his cabinet. In his inauguration speech he urged his cabinet, bureaucrats, and the public to "work . . . work . . . and work" and upon taking office, he made several changes to streamline the structure of government, including plans to lay off 300,000 civil servants.[21]

However, bureaucratic challenges have proven stubbornly resistant and complex. President Jokowi's proposal to staff his cabinet with professionals was deemed politically untenable, as it would have destroyed his coalition. The Minister of Administrative and Bureaucratic Reform estimates that there are one million excess civil servants, many of whom have

[iii]See Public revenue and funding chapter.

overlapping responsibilities, as do many of the agencies to which they belong. Effective intragovernmental coordination remains elusive. In such a context, instructions to work hard may simply be insufficient to tackle the monumental challenges facing the government.

Making the situation more complex, the Jokowi administration must also oversee the implementation of Law 23 of 2014 on local government. This law reallocates a wide array of government authorities and functions, across sectors, from *kabupaten* (regency) and municipal governments to Provincial governments. The law's implementation has progressed more slowly in some sectors than in others, hindered by a lack of guidance on how to execute the transfer of authority, and by a low level of capacity and awareness at the provincial level regarding activities and responsibilities which had not previously been within its area of authority.

While Law 23 significantly realigns government authorities, it also has ramifications for Indonesia's fight against corruption. "Big bang" decentralization in 1999 had the unintended, but perhaps predictable consequence of also decentralizing corruption in Indonesia, enabling local leaders to capitalize on their positions, in some cases developing local fiefdoms. This had particular relevance for land management and governance, as *bupati* (regents) sold off tracts of land, sometimes belonging to other entities, for personal gain. Despite the challenges, moving authority to the provinces simplifies decision making in many areas and may enhance public oversight while reducing opportunities for corruption. Though the full impacts may not be known for some time, the reallocation of authority under Law 23 may do more to reshape Indonesian government than any hallmark policies of the Jokowi administration.

Another important piece of legislation carried over from early 2014 is the "Village Law" (Law 6/ 2014), which is expected to touch half of all Indonesians living in rural areas.[22] At the law's center is the direct allocation of funding to Indonesia's 70,000-plus villages, with 30 percent earmarked for operations, and 70 percent for development. The government disbursed IDR 60 billion in 2017, up from a total of roughly 67 billion between 2014 and 2016, and had plans to double this to 120 billion in 2018.[23] However, the government has decided to delay the increase to 2019 to tackle some of the challenges associated with the law.[24] While the law's impacts are still emerging, as the Village Ministry's Director of Village Development, Taufik Madjid, has said, "the list of problems with the Village Law is much longer than the list of its results so far."

One issue cited in delaying the increase is a lack of meaningful job creation associated with the funding, which has frequently been used for infrastructure and other capital expenses. While job creation was not originally a central goal, the administration now expects employment to be a natural by-product of effective use of funds and is entertaining a new scheme that would more closely tie disbursements to employment.[25] Corruption has also been cited as an issue.[26] While low-level corruption can be difficult to measure, the Indonesian Corruption Watch (ICW) reported an increasing number of cases associated with village funds each year, reaching 96 cases in 2017 and totalling IDR 30 billion (USD 2.1 million) in state losses. The ICW has also warned of manipulation of village funds in the lead-up to the next election cycle.[27]

Yet another challenge has been the capacity of local leaders to effectively expend funds. The law states that village planning and budgeting should involve community representatives such as farmers, fishers, women, and marginalized groups, but regulations lack specific guidance on how to do so.[28] Regulations regarding village-level financial management more generally are thin and would benefit from a stronger framework for village governance and accountability.[29]

A complicating factor is the sometimes overlapping or conflicting nature of the 17 implementing regulations issued as of late 2017. Part of the challenge stems from the distribution of authority over villages at the highest level. Upon taking office, President Jokowi launched a new village ministry, the Ministry of Villages, Disadvantaged Regions and Transmigration (*Kemendesa*). While this again reflects his focus on improving livelihoods for the least advantaged, it has led to some confusion. Altogether, President Jokowi has assigned responsibility for villages and village development to three separate ministries: Kemendesa, the Ministry of Home Affairs, and the Ministry of Finance. Coordination between the three agencies is lacking at times.[30]

Infrastructure, energy, and the economy

Another central piece of President Jokowi's platform has been developing critical infrastructure to connect outlying regions, lower the costs of doing business, and enable economic development. Maritime infrastructure figures centrally in President Jokowi's development plans, highlighted by the "sea-toll" project, the main goal of which is to unite the archipelago and facilitate development in outlying regions,[31] particularly in eastern Indonesia, where 33 of 35 port projects are located.[32]

Like several other initiatives, infrastructure development started slowly as President Jokowi found his footing in office. Only six out of a planned 245 projects have been completed to date. Momentum has grown, however, and the government now contends that 145 projects are in the construction phase.[33] The government further claims that benefits from these efforts are already materializing, asserting in late 2017 that they had succeeded in reducing the price disparity between western and eastern Indonesia by 20-40 percent.[34] Other research has disputed that figure, however, blaming the lack of progress on rent-seekers that monopolize and profit from subsidized infrastructure such as the 13 state-owned cargo ships that transport basic goods between regions. The government also invested in its fishing fleet, including MMAF's provision of 755 fishing vessels during 2017 alone.

A significant hurdle to the infrastructure development agenda has been securing required funding. So far, the government has provided roughly USD 15 billion of its own funds but has received pledges for roughly half of the USD 327 billion in planned projects, including pledges from China through its "One Belt One Road" program.[35]

Despite foreign commitments, budget limitations remain a central challenge for a government looking to develop infrastructure, improve services, and raise standards of living. Indonesia's ratio of tax revenue to GDP is around 10 percent, one of the lowest in Southeast Asia. In 2016, President Jokowi brought Sri Mulyani back from the World Bank to serve as Minister of Finance. Minister Mulyani quickly implemented a tax amnesty program that led to the declaration of more than IDR 4.8 quadrillion (USD 366 billion) of previously undisclosed assets, equivalent to almost 40 percent of Indonesia's GDP, though only IDR 147 trillion (USD 11.1 billion) were repatriated. The Minister's efforts are, however, yielding some success: 2017 tax receipts were the highest in the past three years, and the first quarter of 2018 shows double digit growth year over year.[36]

In addition to low rates of tax collection, energy subsidies have also historically weighed heavily on Indonesian government expenditures. In 2014, as President Jokowi took office, nearly 19 percent of the central government budget was allocated to energy subsidies, equivalent to just under 4 percent of GDP. President Jokowi used some political capital, and a period of low energy prices, to decrease energy subsidies as one of his first major moves in office, saving roughly 9 percent of the total budget, much of which went instead to infrastructure.[37] While subsidies for gasoline were removed, smaller subsidies for diesel fuel remained in place in order to support Indonesia's fishers.

However, as the 2019 election nears, President Jokowi has eased some of these positions, committing to keep electricity and fuel prices unchanged in the coming years. While total subsidy expenditures are expected to remain under the regulated cap of 3 percent of GDP,[38] the move amounts to something of a reversal of his earlier subsidy reduction, a political calculation that will likely come at the cost of infrastructure.[39]

Looking forward to 2019

Days after Indonesians returned from the polls in 2014, their choice of president remained unclear. While most initial counts gave Jokowi the victory, challenger Prabowo Subianto alleged "massive, structured and systematic fraud"[40] and refused to concede. The final tally put Jokowi's margin at roughly 8 million votes, which, while healthy, was the narrowest margin in Indonesia's short history of direct elections.

With roughly a year to go, it seems that the 2019 presidential election could turn out differently. A relatively stable economy and the attenuation of sectarian politics have helped to buoy President Jokowi's popularity. Indonesia's previous president, Susilo Bambang Yudhoyono, who had indicated late support for Prabowo during the last election, may throw the considerable political heft of the Democratic Party (*Partai Demokrat*) behind President Jokowi.[41]

President Jokowi's also continues to benefit from the unprecedented popularity of Minister Pudjiastuti, a dynamic he may wish to preserve. That Minister Pudjiastuti appears willing to serve her country as long as requested by President Jokowi suggests that she may remain in office for the foreseeable future, thereby maintaining the current high level of visibility on fisheries issues in Indonesia.

Yet political fortunes can change quickly. Only four months before the 2014 election, candidate Jokowi held a 30 percent lead in the polls which eventually shrunk to single digits. At the same time, Prabowo Subianto has accepted his party's nomination to run again in 2019, though he awaits further political manoeuvring to determine whether he will have sufficient support from other parties. And while President Jokowi has fortified his base of support, there is now a proven playbook for defeating effective, secular, civilian incumbents.

A replay of the Jakarta gubernatorial election at a national scale, regardless of the victor, could tear at the fabric of the nation in ways that might take years to repair. Moreover, with Prabowo arguing that Indonesia is not suited to Western-style democracy, a new administration could easily wipe out incremental gains made under the Jokowi administration and beyond. In this context, promise of President Jokowi in 2019 may be less about transformational progress in the future, but rather, as in 2014, preventing a rollback to the past.

03
Political trends

Political trends

Prepared by
Sarah Conway

This chapter reviews policy priorities and political trends for the maritime sector in Indonesia, with a primary focus on the marine and fisheries sector.[i] The chapter is structured into the following sections: a) an overview of the institutional landscape of relevant ministries and agencies, b) trends in the maritime sector, and c) trends in the marine and fisheries sector. The companion chapter, "Political Timeline," highlights substantive themes underpinning key political moments and a timeline of recent events.

I. Overview of institutional landscape

Several ministries are connected to the maritime sector, some falling under the umbrella of the Coordinating Ministry for Maritime Affairs (CMMA). The ministry most relevant to the marine and fisheries sector is the Ministry of Marine Affairs and Fisheries (MMAF). The Ministry of National Development Planning (BAPPENAS) is also particularly significant.

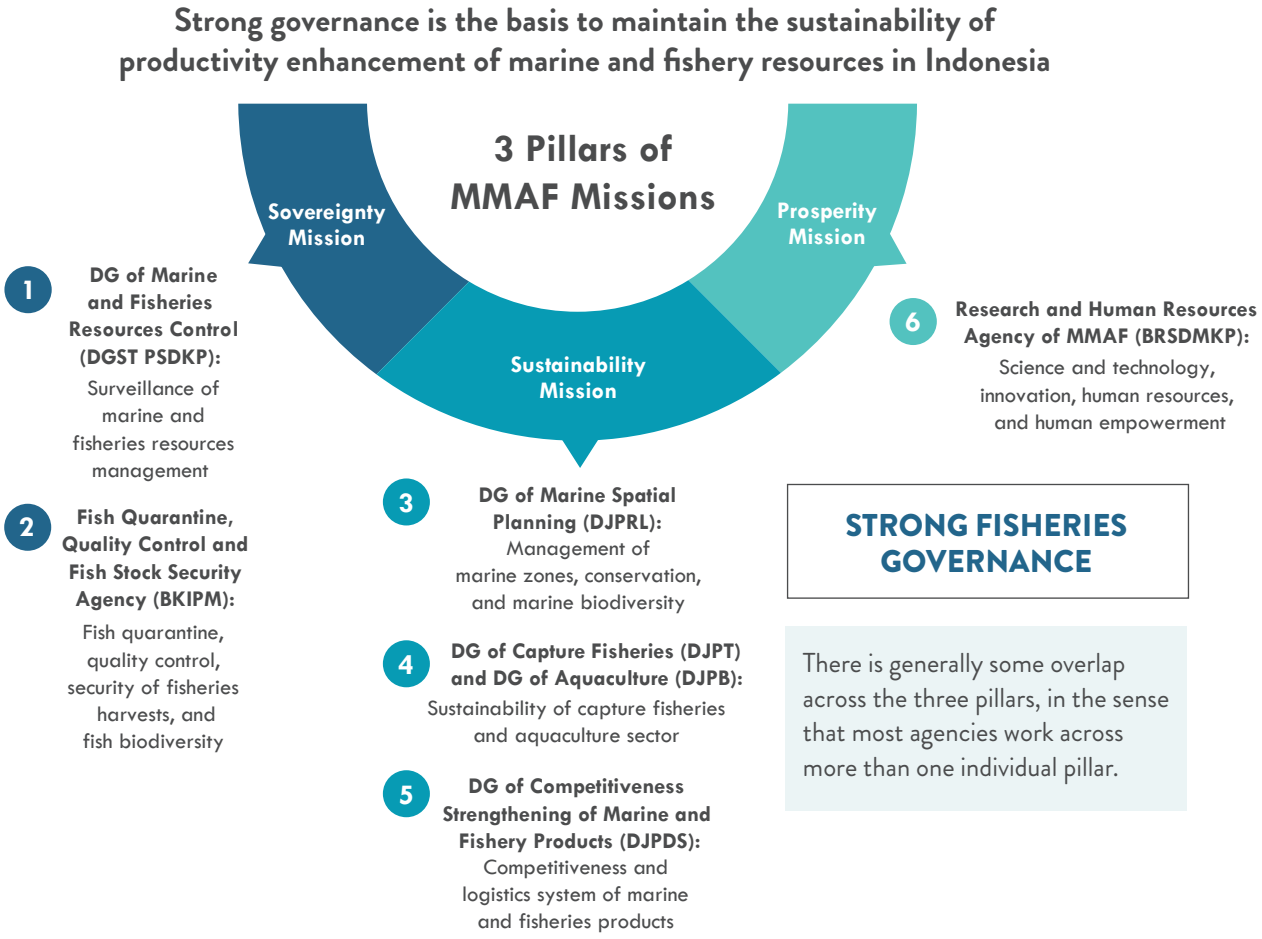
A brief overview of the relevant agencies and their functions are presented here:

- **The CMMA** is responsible for planning and policy coordination across MMAF, the Ministry of Energy and Mineral Resources, the Ministry of Transportation, and the Ministry of Tourism. Its specific functions include aligning and coordinating policies for maritime affairs, including among the ministries it oversees; coordinating maritime infrastructure policies; and executing individual tasks as directed by the President. In July 2016, President Jokowi appointed the third Coordinating Minister of Maritime Affairs, Luhut Binsar Pandjaitan.
- **MMAF** is responsible for managing Indonesia's fisheries, including marine, fresh, and brackish-water fisheries, and aquaculture. Its tasks range from fishery management, research, and stock assessment to fish processing and marketing (including fish product standards), investments in the fisheries sector (including ports and infrastructure), and monitoring fishing vessels and activities. MMAF's priority is to support the sustainable exploitation of marine and coastal resources while also protecting the coastal environment.

  In November 2014, President Jokowi appointed Susi Pudjiastuti, a former businesswoman, as MMAF Minister. She has become one of the most popular ministers, and also one of the most critiqued. Under her leadership, the mission of MMAF is organized around three pillars: sovereignty, sustainability, and prosperity (Fig. 1). Specifically, MMAF's vision is "to achieve sovereign, independent, and sustainable management of marine and fisheries resources for the people's prosperity."[1] The agency's mandate also includes marine conservation and marine spatial planning, which may also fall under the mandate of other ministries (e.g., the Ministry of Environment and Forestry (MEF) manages some national parks). In addition, some marine affairs issues are the responsibility of other ministries (e.g., the Ministry of Transportation deals with sea transport).

The use of "maritime sector" and "marine and fisheries sector" are intentionally used as distinct, rather than interchangeable, terms for purposes of this report. The maritime sector refers to human-related activities associated with sea and ocean resources (i.e., shipping, navigation, mineral extraction, tourism, and fisheries). As a subset of the maritime sector, the marine and fisheries sector involves the management, regulation, and exploitation of marine and coastal resources, including wild capture fisheries and aquaculture.

Figure 1. MMAF Technical Units and Respective Roles, By Pillar



- **BAPPENAS** is responsible for formulating national development planning and budgeting (annual, five-year, and long-term). BAPPENAS reviews all Ministerial programs to ensure conformity with the government-wide workplan. Additionally, the Ministry coordinates international development (bilateral, unilateral, and multilateral) cooperation. BAPPENAS is updating the five-year budget plan in 2018; the result is significant for the marine and fisheries sector as the process will determine whether the sector is selected as a priority area for public investment.

II. Trends and priorities in the maritime sector

A. Global Maritime Axis

The Indonesian fisheries and maritime sector has undergone a series of major changes since President Jokowi took office on October 20, 2014, starting with the slogan *"Jalesveva Jayamahe"* ("in the ocean we triumph"), which he included in his inauguration speech. Upon entering office, President Jokowi also presented a vision—dubbed the "Global Maritime Axis"—to situate Indonesia as a major maritime power.

The Global Maritime Axis is an aspirational doctrine that seeks to reposition Indonesia from an ASEAN focus to a more prominent role in the Indo-Pacific region and global diplomacy. The text of the maritime axis, included below, primarily focuses on trade, food security, infrastructure investments, maritime diplomacy, and security. Recent policies and events—including adoption of the Indonesian Ocean Policy, assertion of sovereignty over the outermost islands, investments in fisheries sector infrastructure (i.e., ports, cold storage), and MMAF's bold stance against IUU fishing—reflect the government's attempts to realize the Axis vision since its initial announcement.

Jokowi's Global Maritime Axis

1. *Rebuild Indonesia's maritime culture. As a country consisting of 17,000 islands, Indonesia should be aware of and see the oceans as part of the nation's identity; its prosperity and its future are determined by how its oceans are managed.*
2. *Maintain and manage marine resources, with a focus on building marine food sovereignty through the development of the fishing industry.*
3. *Provide priority to the development of maritime infrastructure and connectivity by constructing sea highways along the shore of Java, establishing deep seaports and logistical networks, and developing the shipping industry and maritime tourism.*
4. *Through maritime diplomacy, Indonesia invites other nations to cooperate in the marine field and eliminate the source of conflicts at sea, such as illegal fishing, violations of sovereignty, territorial disputes, piracy and marine pollution.*
5. *Indonesia has an obligation to develop its maritime defense forces. This is necessary not only to maintain maritime sovereignty and wealth, but also as a form of its responsibility to maintain the safety of shipping and maritime security.*

B. Implementing President Jokowi Global Maritime Axis via the Indonesian Ocean Policy

The Indonesian Ocean Policy is one of most direct representations of implementing the Global Maritime Axis. During the World Ocean Conference in June 2017, CMMA Minister Pandjaitan launched the Indonesian Ocean Policy (Presidential Decree No. 16/2017).[2] This document outlines the specifics of President Jokowi's Global Maritime Axis, as overseen by the CMMA. While the Policy spans a range of issues, it has essentially two dimensions: strategic and economic.[3]

On the strategic side, Indonesia is focused on developing its defense and security capabilities, primarily by modernizing the Navy's fleet and bases. Recent examples include acquiring attack submarines and Norwegian Advanced Surface-to-Air Missile Systems and commissioning a guided-missile frigate.[4] Indonesia has also asserted its sovereignty over the outermost islands, and continued to protect Natuna (see page 29 for more information).

On the economic side, Indonesia is developing ports, fisheries, and shipping capacity to increase exports as well as to improve the economic circumstances of the outer islands.[5]

Ultimately, the Indonesian Ocean Policy provides high-level framing for the Global Maritime Axis. That said, it remains to be seen how these efforts will translate into the implementation of regulations and instructions. It also remains to be seen whether the Policy's implementation will enable or hinder a transition to sustainable fisheries.

Indonesia Ocean Policy Mission

Ocean resources are managed optimally and in a sustainable manner;

the quality of human resources, marine science and reliable maritime technology are well developed;

strong maritime defense and security are developed;

enforcement of sovereignty, law, and safety at the sea are implemented optimally;

implementing good ocean governance;

the welfare of people at the coastal area and small island are equally developed;

enhancement of competitive marine economic and industrial growth;

reliable marine infrastructure is built;

rules on maritime spatial planning is created; protection of marine environment is implemented;

execution of maritime diplomacy; and strengthening of strong maritime culture and outlook.

C. Tackling maritime issues with a multi-sectoral approach

One threat to the marine and fisheries sector and marine biodiversity more broadly is the presence of plastic waste; Indonesia is the second-largest contributor to marine plastic pollution after China.[6] Minister Pandjaitan has proposed addressing the plastics problem in part by using plastic and other garbage to generate power.[7] He also announced that Indonesia will spend up to USD 1 billion per year to fulfill its target of reducing the amount of plastic and other waste products in its waters by 70 percent by 2025.[8] The CMMA is one of eleven ministries that agreed to a National Action Plan, which started in 2017 to address the issue of marine debris.

Separately, Minister Pandjaitan also is focusing on developing the marine tourism sector, estimating that it could earn USD 1.33 trillion.[9] The sector is already large and growing, attracting 11.52 million foreign tourists in 2016, a 10.7 percent rise from 2015.[10] In comparison, there were 32.6 million arrivals in Thailand and 25.7 million in Malaysia in 2016.[11] Looking ahead, Indonesia predicts that it will host 20 million tourists in 2019. The growth of the marine tourism sector may present new livelihood opportunities to those currently involved in the fisheries sector.

D. Declaring sovereignty over outermost islands, and continuing to protect Natuna

President Jokowi's administration has made it a priority to protect the country's border against foreign territorial claims, an issue that has played out in recent years through disputes with neighboring countries including China, Malaysia, and Singapore. President Jokowi issued a Presidential Decree in 2017 to assert sovereignty over 111 islands, revising a 2005 decree that only mentioned 92 islands. According to Minister Pudjiastuti, the decree was enacted "to prevent issues of occupation or claims of possession by other nations."[12]

The islands of Natuna, which lie in the South China Sea within Indonesia's exclusive economic zone (EEZ), have also been subject to long-standing conflict. While Indonesia has consistently asserted its right to control these islands and their abundant surrounding fishery resources, China disagrees. In fact, China has long asserted claims over nearly 95 percent of the South China Sea, often encroaching upon the 200-nautical-mile EEZ of neighboring countries.[13]

China's so-called "nine-dash line" (Fig. 2) originated with its former Nationalist government in 1947 and has been re-plotted and re-interpreted several times since.[14] Most states in the region, including Indonesia, do not recognize the nine-dash line, and an international tribunal has ruled that the line has no legal basis.[15] As a result, Chinese fishing efforts near Natuna have met with resistance. In 2016 alone, the Indonesian Navy opened fire

Figure 2. "Nine-Dash Line" Map

on Chinese fishing boats three times for illegal fishing.[16] Other countries dealing with China's claim to the South China Sea have been far more measured and have even helped reach collaborative outcomes. For example, despite years of argument, the Philippines recently agreed to set up a special panel with China to determine how the two countries can jointly explore for oil and gas in part of the contested waters.[17]

In July 2017, in an effort to safeguard its claim over the area and to underline its long-held position that it does not recognize the nine-dash line, Indonesia renamed the northern area around its Natuna Islands as the North Natuna Sea.[18] China opposes the change, and in a letter addressed to the Indonesian Embassy in Beijing dated August 25, 2017, China said the move to change "an internationally accepted name" resulted in "complication and expansion of the dispute" and "affects peace and stability."[19]

III. Trends and priorities in the maritime sector

A. Review of recent MMAF policies and priorities

Under Minister Pudjiastuti, MMAF's core policies have involved issuing Ministerial Decrees prohibiting trawling nationwide, addressing illegal fishing by foreign vessels, and establishing new minimum size limits for lobsters, crab, and blue swimming crab, among others. She has also focused on increasing government and private sector investment in the fisheries value chain. The main MMAF-driven political moments in 2016 and 2017 very much align with and build upon the agency's earlier efforts. At the same time, the CMMA has highlighted the need to address plastic waste and develop the maritime sector, among other priorities recently articulated in the Indonesian Ocean Policy. The primary themes of MMAF policies and priorities, largely reflecting actions taken in 2017, are highlighted in the sections below.

Reactions to MMAF Minister Susi Pudjiastuti

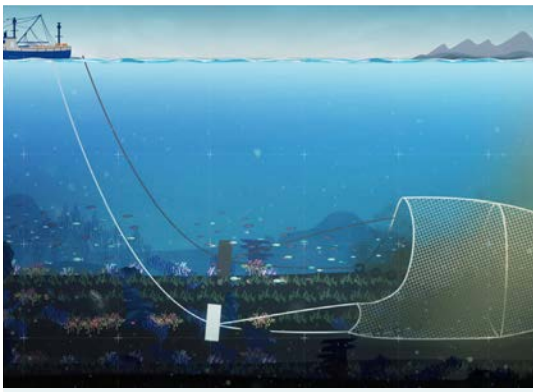
While leading MMAF, Minister Pudjiastuti has introduced a bold set of reforms that has elicited contrasting responses from different audiences. On the one hand, conservation groups in the international community have lauded her leadership in passing regulations that promote sustainable and responsible fishing. She is also seen as a cultural icon domestically and is generally well received. At the same time, fishing operators and politicians who stand to lose from some of these policies have, in some instances, aggressively protested their implementation. These groups successfully resisted implementation of the trawl ban. *(See page 31 for more information.)*

B. Trawling ban: a long history, and uncertain implementation

One of Minister Pudjiastuti's first regulations, Ministerial Regulation No. 2/2015, banned all types of fishing trawl and seine nets effective January 1, 2017. The use of trawl and *cantrang*—a modified Danish seine or trawl with fine mesh nets that cover large tracts of nearshore waters—damage coral reefs and the seabed ecosystem and thus represents an unsustainable fishing practice. Indonesia initially recognized the destructive nature of trawling more than 35 years ago, when the country banned the use of trawl nets on boats greater than 5 GT under Presidential Decree No. 39/1980. The approach to banning trawl nets could look to other countries that have issued a phased ban over time, which has the multiple objectives of reducing the significant juvenile catch of these gears and reducing conflicts with other fishers who use hook and line and more passive gears.

As with many of Minister Pudjiastuti's policies, the ban has been met with a mixed response. Some have expressed support for the ban, highlighting the long-term negative impacts of *cantrang* and trawling on the ecosystem and ultimately on livelihoods.[20] However, *cantrang* usage continued and boat owners and fishers, especially on Java, actively protested the ban. Other individuals and groups have also made complaints:

- Wayan Sudjana, Vice Chairman of the Jakarta Chapter of the Indonesian Chamber of Commerce and Industry (Kadin), said that the regulation threatens the livelihoods of nearly 1 million fishers and another 5 million workers in the fisheries industry.[21]
- Muhaimin "Cak Imin" Iskandar, Chairman of the National Awakening Party (PKB), Indonesia's largest Islamic party and part of President Jokowi's governing coalition, met with the President to voice his opposition.[22]
- Maneger Nasution, Commissioner of the National Commission on Human Rights (Komnas HAM) —operating in his personal capacity—issued a written statement that the ban on trawling gear violates fishers' constitutional rights.[23]
- The banking industry, concerned about loan repayment, is starting to add its voice to the protests.[24]



Negative impacts of trawlers on the seabed

- overfishing;
- gathering untargeted, unwanted catch, or "bycatch," thereby harming other species;
- destabilizing the seafloor;
- damaging coral;
- destroying anemones, sponges, sea pens, urchins, and other fine, fragile-bodied animals;
- and crushing life within the seabed.

Source: Greenpeace, 2016

The underlying motivation of those making complaints has been a subject of debate. Some believe the protests may be motivated by politics rather than true grassroots frustration with the policies. Others have noted that those aggrieved by the ban may not be small fishers but rather larger fishers, whose interests more closely resemble corporate interests.

Faced with this strong resistance, President Jokowi has delayed implementing the regulation several times. Most recently, on January 17, 2018, following a meeting at the State Palace in Jakarta between President Jokowi and representatives of thousands of protestors purporting to be fishers from the northern Java coast, Minister Pudjiastuti announced that implementation of the ban would be extended indefinitely, but only for fishers operating off the coast of North Java.[25] It is unclear whether the ban will be enforced outside this area, and there is no firm indication as to when (if ever) the North Java exemption will end.

To help ease concerns about the ban, MMAF is working to distribute approximately 7,000 new pieces of fishing equipment to replace *cantrang*. Boats less than 10 GT will receive the equipment for free, while boats greater than 10 GT will receive subsidized loans from state-owned lenders Bank Rakyat Indonesia and Bank Tabungan Negara.[26] Distribution has been slow. Other measures also aim to alleviate impacts on those engaged in the fishing industry, including Law No. 7/2016, which requires central and local governments to provide education, incentives, insurance, and livelihood protection for fishers and salt farmers.[27]

C. Tackling IUU fishing by foreign vessels

Minister Pudjiastuti's most visible and hard-lined pursuit has related to tackling IUU fishing by foreign vessels in Indonesia's EEZ.[ii] IUU fishing generally refers to fishing conducted in violation of national laws or internationally agreed-upon conservation and management measures in oceans around the world.[28] While figures vary and little underlying data is available, MMAF estimates that illegal fishing costs Indonesia USD 3-20 billion per year.[29] The actual monetary and non-monetary costs may be much higher if the costs take into account other crimes associated with IUU fishing, including money laundering, human trafficking, tax fraud, and smuggling of drugs, weapons, and endangered species.[30]

A summary of key efforts to address IUU fishing by foreign vessels include:

- In November 2014, a one-year moratorium was placed on foreign-owned and foreign-manufactured fishing vessels > 30 GT (Ministerial Regulation 56/2014). The moratorium was issued in an attempt to crack down on illegal fishing, given that a large proportion of foreign vessels were detected as engaging in illegal activity such as falsifying data and conducting illegal transshipment of fish. Per Ministerial Decree 26B/2015, which governs analysis and evaluation of ex-foreign fishing vessels, MMAF audited 1,132 vessels across 33 ports. Of these, 100 percent were in violation of the law, with 769 in "severe violation" and 363 in "average violation." After the audit, MMAF revoked 15 business licenses, 245 fishing licenses, and 31 reefer licenses.[31]
- In addition to the moratorium, MMAF banned transshipment[iii]–the offloading of catch at sea–in Ministerial Decree No. 57/2014. The transshipment ban has been the subject of controversy; the ban was applied to all fishing companies, including those that have never engaged in IUU fishing and who may rely on transshipment to remain as viable business operations.
- Between 2014 and 2016, two task forces were set up to address IUU fishing by foreign vessels:
  - The Task Force on the Prevention and Eradication of IUU Fishing, established by MMAF to investigate IUU fishing, develop policy recommendations, and strengthen coordination among enforcement agencies, among other things, and
  - The Task Force on Eradication of IUU Fishing, Task Force-115, established by Presidential Decree No. 115/2015 to strengthen the enforcement capacity of MMAF, the Navy, the police, the Coast Guard, and public prosecutors.[32]
- Under the "sink the vessels" policy, Indonesia instituted a publicly visible approach to implementing Law 45/2009, Article 69(4), which allows foreign-flagged vessels to be burned or sunk based on sufficient initial evidence. More than 360 vessels have been scuttled

[ii]The United Nations Convention on the Law of the Sea (UNCLOS) provides definitions for the EEZ as well as territorial waters. The EEZ is the sea zone extending 200 nautical miles out from the coast of a country's islands. Within EEZs, countries have special rights regarding the exploration and use of marine resources. The territorial sea refers to waters over which a country exercises full sovereignty, which extend 12 nautical miles out from the coast.

[iii]The often-hidden practice of transshipment is considered a driver of overfishing and an enabler of illegal fishing and other fisheries crimes. Transshipment is the practice of fishing vessels offloading catch to refrigerated cargo ships, which then carry the catch back to port while the fishing vessels remain at sea, often for months or years at a time. This practice can facilitate a range of potential illegal activities, including mixing illegal catch with legitimate catch, smuggling drugs, and using slave labor.

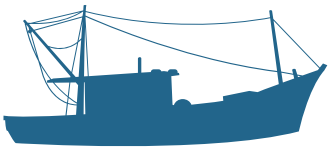
Breaking down the I, U, U in Illegal, Unreported, and Unregulated fishing

Illegal fishing: when vessels or harvesters operate in violation of the laws of a fishery.

Unreported fishing: when fishing is unreported or misreported to the relevant country-level authority or the regional fisheries management organization (RFMO).

Unregulated fishing: when fishing is done by vessels without nationality, vessels flying the flag of a country not party to the RFMO governing the area or species, or vessels harvesting in unregulated areas.

Table 2. Number of IUU Boats per Flag State (Nov. 2014-Nov. 2017)



NO.	BOAT FLAG	TOTAL
1	Vietnam	188
2	Philippines	76
3	Thailand	22
4	Malaysia	51
5	Indonesia	21
6	Papua New Guinea	2
7	China	1
8	Belize	1
9	No Flag	1
	TOTAL	363

This table refers to foreign boats accused of IUU fishing in Indonesian waters.

or destroyed, including 87 vessels in 2017 alone.[33] While applauded by many both within and outside of Indonesia, Minister Pudjiastuti's use of dynamite has been subject to some questions and criticism. In July 2017, the Batam Prosecutors' Office in Riau Islands reportedly suggested auctioning off three confiscated fishing boats of sizes 150 GT, 100 GT, and 16 GT. Minister Pudjiastuti rejected the proposal, stating that boats confiscated for illegal fishing cannot be used for fishing activities. She also said that she would be open to discussing the possibility of converting the ships into research vessels.[34] Most recently, in early 2018, CMMA Minister Pandjaitan and Vice President Jusuf Kalla urged Minister Pudjiastuti to end the policy to sink vessels.[35] The Indonesian Chamber of Commerce and Industry (Kadin) expressed support for their position.[36] Minister Pudjiastuti insists on continuing her ship-sinking policy, as mandated by law, but it remains to be seen how much longer she can maintain this position in the face of rising opposition.[37]

- In May 2016, Indonesia ratified the Port State Measures Agreement, joining 34 countries plus the EU in blocking access of IUU fishing products to the legal market.[38]
- Also at the international level, Indonesia continues to advocate for IUU fishing to be classified as a transnational organized crime (TOC). Most recently, during the Oceans Conference in New York in June 2017, Minister Pudjiastuti urged the UN to declare IUU fishing an organized crime.[39] At the same conference, she called for other countries to share their Vessel Monitoring System (VMS) data to strengthen transparency and combat illegal fishing.
- In July 2017, through Global Fishing Watch (GFW),[iv] Indonesia became the first country to share its VMS data. Since 2013, Indonesia has required VMS on all boats greater than 30 GT per Ministerial Regulation No. 10/2013; this data is now publicly accessible via GFW. While the Indonesian government has real-time access to the data, analyzing it and responding can take time (e.g., patrol boats may not be nearby). Data shared with the public is delayed 72 hours.

The Indonesian government's decision to make its VMS data public appears to be influencing other countries to consider making their own vessel tracking data publicly available. In October 2017, the government of Peru signed a memorandum of understanding (MOU) to initiate the process for making its VMS data publicly available through GFW; the process was expected to be completed in early 2018. GFW is holding conversations with five other countries in South America and Asia to develop similar MOUs. This trend signals an important increase in the transparency of the fisheries sector; as recently as two years ago, it would have been nearly inconceivable for a country to have made such a commitment.

Overall, tackling IUU fishing aligns with Indonesia's three pillars of sovereignty, sustainability, and prosperity for the maritime and fisheries sector. However, current and planned efforts to increase domestic fishing effort stand to offset the reduction in foreign IUU, minimizing the "sustainability"-related gains associated with tackling foreign IUU. It should also be noted that some foreign fleets formerly fishing in Indonesian waters have shifted their fishing activity to other waters, including in Africa, causing possible international impacts.

[iv] GFW is a partnership between Google, Oceana, and SkyTruth. It uses data and open source technologies to show historic commercial fishing activity since 2012 and current commercial fishing activity in real-time. It creates transparency, increases traceability, and promotes sustainability.

Tracking fishing activity with AIS and VMS

Tracking fishing activity with AIS and VMS
Automatic Identification System (AIS) and VMS represent two tools for tracking vessels globally. This data has become increasingly relevant in countries' efforts to fight IUU fishing. AIS and VMS offer differing strengths and limitations in terms of cost, range (line of sight), and applicability.

AIS is primarily intended as a situational awareness tool that allows vessels to electronically exchange two-way data in near real-time, either ship-to-ship or to ship-to-shore. IMO regulations require that most vessels over 300 GT or 65 feet operate with AIS. While there is no cost per message for AIS, there is also no guarantee of message reception.

VMS is a satellite-based communication system that allows vessels to send bi-directional messages (either manual or scheduled) to deliver one-way data in near real-time. Although message reception is guaranteed for VMS, there is a cost per signal, which is shared between the vessel and the relevant maritime authority. Maritime authorities can use AIS and VMS data in complementary ways to develop Maritime Domain Awareness.

One final issue to note with respect to IUU fishing: little attention has been directed toward IUU fishing by Indonesian boats in domestic or foreign waters. Given that IUU fishing by foreign vessels has essentially been eliminated (and IUU fishing by Indonesia vessels was at least temporarily reduced through the moratorium and subsequent re-registration of domestic fishing vessels), a key question will be whether MMAF will be able to design and implement effective measures to limit illegal fishing by Indonesian vessels and also enact preconditions for sustainable management of the legal domestic fishing. Domestically, it is generally understood that the use of illegal fishing gear and the illegal harvesting of certain species below allowable size limits continues. Internationally, researchers are warning that poor and exploited fishers from Indonesia and East Timor are returning to illegal fishing practices in northern Australian waters, where illegal fishing rates have been steadily climbing since 2010.[40] In November 2017, Australia repatriated five Indonesian fishers arrested for illegal fishing in the Australian EEZ.[41]

D. Addressing human rights violations in fisheries

Human trafficking is a challenge distinct from but often interconnected with IUU fishing. Both problems share the same primary drivers: weak rule of law, inadequate data on violators, limited coordination among international actors, and increasing global demand for seafood products at an affordable price.[42]

A 2016 report by the International Organization on Migration (IOM) Indonesia, MMAF's Task Force-115, the University of Indonesia, and Coventry University provides a glimpse into the human trafficking and forced labor practices in the Indonesian fishing industry. The report found:

- systematic, highly organized, and deceptive recruitment and exploitation of fishers and seafarers from multiple countries in Southeast Asia;
- murder and unlawful disposal of corpses, as evidenced by witness testimony;
- extreme cases of labor exploitation, with fishers working over 20 hours per day, up to seven days per week; and a lack of awareness at the local level of human trafficking, forced labor, and associated criminal activity.[43]

Human trafficking

Human trafficking is the use of force, fraud, or intimidation to compel individuals to engage in labor against their will. Human trafficking can take many forms, ranging from literal imprisonment using physical restraints and the threat of violence to subtler forms of psychological coercion, including the imposition of onerous debts that trap the debtor in perpetual servitude.

The number of foreign fishers who were victims of trafficking and assisted by IOM Indonesia averaged 124 per year from 2011 to 2014, and jumped to 1,222 in 2015. While all of these fishers were employed by the Thai fishing industry, the victims originated from different countries: Myanmar (1,328), Cambodia (299), Thailand (78), and Lao PDR (13).[44]

In response to the report and building on Ministerial Decree No. 35/2015, Minister Pudjiastuti issued Ministerial Decree No. 2/2017 in January 2017 to create a human rights certification mechanism for fishing boats operating in Indonesia. It also requires all fishing companies to provide an adequate insurance scheme, a standard minimum wage, and clear working hours for fishers and port workers.[45]

As with other regulations related to combatting IUU fishing, implementation and enforcement of Ministerial Decree No. 2/2017 will require cross-border cooperation. The Indonesian government continues to push for treatment of IUU, human trafficking, and other illegal activities at sea as TOC.[46] Over 250,000 Indonesian crew members work on foreign vessels operating across areas that remain largely unregulated.[47]

Other efforts are underway at the international level to ensure the fair treatment of fishers and others involved in the sector. For example, the 2017 "Monterey Framework," developed by the Coalition for Socially Responsible Seafood, includes three components important to the seafood sector and protecting those involved in it: (1) protect human rights, dignity, and access to resources; (2) ensure equality and equitable opportunity to benefit; and (3) improve food and livelihood security.[48]

E. Fisheries sector fuel subsidies: progress in Indonesia, but business-as-usual internationally

Presidential Decree No. 15/2012, issued by President Susilo Bambang Yudhoyono, limited the purchase of subsidized diesel to vessels less than 30 GT.[49] However, implementation was delayed. Minister Pudjiastuti issued the implementing guidelines—Ministerial Regulation No. 13/2015—to only allow access to fuel subsidies for boats less than 30 GT.[50] Some boats over 50 GT in size attempted to circumvent this change by simply listing their size as below 30 GT. However, the Ministry underwent a re-measuring and re-certifying exercise, thereby eliminating access to subsidies for boats that are in reality greater than 30 GT. According to Pertamina data, 1.2 million kiloliters (kl) of subsidized fuel was provided to fishers in 2016, down 19.46 percent from 1.49 million kl in 2015.[51] Minister Pudjiastuti warned she might ask the Minister of Energy and Mineral Resources, Ignasius Jonan, to remove all fuel subsidies for fishers.[52]

Internationally, the recent Ministerial Conference of the World Trade Organization was unable to reach agreement on draft text related to fisheries subsidies, and instead agreed to "continue to engage constructively in the fisheries subsidies negotiations," with the aim of adopting an agreement in 2019.[53]

F. Foreign partnerships: support to increase productivity and export potential

While Indonesia asserts sovereignty over certain areas, Indonesia is also actively seeking foreign partners to invest in fisheries sector infrastructure (e.g., ports, cold storage) and also to reduce import tariff values in order to make Indonesian fisheries products more competitive. Minister Pudjiastuti has approached the Czech Republic, Japan, Norway, Saudi Arabia, and Russia, among other countries.[54]

Examples include:

- MMAF is actively fighting for import tariff cuts from the EU, which currently charges 6 to 24 percent for Indonesian fisheries products. Minister Pudjiastuti is hopeful that Indonesia can secure a zero percent tariff to align with the current treatment of fisheries products from Timor-Leste, Papua New Guinea, and Vietnam.[55]
- Japan, the largest importer of Indonesian fisheries products, remains an important economic partner. In August, Minister Pudjiastuti asked Japan to reduce the import tariff imposed on fishery products from 7 percent to zero percent, the rate enjoyed by Thai fishery imports.[56] The Japanese government will soon negotiate with Indonesia under the framework of the Indonesia-Japan Economic Partnership Agreement. A reduction in the import tariff would improve the financial bottom line of the fisheries industry and likely result in higher export numbers. Separately, Japan agreed to help Indonesia to build fishing ports and fish markets on Natuna, Sabang, Morotai, Saumlaki, Moa, and Biak islands.[57] Japan will provide grants to develop the capacity of the local people, build integrated fishery facilities in the six outlying islands, and construct 60 coastal radar units.[58]

04 Political moments

Prepared by
Sarah Conway

January 2014
Minister Pudjiastuti introduces moratorium on new fishing licenses/ renewals

July 2014
Joko "Jokowi" Widodo elected President of Indonesia

October 2014
Law 23/2014 on Local Government passed, moving the responsibility for fisheries management from district to provincial governments

February 2015
Transshipment ban extended with exceptions

May 2015
Otoritas Jasa Keuangan (Financial Services Authority) (OJK) expands supply of private sector credit to fisheries industry

June 2015
Task Force on Prevention, Detention and Elimination of Illegal Fishing established by Ministerial Decree

August 2015
MMAF establishes tax deductions for fisheries sector investments

October 2015
Task Force-115 established by Presidential Decree No. 115/2015 to strengthen the enforcement capacity of MMAF, the Navy, the police, the Coast Guard, and public prosecutors

October 2015
Indonesia and the **United States sign MOU** on maritime cooperation

November 2015
Minister Pudjiastuti urges recognition of IUU fishing as a transnational crime

December 2015
Minister Pudjiastuti issues new **Fisheries Management Plan for Tuna**

December 2015
Ministerial Decree No. 35/2015 requires capture fishing companies to adopt human rights principles

March 2016
MMAF issues memo prohibiting foreign and ex-foreign ships from operating in Indonesia

April 2016
Minister Pudjiastuti **signs MOU with Spire Global, a** satellite-powered data company, to pinpoint locations of illegal fishing vessels in Indonesian waters

May 2016
Indonesia ratifies the **Port State Measures Agreement**

May 2016
MMAF launches the Kata Data ("One Data Policy")

December 2016
MMAF launches the Kata New fisheries management plans issued for three commercial fish species

January 2017
Ministerial Decree No. 71/2016 on fishing zones and equipment enters into force

January 2017
Ministerial Decree No. 2/2017 on human rights abuse in fisheries issued

February 2017
The Economist World Ocean Summit held in Bali, Indonesia

February 2017
Minister Pandjaitan **pledges USD 1 billion** a year to **reduce the amount of plastic** and other waste entering the ocean

March 2017
Indonesia declares sovereignty over 111 outermost islands

March 2017
Minister Pudjiastuti announces that all Indonesian fishers using legal fishing gear and practices will receive insurance

March 2017
International Fish Force Academy opens to address fishery-related criminal activities

2014 | FEB 2015 | DEC 2015 | 2016 | JAN - MAR 2017

© Shutterstock.com

"We have to work really hard to return Indonesia's status as a maritime nation. Oceans, seas, straits, and gulfs are the future of our civilization."

President Jokowi, October 2014, Inaugural Address

PETER BENCHLEY OCEAN AWARDS

May 2017
Minister Pudjiastuti wins the **2017 Peter Benchley Ocean Award** in the category Excellence in National Stewardship

May 2017
National Police thwart an attempt to smuggle billions-rupiah worth of lobster seeds

June 2017
Indonesia becomes the first country to **share its VMS data**

June 2017
Minister Pudjiastuti wins the Seafood Champion Award at the SeaWeb Seafood Summit

©Peter King

July 2017
President Jokowi renames a part of South China Sea as **Northern Natuna Sea**

July 2017
The government attempts to curb rising lobster seedling smuggling by encouraging sea farming

August 2017
Indonesia reiterates its commitment to sink trespasser vessels

August 2017
Minister Pudjiastuti asks Japan to reduce the import tariff imposed on fishery products from Indonesia from 7% to 0%

August 2017
Supreme Court gives green light to the **Jakarta reclamation project**

©Asian Development Bank

September 2017
Japan agrees to help Indonesia build fishing ports and fish markets in six outlying islands

October 2017
Minister Pudjiastuti named one of BBC's 100 Women

October 2017
Indonesia Court upholds the seizure of an illegal Thai fishing vessel

November 2017
Indonesia fights for import tariff cuts for fisheries products imported by the EU

December 2017
Minister Pudjiastuti promises to elevate Indonesia's position as a dominant player in the ornamental fish market

©Asian Development Bank

January 2018
MMAF exempts fishers in North Java from complying with the *cantrang* ban

February 2018
MMAF conducts a groundbreaking ceremony to develop **Indonesia's first modern fish market** in Jakarta

March 2018
Minister Pudjiastuti affirms her willingness to serve a second term if President Jokowi is re-elected in 2019, on the condition that the ban on illegal foreign vessels is retained

April 2018
Indonesia appears on target to reaching its commitment of establishing **20 million hectares of MPAs by 2020**

April 2018
Since the start of 2018, Indonesia has seized 26 fishing vessels that were allegedly operating illegally in Indonesian waters

April 2018
Through a partnership with **Google, MMAF** has made 5,000 previously invisible boats viewable online, in an effort to detect illegal fishing activity in real time

MAY - JUNE **2017** | JULY - AUG **2017** | SEP - DEC **2017** | JAN - MAR **2018** | APR **2018**

© Global Fishing Watch

"Illegal fishing is an international problem, and countering it requires cross border cooperation between countries," said Minister Susi. "I urge all nations to join me in sharing their vessel monitoring data with Global Fishing Watch. Together, we can begin a new era in transparency to end illegal and unreported fishing."

Minister Pudjiastuti, June 2017, UN Ocean Conference

Review of Key Political Moments

May 2016

- **MMAF launched the Kata Data ("One Data Policy")** in response to President Jokowi's directive to prioritize the use of accurate, verified, and up-to-date data to inform policy decisions. The national "One Data Policy" is shared across seven ministries; MMAF's Satu Datu program represents one of the pilot programs.

December 2016/January 2017

- **New fisheries management plans were issued for three commercial fish species:** Bali sardinella (lemuru), flying fish (ikan terbang), and blue swimming crab (rajungan). The plans include priority objectives and target indicators for sustainable ecosystem-based management of the target species.[1]
- **Ministerial Decree No. 71/2016 on fishing zones and equipment entered into force on January 1.** However, due to protests and other vocal resistance, President Jokowi delayed implementation to January 2018.
- **Ministerial Decree No. 2/2017 on human rights abuse in fisheries was issued,** creating a human rights certification mechanism for fishing boats operating in Indonesia, and requiring all fishery companies to provide an adequate insurance scheme, a standard minimum wage, and clear working hours for fishers and port workers.[2]

February 2017

- **The Economist World Ocean Summit was held in Bali, Indonesia.** In its fourth year, the Economist World Ocean Summit included over 300 individuals from nearly 60 countries who discussed the transition from a conventional to a sustainable ocean economy.
- **Minister Pandjaitan pledged USD 1 billion a year to reduce the amount of plastic and other waste products polluting Indonesian waters.** The CMMA is one of eleven ministries that have agreed to a National Action Plan focused on addressing the issue of marine debris.

March 2017

- **Indonesia declared sovereignty over 111 outermost islands,** revising a 2005 decree that included 92 islands.[3]
- **Minister Pudjiastuti announced that all Indonesian fishers using legal fishing gear and practices will receive insurance.** Fisher families will receive up to IDR 200 million (USD 14,760) in compensation for a death at sea, IDR 160 million (USD 11,800) in case of death following a land accident, and IDR 100 million (USD 7,380) for permanent disability due to an accident on land.[4]
- **International Fish Force Academy officially opened.** A joint effort by MMAF, the Ministry's Task Force-115, and the Indonesian National Police, the school will train investigators and public prosecutors to address fishery-related criminal activities.[5]

April 2017

- **Indonesia's Parliament ratified a 2014 maritime agreement on boundaries with the Philippines.** The agreement clarifies the boundaries between the two countries' EEZs in the Mindanao Sea and Celebes Sea. This will provide legal certainty for the more than 107,000 Indonesian fishers and 152 vessels of 30 GT and above operating in the waters off North Sulawesi.[6] Similar discussions are currently in progress with Palau.

May 2017

- **Minister Pudjiastuti won the 2017 Peter Benchley Ocean Award in the category Excellence in National Stewardship** for her work to protect Indonesia's marine ecosystem and fisher communities.[7] She also won WWF's Leaders for a Living Planet Award in September 2016.[8]
- **Police foiled attempts to smuggle a billion-rupiah worth of lobster seeds.** Working in collaboration, MMAF and the National Police thwarted a series of attempts to smuggle 65,000 lobster seeds worth billions of rupiah.[9]

June 2017

- **Indonesia became the first country to share its VMS data.** At the United Nation's Ocean Conference, Indonesia became the first nation ever to make VMS data public. The data is accessible via data mapping platform GFW, a partnership between Google, conservation group Oceana, and SkyTruth, a nonprofit that uses tools like satellite imagery to monitor environmental issues. Minister Pudjiastuti and GFW have urged other countries to do the same, making publication of VMS data the new standard. To date, Peru has also signed an MOU to make its VMS data publicly available.[10]
- **Minister Pudjiastuti won the Seafood Champion Award at the SeaWeb Seafood Summit** held June 5-7 in Seattle.[11]

July 2017

- **President Jokowi renamed a part of South China Sea as Northern Natuna Sea.** The government of Indonesia decided to rename the part of the South China Sea that falls within Indonesia's EEZ as the North Natuna Sea, a move to assert Indonesian sovereignty in the face of increasing pressure from China.[12] The Chinese Ministry of Foreign Affairs was quick to condemn the renaming.[13]

- **The Indonesian government tried to curb rising lobster seedling smuggling by encouraging sea farming.** For the first half of 2017, the value of the smuggled lobster seedlings was estimated to be IDR 158 billion (USD 11 million), representing an increase of 120 percent compared to the first half of 2016. The increase was driven by high demand, especially from Vietnam, which is suffering from declining fish stocks due to overfishing. MMAF disbursed IDR 50 billion (USD 3.5 million) in financial aid to over 2,000 fishers in West Nusa Tenggara, a center of lobster and lobster seedling production, encouraging them to switch to aquaculture instead of catching lobster seedlings in open water, which is prohibited.[14]

August 2017

- **Indonesia reiterated its commitment to sink trespasser boats.** Minister Pudjiastuti reiterated her commitment to destroy vessels that trespass into Indonesian waters, announcing that Indonesia has sunk over 300 boats since 2014.[15]
- **Minister Pudjiastuti asked Japan to reduce the import tariff imposed on fishery products from Indonesia from 7 percent to 0 percent.**[16] This would align with Japan's no-tariff policy for imported Thai fisheries products.[17] The Japanese government will soon negotiate with Indonesia under the framework of the Indonesia-Japan Economic Partnership Agreement.
- **Supreme Court gave Jakarta reclamation project green light.** The Indonesian Supreme Court rejected an appeal by the Indonesian Forum for the Environment (WALHI) and the People's Coalition for Fisheries Justice Indonesia (Kiara), allowing PT Agung Podomoro Land (APL)—a publicly listed property giant—to continue construction work on Islet G, one of 17 islets to be created in the Jakarta Bay.[18]

September 2017

- **Japan agreed to help Indonesia build fishing ports and fish markets on Natuna, Sabang, Morotai, Saumlaki, Moa, and Biak islands.**[19] Japan will provide grants to develop the capacity of local people, build integrated fishery facilities in the six outlying islands, and construct 60 coastal radar units.[20]

October 2017

- **Minister Pudjiastuti named one of BBC's 100 Women**—an annual list of 100 influential and inspirational women around the world.[21]
- **Indonesia Court upheld the seizure of an illegal Thai fishing vessel.** Indonesia won a two-year court battle that confirms the legality of the government's seizure of a Thai vessel, the Silver Sea 2, linked to human trafficking and illegal fishing. The vessel was seized in August 2015 following an Associated Press investigation that demonstrated its linkage to human trafficking. The vessel's crew also intentionally turned off the vessel's VMS, engaged in transshipment in Papua New Guinea waters, and operated without an Indonesian fishing license. The ruling from a court in Aceh demonstrates that governments can win the fight against cross-border crime. The Thai captain, Yotin Kaurabiab, was fined IDR 250 million (USD 18,900). While the fine was minimal, Minister Pudjiastuti lauded the ruling as "monumental" and plans to use the Silver Sea 2 as part of a living museum to teach the public about illegal fishing.

November 2017

- **Indonesia fought for import tariff cuts for fisheries products imported by the EU.**[22]

December 2017

- **Minister Pudjiastuti promised to elevate Indonesia's position as a dominant player in the ornamental fish market.** In 2016, Indonesia was the world's fifth-largest exporter of ornamental fish, with a 7.13 percent market share. By comparison, the largest exporter, Singapore, captured 12.44 percent of the market. Minister Pudjiastuti has called on stakeholders to work together to advance the industry.[23]

January 2018

- **Minister Pudjiastuti announced that the transition period for complying with a ban on the use of cantrang would be extended indefinitely for fishers operating off the coast of North Java,** effectively placing the cantrang ban on hold in that area. This announcement followed protests and political pressure over the ban, which was set to take effect in January 2018. MMAF has started a program to distribute approximately 7,000 new pieces of fishing equipment as replacements for the cantrang to help offset concerns about the ban. Although distribution of the gear has been slow to start, vessels less than 10 GT are expected to receive the equipment for free. Vessels greater than 10 GT will receive subsidized loans from state-owned lenders Bank Rakyat Indonesia and Bank Tabungan Negara.[24]

February 2018

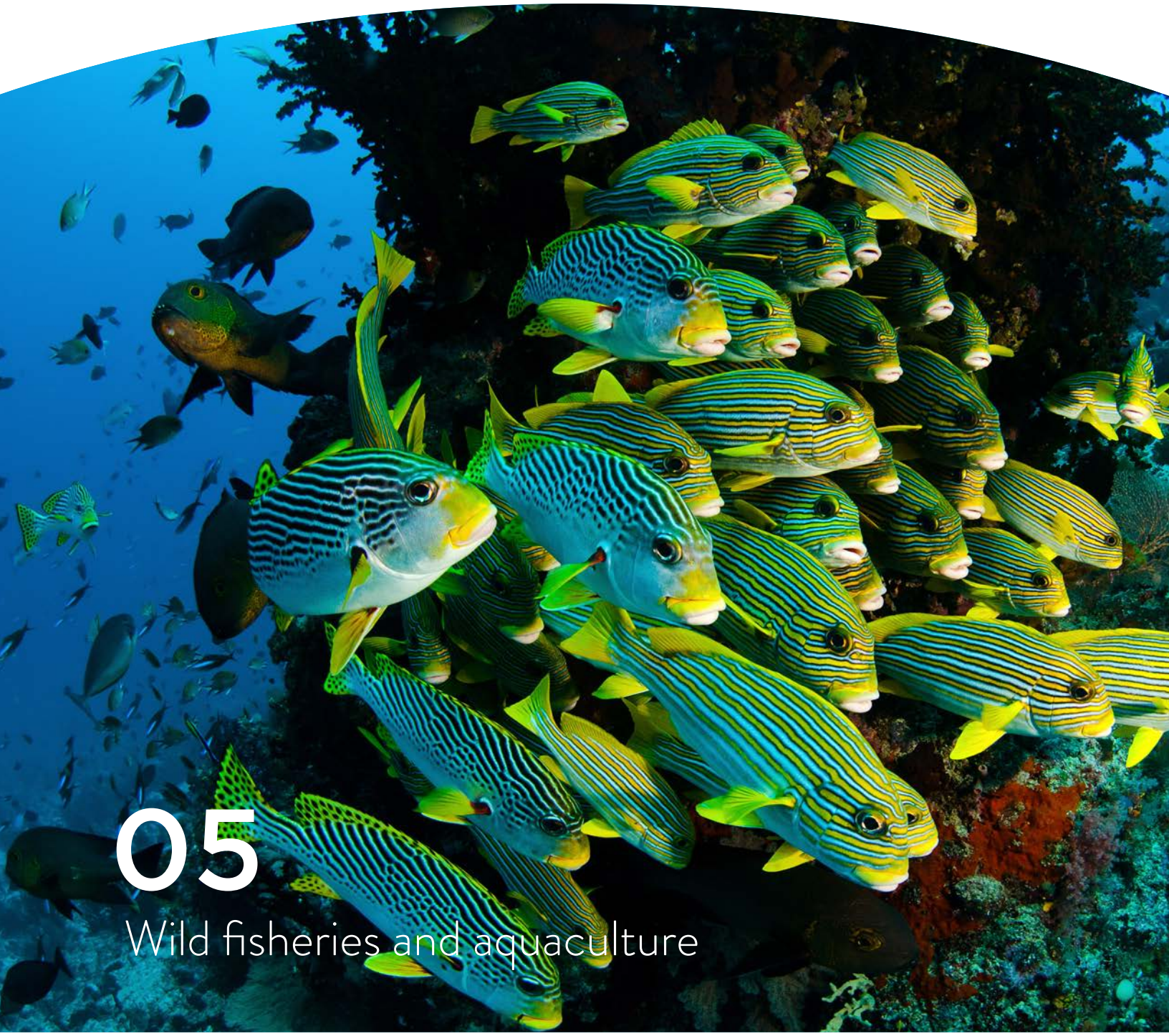
- **MMAF conducted a ground-breaking ceremony for the country's first modern fish market,** to be developed on a site in North Jakarta. The facility is expected to include three stories of market space, with 900 wet stalls, 69 dry stalls, 18 fishing kiosks, and 68 fresh fish kiosks.[25] The facility will also feature a chilling room, packing room, laboratory, bank, health clinic, culinary center, and ice storage.

March 2018

- **Minister Pudjiastuti affirms her commitment to stringent law enforcement and implementation of MMAF fisheries policies,** amidst rising political challenges and shifting dynamics in anticipation of the 2019 presidential election.[26] President Jokowi is expected to start campaigning in October 2018 to secure a second term. Minister Pudjiastuti has expressed her willingness to serve a second term if President Jokowi wins re-election, on the condition that he retains the ban on foreign trawlers fishing in Indonesian waters.

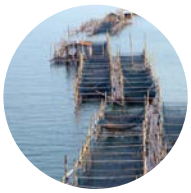
April 2018

- **Indonesia appears to be on target to reach its commitment of establishing 20 million hectares of MPAs by 2020.** To date, the country has protected nearly 18 million hectares of marine and coastal areas.[27] Going forward, additional work will be needed to validate boundaries, zoning, tenure, management units, and program budgets to ensure long-term sustainability and enforcement.
- **Since the start of 2018, Indonesia has seized 26 fishing vessels that were allegedly operating illegally in Indonesian waters.**[28] According to MMAF, 20 of the 26 vessels were Indonesian, three were Vietnamese, two were Philippine, and one was Malaysian. The government has permitted the sale of some seized vessels, after President Jokowi stated that the "previous tough policy" demonstrated Indonesia's serious stance in fighting illegal fishing.
- **Through a partnership with Google, MMAF is detecting illegal fishing activity in real time via satellite tracking.** The new initiative has revealed the location of nearly 5,000 previously invisible boats.[29] Using the same algorithms used by Global Fishing Watch, Google combined VMS data with raw satellite imagery to create a detailed footprint of fishing activities in near real-time. After Indonesia became the first country to make its VMS data public in 2017, it has sought to leverage the technology to improve enforcement of fisheries laws and regulations.



05
Wild fisheries and aquaculture

Wild fisheries and aquaculture



Prepared by
CEA and Stuart J. Green

I. Overview of the fisheries sector

The fisheries sector plays an important role in Indonesia's economy by contributing to food security, livelihoods, income generation, and foreign exchange earnings. This chapter provides: (1) an overview of the fisheries sector in Indonesia, (2) an examination of the wild capture fisheries sector, (3) a review of the aquaculture sector, and (4) case studies of four fisheries—snapper and grouper, blue swimming crab, tuna, and sharks and rays—that are ecologically and/or economically important to Indonesia.

A. A brief note on data quality

The quality of official fisheries statistics is variable, both at the global level and at the country level in Indonesia. Globally, fisheries statistics underestimate actual catch on account of illegal fishing, unreported catch by fishers, discards, and difficulty in tracking landings from small-scale fisheries. One study, for instance, found that tuna catch from small- and medium-scale fishing vessels from the second-largest tuna port in Indonesia, near North Sulawesi, could be almost 40 percent higher than reported.[1]

The issue of catch and effort underestimation is particularly urgent in Indonesia, as it constrains the ability of government agencies to set well-informed targets (i.e., production, export, and GDP targets) and to design and implement effective fisheries management policies. Limited data on landings can also lead to uncertainty in estimating fish mortality, stock health, and impact on ecosystems. MMAF is currently working to improve its data collection systems for fisheries, due to reforms in the Administration and demands from regional fisheries management organizations (RFMOs). Both international and in-country NGOs are providing support to the government to collect catch and effort data. (In the case of tuna, Indonesia's data is now used by RFMOs to update stock status, a sign of improvement.)

A series of recent government programs in Indonesia to modify the approach to data collection has resulted in an overhaul of several data collection systems, in contrast to a piecemeal approach of repairing individual pieces of the system. While it remains unclear whether the results of this overhaul have been successful, one byproduct is that trend data obtained from sustaining portions of data collection methodologies are no longer comparable on a year-to-year basis. This is the case for stock assessment techniques from MMAF, which introduced a new methodology for the year 2017, and therefore means that MMAF stock assessment data cannot be compared on a one-to-one basis with historical trends. It is important to recognize that catch data on over 1,000 species of different species of fish and invertebrates caught by well over one million fishers on over half a million boats, using multiple fishing gears and fishing grounds across the world's largest archipelago is understandably an immense and difficult task.

For the purpose of this report, data are used from a combination of sources—including MMAF, *Badan Pusat Statistik* (Statistics Indonesia) (BPS), the Food and Agriculture Organization of the United Nations (FAO), RFMOs, published literature, and other sources—to provide the most comprehensive picture possible. Multiple sources are referenced in some instances (e.g., for estimating the country's fishing fleet) in an attempt to address gaps from the various sources. The authors of this report readily acknowledge that unreliable data remains a challenge when attempting to profile fisheries statistics and trends in many countries, including Indonesia. The best available data source and/or a combination of sources are used for this report, and efforts are made to recognize limitations of data availability and/or quality on a particular topic.

B. Trends in Indonesia's seafood sector

Indonesia is the second-largest fish producer in the world after China, with wild capture fisheries and aquaculture production of 5.9 and 4.4 million tons, respectively, in 2015.[2] Similar to global trends, wild catch in Indonesia has plateaued in recent decades, while aquaculture production has expanded at a rapid rate. However, the rate of aquaculture growth in Indonesia has been even more staggering than the global average, as it has more than quadrupled from 2000 to 2015. Capture fisheries production showed a growth rate of less than 1 percent from 2014 to 2015, while aquaculture production increased by 9 percent (Fig. 1).[3] Excluding seaweed, aquaculture currently accounts for roughly 42 percent of fisheries production in the country (Fig. 2).[4] Seaweed production in Indonesia has increased at an even faster rate than other types of aquaculture production, accounting for roughly 11.3 million tons of production in 2015.[5] The total value of wild capture and aquaculture exports in 2017 was between USD 3.17 and 4.09 billion.[6,7]

Figure 1. Volume of Seafood Production in Indonesia, 2000-2015

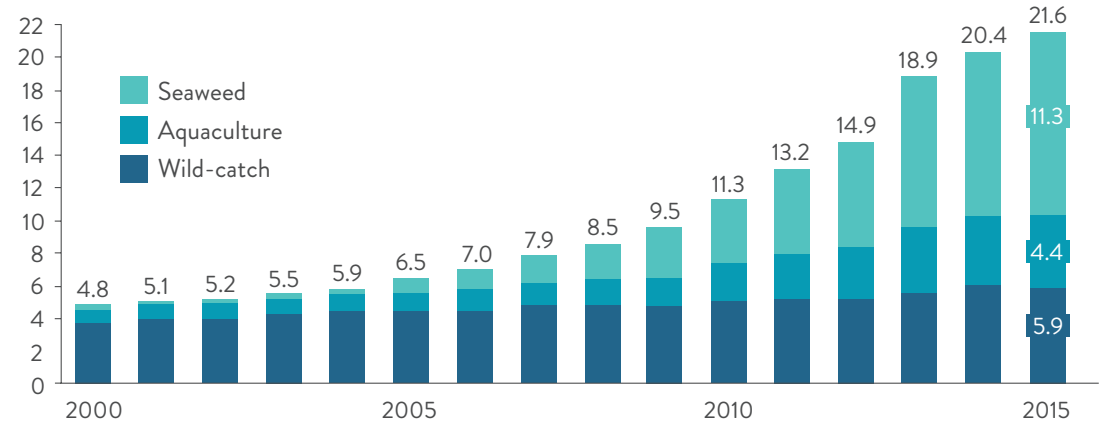
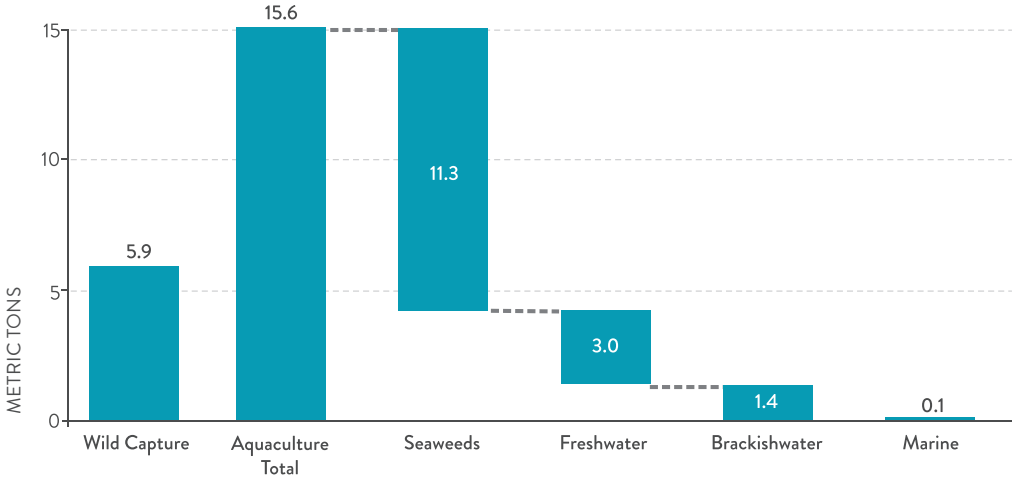


Figure 2. Wild Fisheries and Aquaculture Production in Indonesia, 2015

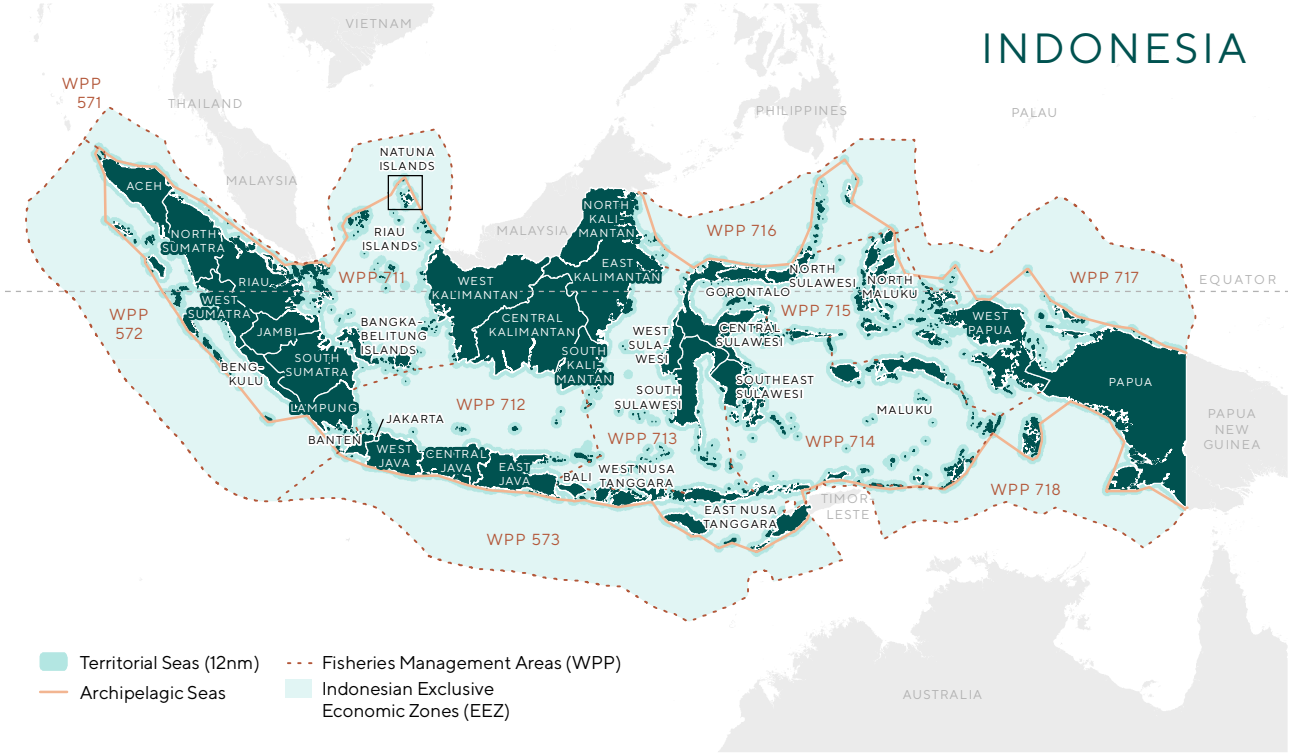


According to analysis from WorldFish, aquaculture is projected to surpass wild capture fisheries as the leading source of fish production in Indonesia sometime between 2026 and 2030.[8] Although aquaculture growth will be important for meeting future food security demands in the country, there are inevitable challenges associated with this growth. Aquaculture expansion introduces concerns on feeds, wild fry, disease and the genetic implication of escapees (which affect already stressed wild stocks). The government's focus on ambitious growth for aquaculture, wild fish, and economic growth along the country's coastal zones are already coming in to conflict.

C. Division of fisheries management areas

The national waters of Indonesia are divided into 11 *Wilayah Pengelolaan Perikanan* (WPP), or fisheries management areas, per the MMAF's decree No. PER. 01/MEN/2009 (Fig. 3/Table 1). The areas are divided for fisheries management purposes based on characteristics of fish resources and the natural environment of each area.

Figure 3. Map of Indonesia's WPPs



Map amended in August 2018.

Table 1. List of WPPs in Indonesia

WPP #	WPP NAME
WPP 571	Malacca Strait and Andaman Sea
WPP 572	Indian Ocean in the West of Sumatra and Sunda Strait
WPP 573	Indian Ocean (South of Java) – Southern Nusa Tenggara, Sawu Sea, and Western Timor Sea
WPP 711	Karimata Strait, Natuna Sea, and Southern China Sea
WPP 712	Java Sea
WPP 713	Makassar Strait, Bone Bay, Flores Sea, and Bali Sea
WPP 714	Banda Sea and Tolo Bay
WPP 715	Tomini Bay, Maluku Sea, Halmahera Sea, Seram Sea, and Bereau Bay
WPP 716	Sulawesi Sea and North of Halmahera

D. Fisheries sector role in national food security and employment

The fisheries sector is an important contributor to national food security and employment in Indonesia. A recent study ranked Indonesia as the eighth-most fish-dependent nation in the world, measured by dependence on fish-derived animal protein (Fig. 4, Table 2).[9,10]

Figure 4. Fish Dependency Around the World

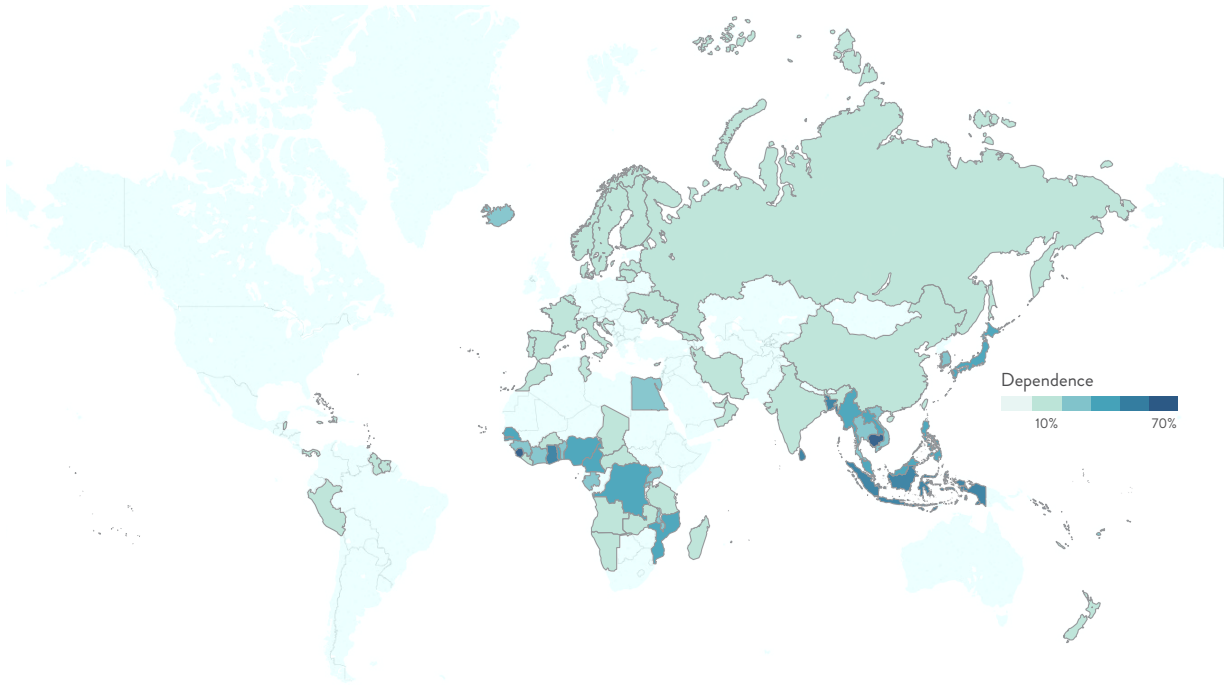
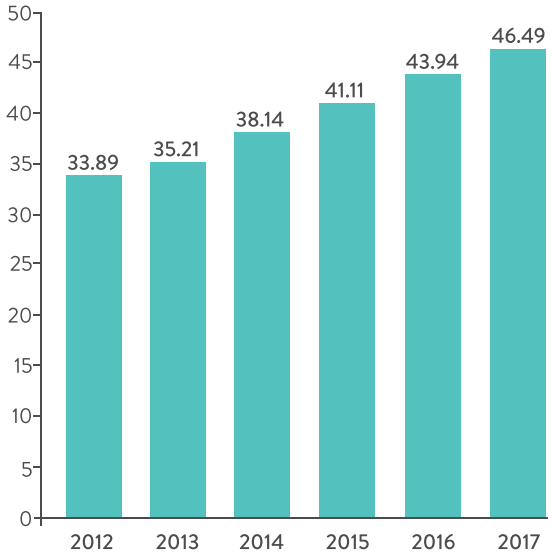


Table 2. Top 10 Fish-Dependent Nations, Measured in % of Animal-Source Protein Derived from Fish

COUNTRY	FISH-DERIVED ANIMAL PROTEIN
Maldives	70.87%
Cambodia	68.71%
Sierra Leone	64.36%
Kirbati	62.46%
Solomon Islands	59.13%
Sri Lanka	55.30%
Bangladesh	54.13%
Indonesia	52.68%
Ghana	49.94%
Gambia	49.01%

Figure 5. Fish Consumption per Year in Indonesia (kg/year), 2012-2017



*2017 figure estimated.
Source: BPS, 2017

In 2017, Indonesia's estimated per capita rate of fish consumption was 46.49 kg/year (Fig. 5).[11] According to MMAF, national fish consumption is increasing in every province in Indonesia, which may be partly attributable to a national campaign called *"Gemar Makan Ikan,"* or "Eat Fish." The campaign is designed to increase domestic consumption of fish as a source of protein in order to "improve the human potential of Indonesia," which is one of the nine priorities in the Administration's Nawacita development agenda.[12] The government has set a target for national fish consumption to reach 54.49 kg per capita in 2019. As an implementing partner of the campaign, MMAF has established fish consumption promotion councils throughout the country, at the provincial, district, municipal, and sub-district levels.[13]

National statistics on fish consumption can sometimes mask important individual differences across provinces. Fish consumption rates and the contribution of fish to nutritional intake can vary considerably by province based on many factors, such as access to fish products, cost of fish and alternative foods, disposable income, and socioeconomic and cultural factors.[14] For instance, Central Java (one of the most populous regions of the country) has a per capita fish consumption rate of less than 20 kg/year.[15] Most other provinces—aside from Java, Lampung, Bengkulu, Bali, and West and East Nusa Tenggara—have an annual per capita consumption rate greater than 31.4 kg.[16]

The ability of capture fisheries in particular to contribute to food security and nutrition security in Indonesia could become significantly compromised by overfishing, the ranging impacts of climate change on the ocean, and associated declines in fish catch. According to recent analysis, roughly 10 percent of the world will experience deficiencies in essential micronutrients and fatty acids due to declining productivity of capture fisheries over the coming decades; these impacts will be most pronounced in low-latitude developing countries.[17] This analysis indicates that Indonesia is in a high-risk category, with both high reliance on fish and high vulnerability to micronutrient malnutrition. These micronutrient deficiencies may increase the risk of perinatal and maternal mortality, growth retardation, child mortality, cognitive deficits, and reduced immune function.[18] For this reason, coastal subsistence and artisanal fishing communities are particularly at risk from a livelihoods and nutrition security perspective if there are fewer and smaller fish to eat.

In terms of livelihoods, the wild capture fisheries and aquaculture sectors employ approximately 2.7 million and 3.3 million workers, respectively.[19] Additionally, over 1 million workers are involved in the processing and marketing of fisheries products. The fisheries sector plays a particularly valuable role in coastal communities, where people are likely to engage in fishing as a form of subsistence and as a primary or secondary source of employment.

The majority of Indonesian fishers are small-scale fishers.[20] Given widespread economic growth in the country in recent years, there has likely been a trend of fishers moving from a single livelihood to multiple streams (e.g., working in a trade such as carpentry and fishing on a seasonal basis). In this respect, fishing is likely transitioning away from serving as the primary source of income for many fishers given the shift to a part-time and/or seasonal basis.

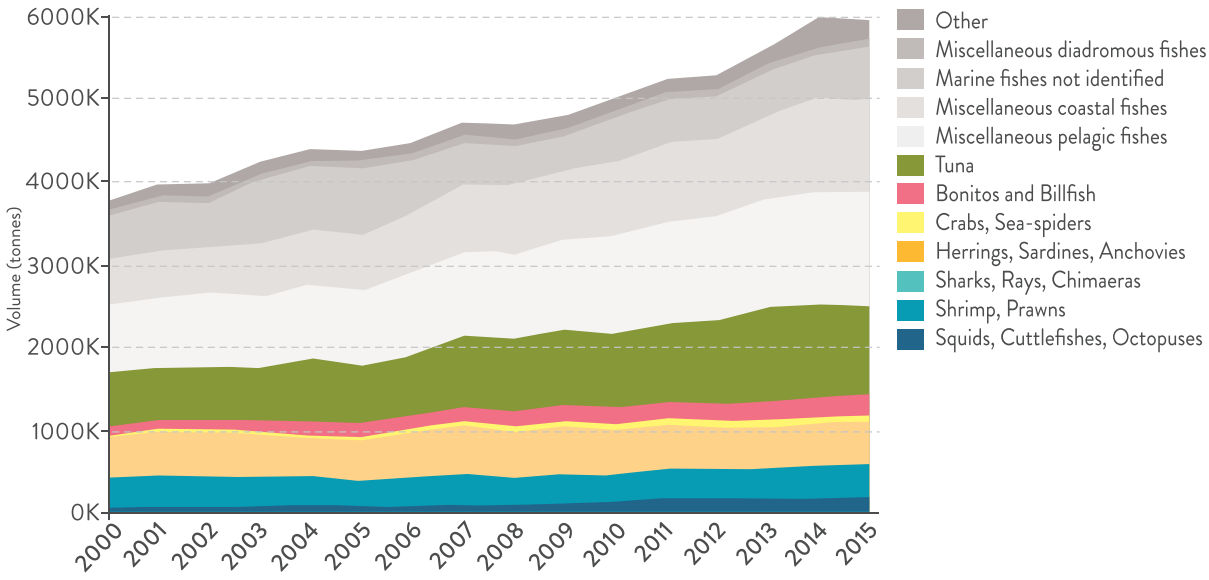
II. Review of the wild capture fisheries sector

A. Trends in landings and trade

Production from wild capture fisheries in inland and marine waters currently makes up 58 percent of total fisheries production in Indonesia.[21] The wide marine biodiversity found in Indonesia's tropical waters is also reflected in the diversity of catch: as many as 90 species make up 90 percent of capture fisheries production (including tuna, scad, mackerel, catfish, grouper, shark, squid, and bivalves).[22]

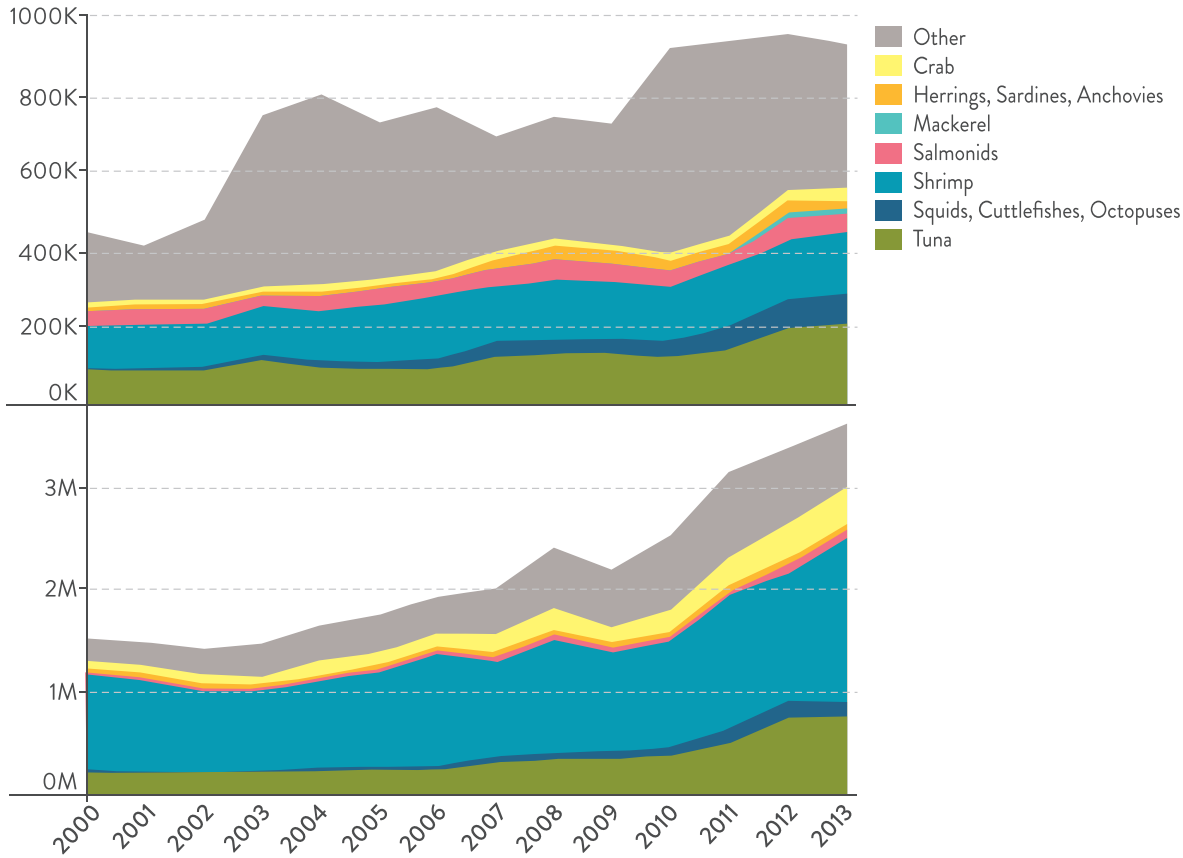
Demersal fishes, small pelagics, and shrimps are primarily captured in fishing grounds in the Malacca Strait, the southern edge of the South China Sea, the Arafura Sea, and the Java Sea.[23] Most pelagic species (including tunas) are captured in archipelagic waters in the central and eastern parts of the country, as well as on the high seas. By volume, skipjack tuna accounts for the largest portion of wild capture landings (Fig. 6).[24]

Figure 6. Wild Capture Landings by Volume, 2000-2015



By value, prepared tuna is the most important export commodity following frozen shrimp and prawn. These crustacean products are primarily farmed and account for 27 percent of the export value for seafood products (Fig. 7).[25] The primary export countries for Indonesia's wild landings include China (344,000 tons), Thailand (198,871 tons), the United States (168,017 tons), Japan (108,847 tons), and the European Union (94,948 tons), with figures indicated for 2014 values.[26]

Figure 7. Wild Capture Exports by Volume and Value, 2000-2015



B. Stock status

Reliable data on stock status in Indonesia is relatively scarce. Research suggests that the majority of targeted fish stocks in Indonesia are fully or over-exploited.[27] Nearly half of Indonesia's wild capture fish stocks are overexploited, and at least seven out of Indonesia's 11 WPPs show no opportunities for immediate expansion of production.

The best available statistics on stock status are provided by MMAF's National Commission on Stock Assessments. Table 3 shows the potential catch per year, total allowable catch (TAC), and utilization rate by WPP for 2017.[28] It is important to note that the 2017 data presented here are based on MMAF's new methodology for stock assessments, which uses an acoustic method. For this reason, the data are not comparable with historic trends given the introduction of a new methodology.

Currently the MMAF defines fish into a series of categories (i.e., demersal, tuna, small pelagics) that clumps data together, making it difficult to see the actual species-by-species trends. Ideally it would be possible to disaggregate high-value fisheries (from a food security and economic perspective) from the datasets. However, the current data aggregation prohibits this differentiation and also makes it difficult to ascertain "potential catch" figures.

The TAC for all WPPs combined in 2017 was approximately 12.5 million tons. The government uses this figure to inform annual production targets. The government has set a fisheries production target for MMAF of 17.6 MT in 2018 and 22.32 MT in 2019.[29] Additional increases of these levels will have significant deleterious impacts on the future fisheries potential of the country.

Table 3. Stock Status by WPP, 2017

Indonesian WPP (Fisheries Management Area)		SMALL PELAGICS	BIG PELAGICS	DEMERSAL FISH	REEF FISH	PENAEID SHRIMP	LOBSTER	BLUE SWIMMING CRAB	3- SPOT SWIMMING CRAB	SQUID	TOTAL
Strait of Malacca and Andaman Sea	Potential catch (ton)	99,865	64,444	145,495	20,030	59,455	673	12,829	13,614	9,038	**425,444**
	Total allowable catch (ton)	79,892	51,556	116,396	16,024	47,564	539	10,263	10,891	7,230	
WPP 571	Utilization rate	0.83	0.52	0.33	0.34	1.59	1.3	1	0.93	0.62	
Indian Ocean: West of Sumatra and the Sunda Straight	Potential catch (ton)	527,029	276,755	362,005	40,570	8,023	1,483	9,543	989	14,579	**1,240,975**
	Total allowable catch (ton)	421,623	221,404	289,604	32,456	6,418	1,186	7,634	791	11,663	
WPP 572	Utilization rate	0.5	0.95	0.57	0.33	1.53	0.93	0.18	0.49	0.39	
Indian Ocean: South of Java	Potential catch (ton)	630,521	586,128	7,902	22,045	7,340	970	526	3,913	8,195	**1,267,540**
	Total allowable catch (ton)	504,417	468,902	6,322	17,636	5,872	776	421	3,130	6,556	
WPP 573	Utilization rate	1.5	1.06	0.39	1.09	1.7	0.61	0.28	0.98	1.11	
South China Sea: Karimata Strait, Natuna Sea	Potential catch (ton)	330,284	185,855	131,070	20,625	62,342	1,421	2,318	9,711	23,499	**767,126**
	Total allowable catch (ton)	264,227	148,684	104,856	16,500	49,873	1,137	1,854	7,769	18,799	
WPP 711	Utilization rate	1.41	0.93	0.61	1.53	0.53	0.54	1.09	1.18	1.84	
Java Sea	Potential catch (ton)	364,663	72,812	657,525	29,951	57,965	989	7,664	23,508	126,554	**1,341,632**
	Total allowable catch (ton)	291,730	58,250	526,020	23,961	46,372	791	6,131	18,806	101,244	
WPP 712	Utilization rate	0.38	0.63	0.83	1.22	1.11	1.36	0.7	0.65	2.02	
Makassar Strait, Bone Bay, Flores Sea, and Bali Sea	Potential catch (ton)	208,414	645,058	252,869	19,856	30,404	927	4,347	5,463	10,519	**1,177,857**
	Total allowable catch (ton)	1	516,046	202,295	15,885	24,324	742	3,477	4,370	8,415	
WPP 713	Utilization rate	1.23	1.13	0.96	1.27	0.52	1.4	0.83	0.73	1.19	

Moderately exploited

Fully exploited

Overexploited

Table 3. Stock Status by WPP, 2017

Indonesian WPP (Fisheries Management Area)		SMALL PELAGICS	BIG PELAGICS	DEMERSAL FISH	REEF FISH	PENAEID SHRIMP	LOBSTER	BLUE SWIMMING CRAB	3- SPOT SWIMMING CRAB	SQUID	TOTAL
Banda Sea and Tolo Bay	Potential catch (ton)	165,944	304,293	98,010	145,530	3,180	724	1,145	1,669	68,444	**788,939**
	Total allowable catch (ton)	132,755	243,435	78,408	116,424	2,544	579	916	1,335	54,755	
WPP 714	Utilization rate	0.44	0.78	0.58	0.76	0.39	1.73	1.55	0.77	1	
Tomini Bay, Maluku Sea, Halmahera Sea, Seram Sea, and Berau Bay	Potential catch (ton)	555,982	31,659	325,080	310,866	6,436	846	891	495	10,272	**1,242,526**
	Total allowable catch (ton)	444,786	25,327	260,064	248,693	5,149	677	712	396	8,217	
WPP 715	Utilization rate	0.88	0.97	0.22	0.34	0.78	1.32	1.19	0.98	1.86	
Sulawesi Sea and North of Halmahera	Potential catch (ton)	332,635	181,491	36,142	34,440	7,945	894	2,196	294	1,103	**597,139**
	Total allowable catch (ton)	266,108	145,193	28,914	27,552	6,356	715	1,756	235	883	
WPP 716	Utilization rate	0.48	0.63	0.45	1.45	0.5	0.75	0.38	0.5	1.42	
Pacific Ocean, Cendrawasih Gulf	Potential catch (ton)	829,188	65,935	131,675	15,016	9,150	1,044	489	58	2,140	**1,054,695**
	Total allowable catch (ton)	663,350	52,748	105,340	12,013	7,320	835	391	46	1,712	
WPP 717	Utilization rate	0.7	1	0.39	0.91	0.46	1.04	0.87	1.21	1.09	
Arafuru Sea, East Timor Sea, Aru Sea	Potential catch (ton)	836,973	818,870	876,722	29,485	62,842	1,187	1,498	775	9,212	**2,637,565**
	Total allowable catch (ton)	669,579	655,096	701,378	23,588	50,274	950	1,198	620	7,370	
WPP 718	Utilization rate	0.51	0.99	0.67	1.07	0.86	0.97	0.85	0.77	1.28	
TOTAL ALLOWABLE CATCH (TON)											**12,541,438**

Moderately exploited

Fully exploited

Overexploited

C. Number of fisher households and size of fishing fleet

To understand the size of Indonesia's fishing fleet and the number of vessels by size category, a number of sources must be consulted due to data gaps. Per Law of Indonesia No. 7/2016, small-scale fishers are defined as those who work without a vessel, or with a vessel of maximum 10 gross tonnage (GT). Medium-scale fishers are commercially oriented, and use vessels between 11 GT and 100 GT. Large vessels are those in size classes above 100 GT. Vessels are currently being "re-assessed" for their gross tonnage as it appears there are some discrepancies on the historical measurement, with an unrealistically large number of boats holding the 29.9 GT size, which allows for a provincial fishery license if fishing within 12 nm and the avoidance of the more rigorous and expensive license issued through the MMAF. This reassessment may increase gross tonnage for vessels above 10 GT by 20 to 50 percent. According to MMAF, there were approximately 625,000 vessels (across all size classes) in the country's fleet in 2014 (Fig. 8).[30]

Figure 8. Number of Fishing Vessels, Based on Vessel Type and Motor Size, 2010-2014

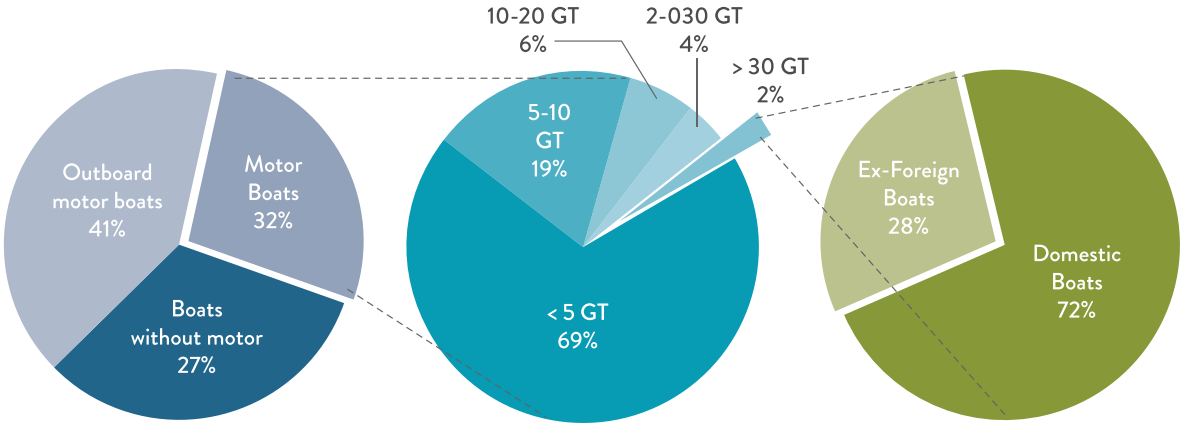
TYPE	YEAR					AVG INCREASE (%)	
	2010	**2011**	**2012**	**2013**	**2014**	**2009-14**	**2013-14**
Boat, no engine	172,907	170,938	172,333	175,510	165,066	(1.11)	(5.95)
Boat, outboard engine	231,333	225,786	245,819	237,625	238,010	0.83	0.16
Motorized fleet	164,150	185,121	198,538	226,573	222,557	8.09	(1.77)
< 5GT	110,163	123,748	137,587	151,939	152,493	8.74	1.02
5-10 GT	31,460	35,877	37,694	46,358	41,374	7.83	(10.75)
10-20 GT	10,988	13,201	11,583	15,208	14,301	8.30	(5.96)
20-30 GT	7,264	8,022	7,611	8,782	9,578	7.44	9.06
30-50 GT	857	914	917	1,074	1,029	4.98	(4.19)
50-100 GT	1,747	1,801	1,641	1,727	1,766	0.43	2.26
100-200 GT	1,290	1,204	1,167	1,127	840	(9.66)	(25.47)
> 200 GT	381	354	338	358	176	(14.13)	(50.84)
TOTAL	**568,390**	**581,845**	**616,690**	**639,633**	**625,633**	**2.47**	**2.20**

Source: MMAF, 2015

The following takeaways are important to understanding the composition of the country's fishing fleet:

1) Motorized vessels make up only about 30 percent of the Indonesian fleet on average, which indicates the importance of small-scale fishing in the country. While motorized boats make up roughly one-third of vessels in the national fleet, boats with outboard engines make up 41 percent of the fleet. Boats without a motor comprise the remaining 27 percent (Fig. 9).[31]

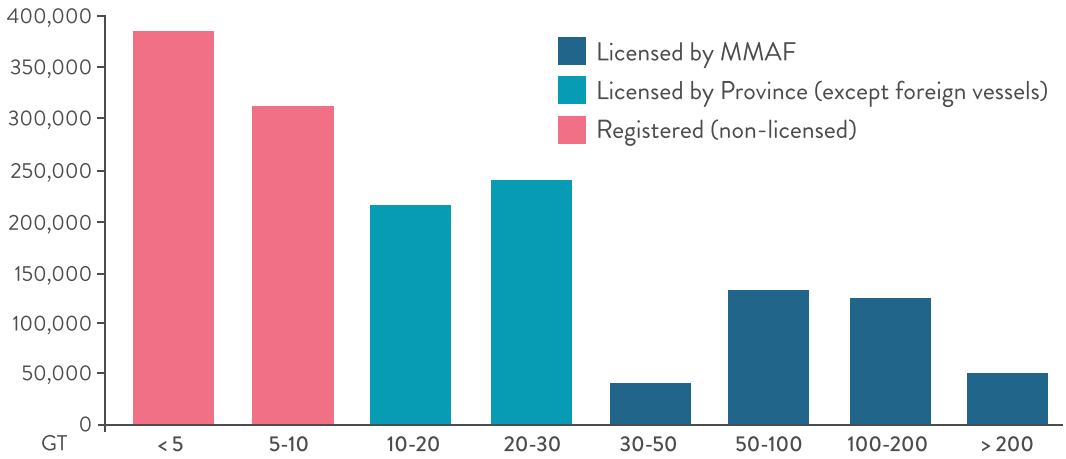
Figure 9. Composition of National Fisheries Vessels in Indonesia



Source: MMAF, 2018

2) Official vessel registration and license numbers likely underestimate the number of vessels that are actually operational, making it difficult to estimate the actual number of vessels active in the various fisheries. Statistics are likely to omit at least a portion of smaller boats for which a fishing license is not required. This is because the reclassification of small-scale fishers from 5 GT to 10 GT means that boats under 10 GT are required to register with the provincial government but do not need a fishing license. (Fig. 10).[32] Additionally, medium-scale boats for which licenses are granted by provincial or municipal authorities are likely to be underestimated. For instance, MMAF statistics indicate a decrease in boats under 10 GT, from nearly 200,000 boats in 2013 to roughly 150,000 boats in 2016. There are no external events that might explain such a marked decrease.[33] Furthermore, about 8,900 units with the capacity of 30 GT and above were operational, yet only 3,600 vessels were legally licensed and thus recorded in 2016.[34]

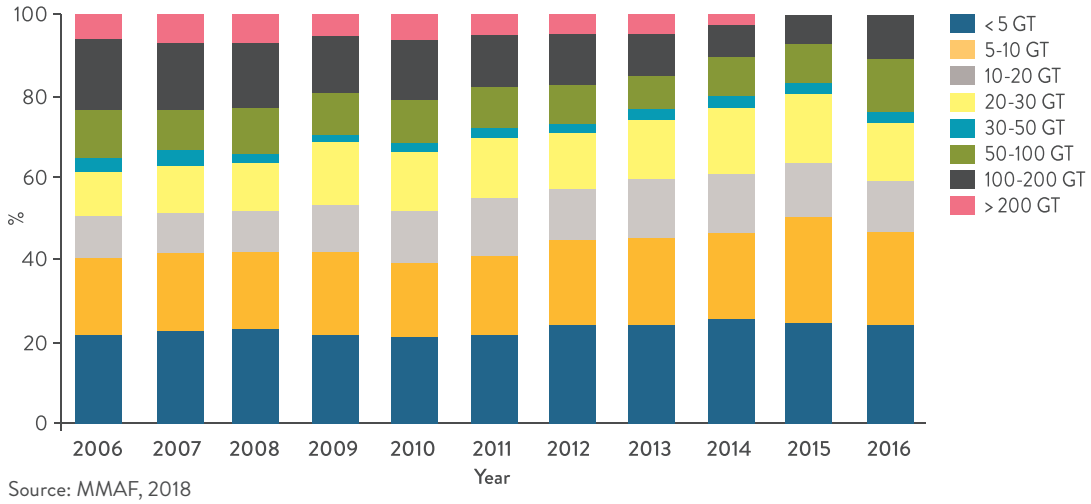
Figure 10. Capacity of Indonesia's Fleet, 2014



Source: MMAF, 2015

3) While small-scale vessels make up a significant portion of absolute vessel numbers (Fig. 10), small-scale vessels are relatively less significant when it comes to fishing power.[35] Still, this segment makes up about half the capacity of the entire fleet and should not be overlooked, particularly given the critical role of nearshore fisheries in contributing to food security. When considering numbers of motorized fishing vessels for the different size classes, small-scale vessels dominate the country's fleet, representing about 88 percent of motorized fishing vessels. However, when considering fishing or capture power, the relative significance of the smallest fishing vessels is reduced significantly to just over 20 percent, while medium-size vessels between 20-100 GT represent approximately 30 percent of the capture power of Indonesia's motorized fleet (Fig. 11).

Figure 11. Relative Fishing Power of Motorized Vessels in Indonesia's Fleet, 2006-2016



Source: MMAF, 2018

Nonetheless, the recent size reclassification (from <5 GT to <10 GT) means that small-scale vessels account for nearly half the total capacity of the country's entire fishing fleet, so these vessels play an important role. The significant shifts that occurred in the fleet composition after 2013 are notable. In addition to a 10 percent decrease in vessels in the 5-10 GT size category from 2013 to 2014, there was a 50 percent decrease in vessels above 200 GT (Fig. 8). The latter trend may be partly attributed to vessels marking down their size so as to be subject to lower taxes. Similar to the practice observed in similar Asian countries, Indonesia has seen a shift of fishers modifying smaller boats to increase fishing effort, including by adding larger seine and ring netting gears and trawls.

In recent years there has been a very strong increase in Indonesia's small- and medium-scale fishing effort, as well as development and investment within the country's coastal zone and nearshore fisheries. This has created unprecedented pressure that is leading to resource use and resource user conflicts, between and within the fisheries. These conflicts will require localized solutions that are better managed at the local level if the national enabling policies are in place. Fisheries management has shifted since Law 23/2015, which transitioned the management responsibility for fisheries management from the district to provincial government. This change has brought to the fore issues on continuity, capacity and the resources for management at the provincial government level.

III. Review of the aquaculture sector

A. General overview of aquaculture sector

Indonesia is second only to China as the largest aquaculture producer in the world. The country's aquaculture sector has expanded rapidly in recent years, and the sector is poised for continued growth in future decades. Although the country's aquaculture sector is forecast to overtake wild capture fisheries in next 10 to 15 years, its future sustainable growth is not considered secure.[36] While aquaculture production can be ecologically efficient theoretically, its sustainability is dependent on species, production systems, and the intensity of production methods.

The national government (particularly led by BAPPENAS, in partnership with the CMMA and MMAF) has placed a high priority on aquaculture's development to drive increases in overall seafood production, yet there are substantial environmental constraints and impacts associated with this growth. Independent analysis has found that current aquaculture production targets set by the Indonesian government are close to impossible to achieve due to lack of space on an already crowded and fast growing coastal zone that lacks comprehensive spatial management plans and zoning. Furthermore, this growth (if realized) would carry overwhelming environmental costs.[37] Investments and public policies designed to mitigate these environmental impacts will be essential to facilitate the sector's growth at the desired rate and scale.

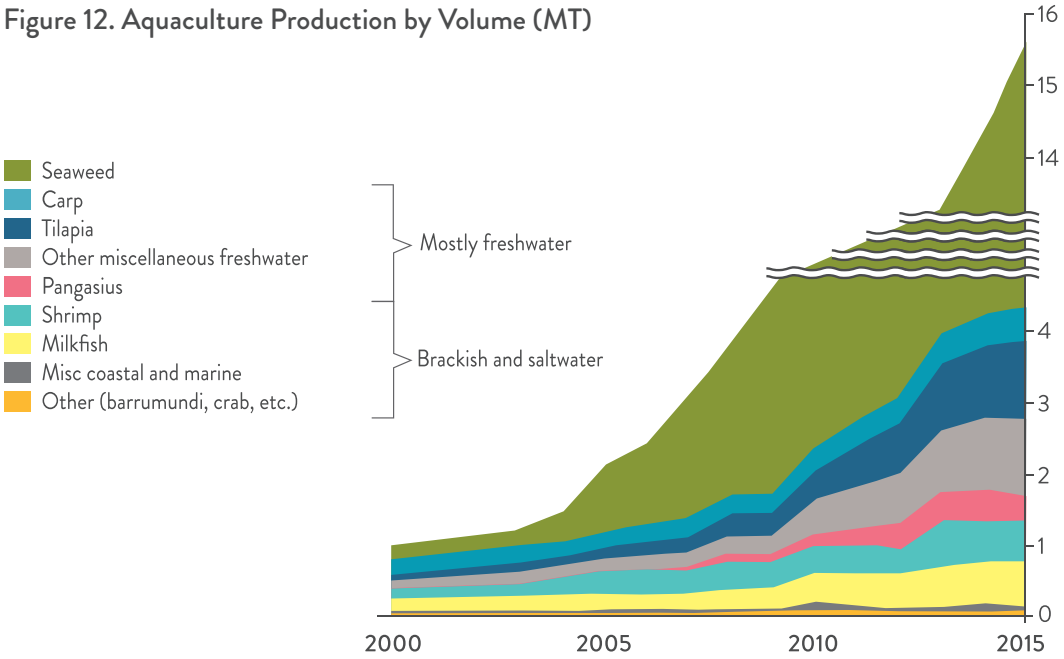
This section explores key trends in the aquaculture sector—including historic and projected growth, key production species, environmental constraints and impacts, contributions to food security, and sector funding by foundations and development aid.

B. Recent growth and key production species

As wild capture landings have plateaued in Indonesia over the past decade, aquaculture has become the main driver for growth in seafood production. Since 1960, the annual growth rate of the aquaculture sector has been 7.7 percent. Excluding seaweed, aquaculture currently accounts for approximately 42 percent of fisheries production in Indonesia, a notable increase from only a 10.6 percent share in 1960.[38] Whereas capture fisheries production grew at a rate of less than 1 percent from 2014 to 2015, aquaculture production increased by 9 percent. Seaweed production in Indonesia has increased at an even faster rate than the rest of aquaculture production, accounting for roughly 11.3 million tonnes of production in 2015.[39]

Aquaculture production in Indonesia is mainly conducted in marine, brackish, and fresh water. Seaweed, which is considered to have relatively low environmental impact, dominates overall aquatic production by volume (Fig. 12). The sector's recent level of growth is particularly notable given that 80 percent of aquaculture farms in Indonesia (as of 2014) were small enterprises using minimal technology and lacking access to finance.

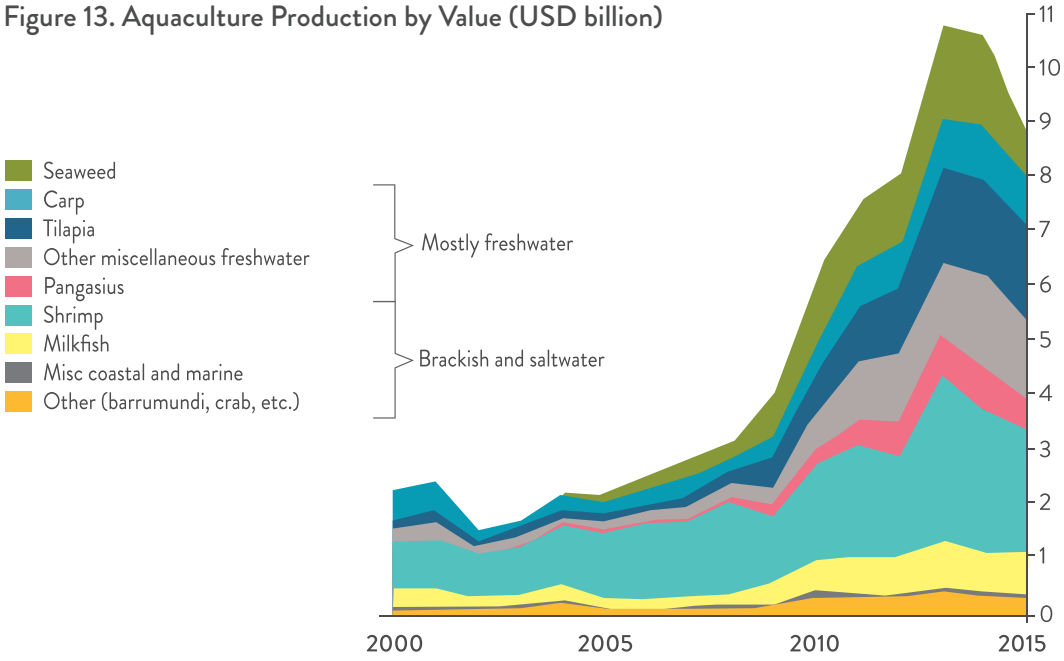
Figure 12. Aquaculture Production by Volume (MT)



Source: FAO, FishStatJ

By value, export commodities including shrimp and tuna as well as domestically-consumed species such as tilapia and milkfish are more important (Fig. 13). The total value of shrimp production exceeded USD 3 billion in 2013, by far the highest of any species, but fell to USD 2.2 billion in 2015. Though seaweed makes up 70 percent of aquaculture volume, it only accounts for 10 percent of production value. Despite surging volumes, total seaweed value has declined in recent years.

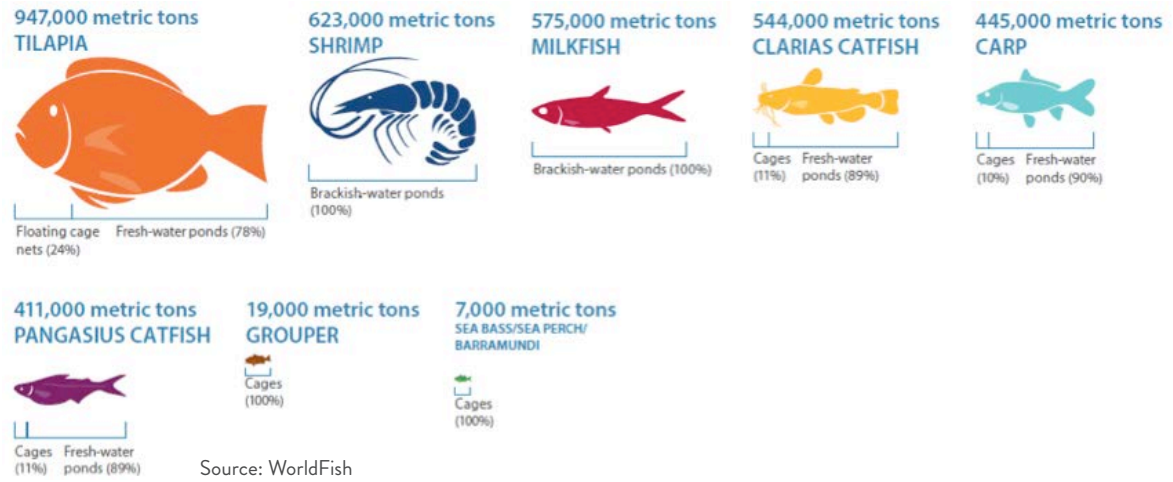
Figure 13. Aquaculture Production by Value (USD billion)



Source: FAO, FishStatJ

About eight species represented approximately 90 percent of aquaculture production in Indonesia by weight in 2014 (excluding seaweed): Nile tilapia (23% of aquaculture production), Clarias catfish (16%), milkfish (13%), white-leg shrimp (10%), common carp (10%), Pangasius catfish (10%), and Asian tiger shrimp (3%) (Fig. 14).[40]

Figure 14. Key Species of Indonesian Aquaculture Production



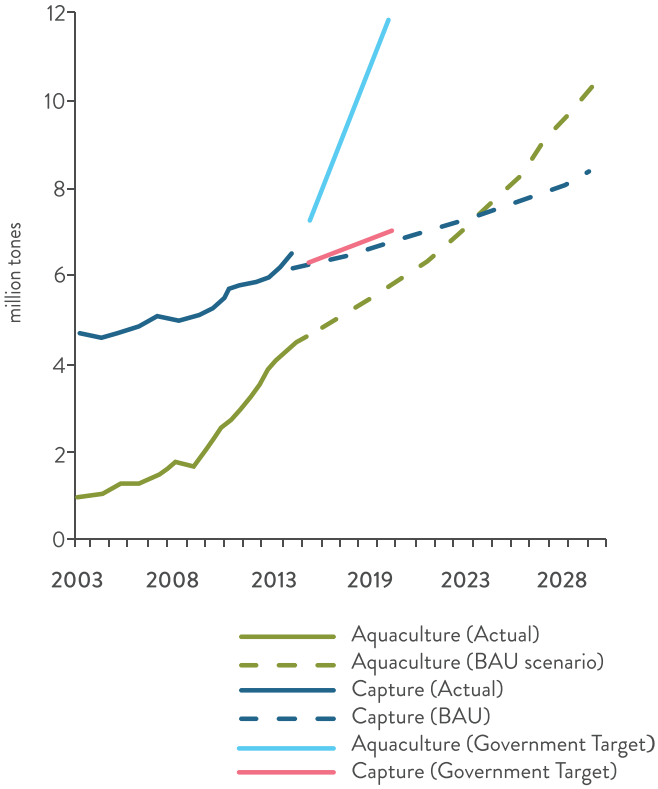
Source: WorldFish

C. Projected growth of the aquaculture sector

Recent analysis indicates that aquaculture will overtake capture fisheries as the leading source of fish production in Indonesia between 2026 and 2030.[41] Some forms of aquaculture are already filling the gap in fishing communities that are experiencing losses in capture fisheries due to overfishing in nearshore waters. The Government of Indonesia has set national fisheries production targets (comprising both wild capture and aquaculture) that would require a doubling from 2014 levels by 2019 (12.2 MT to 22.32 MT). Analysis suggests that most of these targets would have to be achieved through rapid expansion of aquaculture, given the slowing growth of wild capture fisheries.[42]

Under a business-as-usual scenario, aquaculture and capture fisheries are projected to expand at an annual rate of 7.0 percent and 2.1 percent, respectively, from 2012 to 2030.[43] Both capture fisheries and aquaculture will continue to expand under a business-as-usual scenario, but at slower rates as compared to those of recent decades. Of significance, these projections indicate that projected outputs under the business-as-usual scenario are considerably below government targets through 2019, particularly for aquaculture (Fig. 15).[44] These projections suggest that the government's targets may be markedly optimistic and unlikely to be achieved, at least for aquaculture production.

Figure 15. Historic and Projected Fisheries Growth, 2003-2030



The business-as-usual scenario was defined such that exogenous variables in the model follow historical trends. Actual data: 2003-2014; business-as-usual projection: 2015-2030; government target: 2015-2019.

Source: Tran et al., 2017

From an employment perspective, modeling by WorldFish projects that aquaculture's growth in Indonesia will create 8.9 million total jobs by 2030 under a business-as-usual scenario, a 300 percent increase from the current 2.7 million jobs.[45] Under an export or domestic-oriented growth scenario, roughly 15 million jobs would be created. Balancing environmental, social, and economic issues is an important prerequisite for the industry's ability to expand and realize projected growth. Although tilapia farming is estimated to be a substantial employer in the future, shrimp and grouper (as higher-value species) will provide proportionally more jobs in associated industries, including processing and retail.[46]

As it relates to revenue, production values for the seven major aquaculture commodities are projected to increase from USD 5.9 billion (2012) to USD 39.5 billion in 2030 under a business-as-usual scenario.[47] The production value would increase to an estimated USD 43.9 billion under a domestic-oriented scenario and to USD 50.4 billion under an export-oriented scenario. Although these estimates suggest that aquaculture could have substantially higher economic value as compared to present-day values, it is important to note that sizeable investment would be necessary to realize this growth. Significant investments would be required for farm infrastructure and operations, and for supply industries (including feed, seed, and supply services).

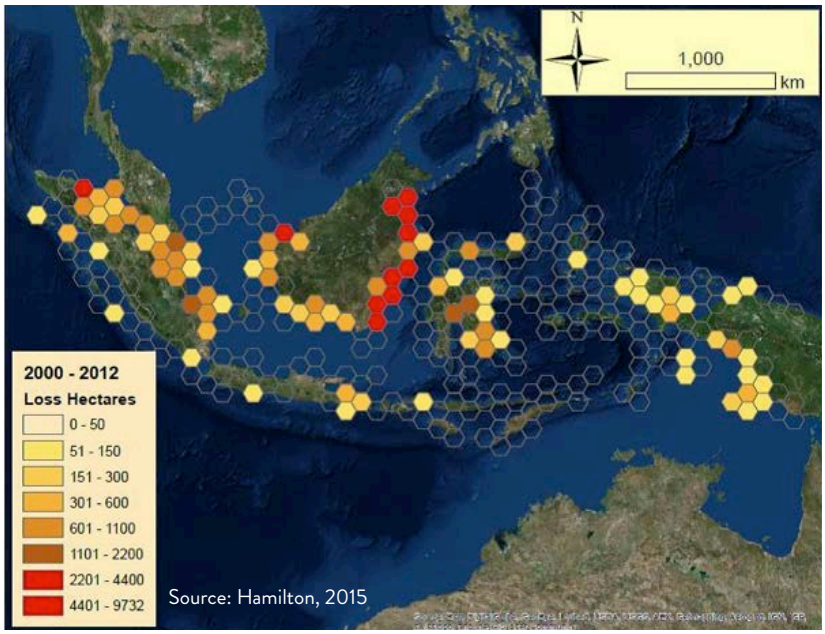
D. Constraints on growth and environmental impacts

Whereas capture fisheries face a variety of challenges including unsustainable fishing practices, poor management, and overfishing, aquaculture faces its own distinct limits to growth and sustainability. Analysis by WorldFish highlighted three primary environmental challenges facing future growth in the country's aquaculture sector:[48]

1. Land area cannot support aquaculture growth under business-as-usual and high domestic or export-oriented growth projections. Under a business-as-usual scenario, an area of roughly 95,000 km^2 would be required for production and inputs by 2030; this area is larger than the land area of Java itself and thus seems highly improbable.

The footprint of aquaculture to date, as well as the sector's potential to impact remaining mangrove cover in the country bears important consideration, especially as it relates to ecosystem services both for the country (as coastal protection and fish-spawning habitat) and the world (as a global carbon sink). Indonesia has the highest mangrove cover in the world, home to roughly 28 percent of all mangroves.[49] Yet it is also experiencing the world's fastest rate of mangrove destruction. This trend is particularly alarming given that Indonesia's mangroves hold the largest mitigation potential of any country. Roughly 30 million tons of carbon emissions could be reduced from prevented mangrove conversion in Indonesia annually—an amount which is nearly equal to all of New Zealand's annual carbon emissions. From this perspective, Indonesia's blue carbon assets represent a massive global carbon sink and a key opportunity for climate mitigation at the global level.

Figure 16. Map of Indonesia's Mangrove Forest Loss



The main causes of mangrove loss in Indonesia have included aquaculture (both government-funded development programs as well as foreign-funded initiatives), agriculture (including oil palm expansion), coastal development, and urbanization. Between 2000 to 2012, mangrove conversion to aquaculture was concentrated in eastern Kalimantan (Fig. 16).

As it relates to aquaculture expansion, thoughtful land use policies and intensification in land use practices will be necessary, particularly given the significant ecosystem services that remaining coastal forests and wetlands in Indonesia provide.

2. The increasing scarcity of freshwater resources could limit the continued expansion of aquaculture. To date, the impact of aquaculture production on freshwater resources has received less attention. However, both water quantity and water quality are important considerations in understanding the full lifecycle assessment of aquaculture systems. In the context of the aquaculture sector in Indonesia, freshwater consumption must consider both direct on-site water use (particularly for freshwater finfish production and shrimp framing in brackish water) as well as water inputs for aquafeeds. As formulated feeds increasingly replace fish meal and fish oil with terrestrial feed ingredients, the sector may place added pressure on freshwater resources.[51]

Larger shares of certain terrestrial feedstuffs in fish diets may decrease water productivity due to increasing water footprint. An independent analysis found that the estimated global total water footprint of commercial aquafeed was 31-35 km^3 (in 2008 figures). Globally, the top five contributors to the total water footprint of commercial feeds were Nile tilapia, Grass carp, Whiteleg shrimp, Common carp and Atlantic salmon.[52] Therefore, the water footprint associated with farming carp, tilapia, and shrimp are particularly relevant in an Indonesian context.

Opportunities for limiting pressure on freshwater resources include controlling underlying use of freshwater, enhancing productivity (i.e., higher yield per unit of water consumed and/or polluted), and optimizing feed composition.

3. Future projections for aquaculture feed would require an outsized demand for marine fish as feed ingredients. According to analysis from WorldFish, aquaculture feeds would require 7.8 million metric tons of marine as feed ingredients, assuming a business-as-usual scenario and current feed formulation practices.[53] Under domestic-oriented growth and export-oriented scenarios, 11.9 million metric tons and 16.4 million metric tons of marine fish would be required, respectively.[54] This level of demand would require that all Indonesian fisheries catch is allocated to aquaculture feed inputs, which is not viable.

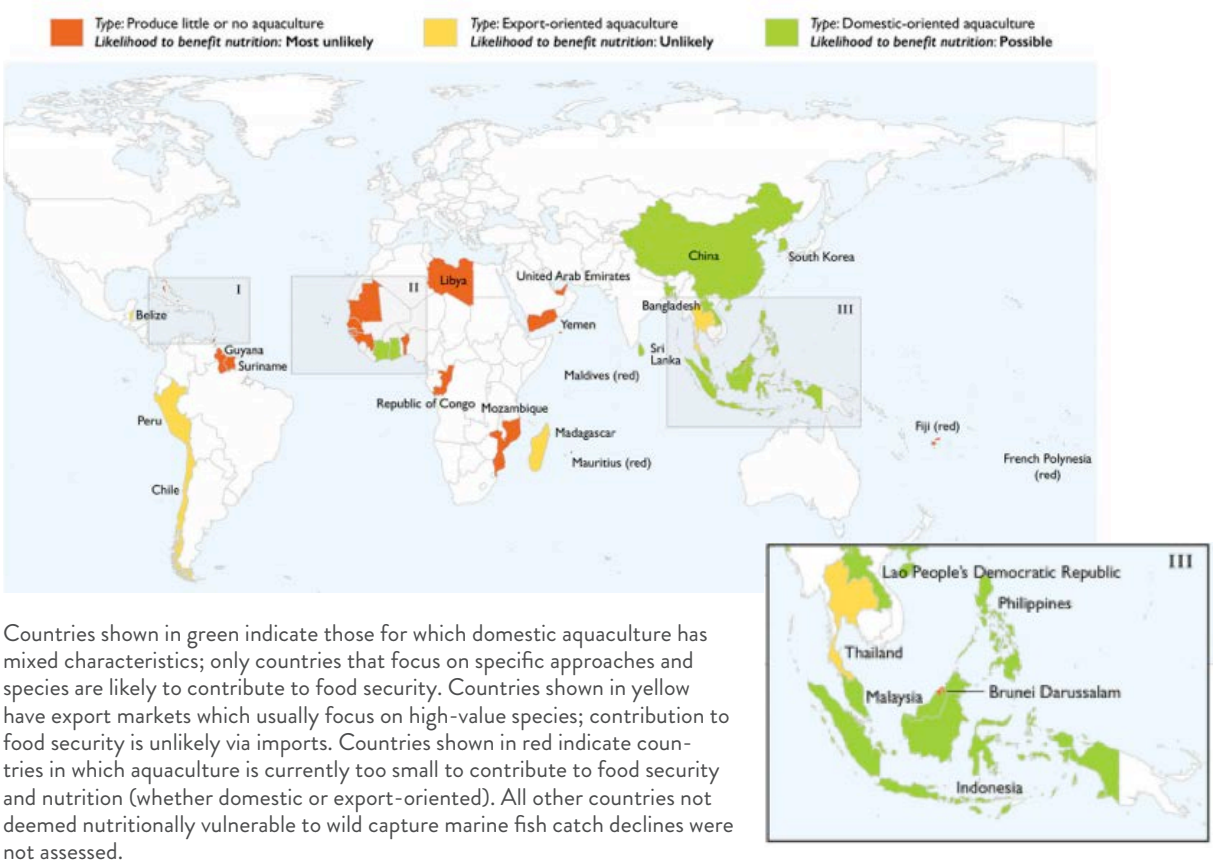
Based on these projections, any increases in aquaculture production should aim to reduce the loss of important ecosystems, focus on the intensification of sustainable farming practices, and increase the efficiency of feed inputs.

E. Contribution of aquaculture to food security

Given that the global population is expected to reach 9.7 billion people by 2050, proponents have pointed to the aquaculture sector as a promising option for bolstering food security—a notion which has also been echoed in the development agenda of the Indonesian government. Now that aquaculture supplies half of the fish consumed directly by humans,[56] it is an important question to ask whether aquaculture actually meets the needs of poor and food-insecure populations. In many countries where aquaculture production is expanding, the market is oriented either towards wealthier consumers in domestic cities or in international markets, thus overlooking the needs of rural communities which may have a higher level of food insecurity.

A recent analysis of 41 seafood-reliant nutritionally vulnerable nations (NVNs) assessed whether aquaculture meets human nutritional demand, either directly via domestic production or trade, or indirectly via the purchase of nutritionally-rich dietary substitutes. This analysis found that Indonesia is one of 10 seafood-based NVNs which has domestic-oriented aquaculture production (Figure 17).[57] Findings from this analysis suggest that aquaculture can be an essential contribution to local diets and economies, yet the government must implement targeted policies to explicitly account for the needs of food-insecure populations. These policies might include regulations and market mechanisms (i.e., tax incentives or subsidies), public health campaigns, and conservation strategies to support sustainable fisheries.

Figure 17. Aquaculture's Contribution to Food Security and Nutrition



Countries shown in green indicate those for which domestic aquaculture has mixed characteristics; only countries that focus on specific approaches and species are likely to contribute to food security. Countries shown in yellow have export markets which usually focus on high-value species; contribution to food security is unlikely via imports. Countries shown in red indicate countries in which aquaculture is currently too small to contribute to food security and nutrition (whether domestic or export-oriented). All other countries not deemed nutritionally vulnerable to wild capture marine fish catch declines were not assessed.

In a transitional country such as Indonesia, key aquaculture products like shrimp, tilapia, and catfish are primarily targeted for export markets or for domestic consumption by the growing middle class in the country's urban areas. The benefits of these export-oriented industries to livelihoods and food security for the coastal poor are not apparent, particularly based on data in national economic growth statistics or national seafood balance sheets. It is likely that less-intensive and more-diverse forms of aquaculture (i.e., small indigenous fish grown in ponds for household consumption) may hold the greatest opportunity for meeting the food and nutrition security needs of the rural poor in Indonesia.[58]

F. Government investments in the aquaculture sector

The government has invested in several initiatives which have helped facilitate the rapid growth of aquaculture to date, and it continues to prioritize the sector's growth through several areas of investment. More broadly, the government has designated development zones for aquaculture to facilitate intensified production through investment in private hatcheries, distribution and marketing programs, training, information systems, and access to capital.[59] Through the Director General of Aquaculture (DJPB), the MMAF has established programs for research technology aimed at optimizing aquaculture production, including the National Broodstock Center and Regional Broodstock Centers for shrimp, grouper, tilapias, and seaweed.[60] The DJBP is also implementing a priority program called *Gerakan Pakan Mandiri* ("Self-Suffice Fish Feed Movement") which focuses on seaweed cultivation, freshwater fish farming, and sustainable feeds.

To better understand possible future scenarios for the sector, the MMAF is collaborating with WorldFish, an international nonprofit which researches the potential of fish and aquaculture to reduce hunger and poverty in developing countries. Through this collaboration, the MMAF has commissioned WorldFish to conduct analysis (findings of which are presented in this report) and create an aquaculture master plan for the country by 2020. WorldFish has prepared scenarios of future supply and demand for fisheries products, in addition to identifying future opportunities and challenges for aquaculture to help inform sector investments and policies in Indonesia.

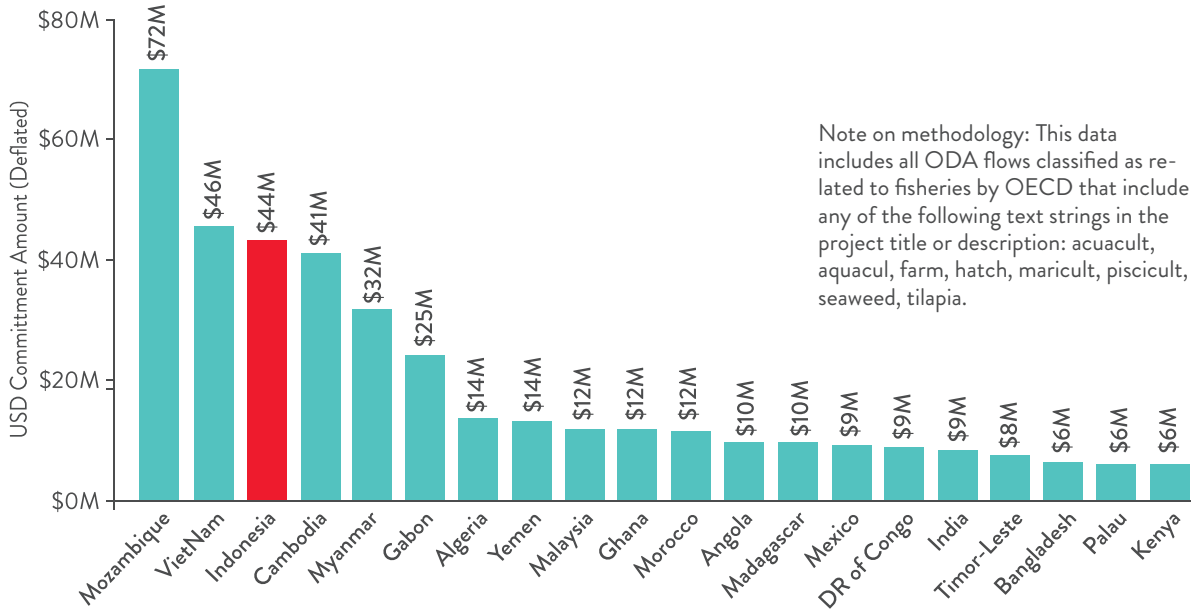
G. ODA and foundation funding for the aquaculture sector

Aside being embedded in government priority and investment programs, the aquaculture sector in Indonesia has received significant funding from official development assistance (ODA), and to a lesser extent, from private foundations.

During 2000-2016, Indonesia was the third largest recipient of ODA funding, having received a total of $44 million for its aquaculture sector (Fig. 18). Only Mozambique and Vietnam, two other development priorities for aquaculture from a livelihoods and food security perspective, received a higher level of funding.

The World Bank and Asian Development Bank were previously key funders of aquaculture in Indonesia. However, as part of Indonesia's graduation to a middle-income country—in addition to economic policies of the Indonesian government—the country shifted from receiving traditional forms of aid, which resulted in a reduction in loans. As part of the transition to less concessional finance, aquaculture loans from the World Bank and Asian Development Bank were cancelled.

Figure 18. Top Recipients of Aquaculture ODA Funding, Total: 2000-2016



Source: OECD Creditor Reporting System (CRS) Database; CEA analysis.

Philanthropic foundations have historically provided relatively low levels of funding for aquaculture in Indonesia. However, foundations are paying increased attention to the sector's development, particularly as it is inextricably connected to other areas related to the marine and fisheries sector, from fisheries management to habitat protection.

The Gordon and Betty Moore Foundation and the David and Lucile Packard Foundation have been the leading foundation funders of aquaculture in Indonesia (Table 4). Between 2007 and 2017, the Moore Foundation gave over USD 1 million to the sector, while the Packard Foundation provided nearly USD 200,000 in exploratory grants. Walton family members (distinct from the Walton Family Foundation's Oceans Program) issued approximately USD 850,000 in grants to the sector in 2017. Additionally, individual giving by Walton family members includes USD 1.1 million in aquaculture grants which are currently under development for 2018. Given recent strategy refreshes, it is expected that foundations will continue to explore this area closely as a possible area of investment and engagement.

Table 4. Foundation Funding for Aquaculture, 2007-2017

FOUNDATION	GRANTEE	AMOUNT	YEAR
Moore Foundation	International Center for Living Aquatic Resources Management Inc.	407,672	2013
Moore Foundation	Aquaculture Stewardship Council Standards	682,066	2015
Packard Foundation	Trust for Conservation Innovation	29,460	2013
Packard Foundation	Conservation International	166,000	2017
Walton individual giving	Sustainable Fisheries Partnership	300,000	2017
Walton individual giving	IDH	68,000	2017
Walton individual giving	PT Hatfield	250,000	2017
Walton individual giving	WorldFish/Stockholm Resilience Institute	233,000	2017

H. Conclusion

As detailed in this section, aquaculture is now an important driver of the fisheries economy in Indonesia. Across essentially all projection scenarios, the sector appears poised for rapid growth and is slated to receive considerable attention and investment from the national government, private sector, and foreign funders. However, the sector relies on management which is more akin to traditional agriculture rather than wild capture fisheries (as a renewable resource). As capture fisheries face increasing threats and likely declines from overfishing, the government must balance both aquaculture growth along with concerted efforts to improve capture fisheries management.

The intersection of several issues—spatial planning, coastal zoning, livelihoods diversification, economic development, and food security initiatives—underscores the need for government programs and development agendas to marry the constraints and opportunities facing marine aquaculture and marine capture fisheries, along with freshwater aquaculture and freshwater fisheries management. Ensuring that these sectors work in harmony with each other, rather than in silos or in conflict with each other, will be essential to the sustainable growth of Indonesia's fisheries in the future.

06
CASE STUDIES

CASE STUDY

Snapper and grouper fishery

Prepared by
Peter Mous

I. State of the fishery

The "deepwater snapper and grouper fisheries" is a collective name for demersal fisheries targeting snapper (Lutjanidae) and grouper (subfamily Epinephelinae). In Indonesia, fishers targeting these demersal fisheries also catch substantial quantities of emperors (Lethrinidae), grunts (Haemulidae), and various species of at least ten other families. Overall, up to 300 different species may be caught through fishing effort in these fisheries, but the five most important species account for more than 50 percent of the catch (Fig. 1).

In dropline fisheries, the top five species by volume are snapper, accounting for roughly 54 percent of the catch by volume (Table 1). Nearly all of these snapper species are at high risk of overfishing and nearly all have high percentages of immature juveniles in the catch due to demand for "golden size" products, in combination with excessive fishing effort.

Table 1. Dropline Fisheries – Status of Top 5 Species by Volume

SCIENTIFIC NAME	COMMON NAME	VOLUME OF CATCH (%)	RISK LEVEL	PROPORTION OF JUVENILES (%)
Pristipomoides multidens	Goldband Snapper	18.65%	High risk	37%
Aphareus rutilans	Rusty Jobfish, Lehi	9.44%	High risk	20%
Pristipomoides typus	Red-tailed Opakapaka	9.26%	High risk	42%
Etelis sp. (Undescribed)	Ruby Snapper, Ehu	8.98%	High risk	53%
Lutjanus malabaricus	Malabar Snapper	7.09%	High risk	53%

In the longline fisheries, the top five species by volume include snappers and emperors (Table 2). These species account for approximately 72 percent of the catch by volume. Nearly all of these species are at high risk of overfishing and nearly all have medium to high percentages of immature juveniles in the catch due to both demand for "golden size" products and excessive fishing effort.

Table 2. Longline Fisheries – Status of Top 5 Species by Volume

SCIENTIFIC NAME	COMMON NAME	VOLUME OF CATCH (%)	RISK LEVEL	PROPORTION OF JUVENILES (%)
Lutjanus malabaricus	Malabar Snapper	38.18%	High risk	14%
Pristipomoides multidens	Goldband Snapper	22.52%	High risk	22%
Lutjanus sebae	Red Emperor Snapper	4.18%	High risk	67%
Lethrinus laticaudis	Grass Emperor	3.57%	Low risk	0%
Pristipomoides typus	Red-tailed Opakapaka	3.31%	High risk	21%

Figure 1. Fish Landing Place, Brondong, Lamongan District, North Coast of Java, December 2017

Red snapperfish in foreground are mostly malabar snapper. The fishery's catch primarily consists of medium-sized fish, ranging from about 300 g to 10 kg, but some of the species in this assemblage grow to a much larger size: the grouper Hyporthodus octofasciatus, for example, grows to a total length of 160 cm, weighing nearly 50 kg. Most of the catch is marketed as whole fish or fillets, either frozen or fresh, destined for export as well as domestic markets.

The deepwater snapper and grouper fisheries in Indonesia use droplines, longlines, traps, and gillnets in waters between 50 and 500 m deep. There is substantial overlap in fishing grounds among the different gear types, but droplines tend to be used in comparatively deep habitat. Boats operating on the western parts of the Java Sea fish offshore in waters that are slightly shallower, around 30-40 m. Fishing vessels range in size from motorized canoes to decked vessels of 150 GT, but vessels of 10-20 GT represent most of the fleet's capacity. Fishing trips may last as short as one day, covering a couple of nautical miles, or six months or more for larger vessels covering up to 2,000 nautical miles.

Figure 2. Medium-Scale Dropliners (c. 15 GT) in Lamongan District, North Coast of Java

These boats fish in the Java Sea (FMA 712), usually at depths of 50-70 m. Although dropline is the main gear, these boats may also deploy traps and gillnets.

There are no production statistics on the snapper and grouper fishery. A rough estimate of total production of this fishery is 100,000 metric tons per year. This fishery's production likely has been increasing at a rate of about 5 percent per year over the past decades, on pace with the reported increase in total production from marine capture fisheries in Indonesia. Until 2012, MMAF aggregated production statistics by species or species group,

by gear type, and by WPP, but not by a combination of any of these categories. Moreover, the species groups were still too loosely defined to drill down to a level of detail that would be useful for stock assessment. Since 2012, MMAF has been reporting production statistics by species for skipjack tuna only, while all other species are grouped in broad categories (i.e., large tuna species, small tuna species, other fish, shrimp, and other crustaceans). The FAO has been reporting more detailed data than MMAF on Indonesia capture fisheries.

The number of boats involved in the deepwater snapper and grouper fishery remains unknown, but a rough estimate can be made based on the total catch and the average productivity of fishing vessels. Data collected by The Nature Conservancy (TNC) suggest that, on average, a fishing vessel targeting deepwater snapper and grouper realizes an annual catch of 1 metric ton per GT. This is close to the number MMAF uses to estimate annual catch for fishing vessels (1.0 to 1.2 metric ton per GT depending on gear, see Ministerial Decree 86 of 2016). It follows that the total fleet comprises about 100,000 GT, with about 5,000-10,000 total vessels, varying between 5 and 150 GT. The number of small-scale vessels (< 5GT) that participate in the deepwater snapper and grouper fisheries cannot be estimated with meaningful accuracy, and it is unknown to what extent the small-scale fleet's catches contributed to overall catch statistics. The total contribution by the small-scale fleet to deepwater snapper-grouper fisheries is thought to be substantial, though lower than the combined contribution from the mid- and large-scale fleets.

II. Data-poor and length-based assessment of the fishery

Given that statistics on catch and fleet are not available for this fishery, conventional surplus production models (which require a time series of such data) cannot be used. It is, however, possible to use data on the length composition of fish in the catch to assess whether fish stocks are overexploited. In general, if length composition data show that most fish in the catch are approaching the maximum length that these fish attain (Lmax), then exploitation level is low. If most fish in the catch are small relative to their Lmax, this indicates that fishers are removing fish before they have reached their full growth potential, so exploitation level is high.

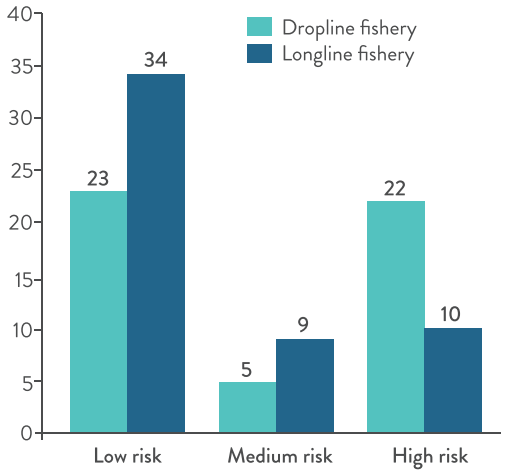
The Nature Conservancy has used these length-based methods to calculate indicators such as Spawning Potential Ratio (SPR)—the proportion of adults compared to an unfished population—for the 50 most abundant species in catches of dropline and longline fishing vessels. An SPR of less than 25 percent indicates that the stock is at high risk due to overfishing, and an SPR of greater than 40 percent indicates that the stock is at low risk due to overfishing. Table 3 and Figure 3 show that SPR values, and therefore risk levels, vary among different species and gears. Most of the dominant species are overexploited, with the notable exception of the grouper Epinephelus areolatus, which is at low risk.

Table 3. SPR and Associated Risk Levels, of the Top Five Species in Dropline/Longline Fisheries

GEAR/SPECIES	SPR (%)	RISK LEVEL / TREND
DROPLINE		
Lutjanus malabaricus	15%	High risk / improving
Pristipomoides multidens	8%	High risk / deteriorating
Lutjanus sebae	13%	High risk / improving
Lethrinus laticaudis	51%	Low risk / improving
Pristipomoides typus	3%	High risk / deteriorating
LONGLINE		
Lutjanus malabaricus (malabar snapper)	15%	High risk / deteriorating
Pristipomoides multidens (goldband snapper)	20%	High risk / improving
Epinephelus areolatus (aerolate grouper)	48%	Low risk / improving
Pristipomoides typus (red-tailed opakapaka)	14%	High risk / improving
Lutjanus sebae (red emperor snapper)	2%	High risk / deteriorating

Data are from all WPPs combined. Data on status cover the period February 2017–January 2018, while data on trends cover the period January 2014–January 2018. Species are sorted in order of decreasing abundance (in numbers).

Figure 2. Medium-Scale Dropliners (c. 15 GT) in Lamongan District, North Coast of Java



Data aggregated from all WPPs, February 2017-January 2018.

Another length-based indicator of fishery status is the percentage of juveniles in the catch. This indicator applies to fish populations that have low or moderate between-year variation in the number of larvae and fingerlings, which appears to be the case for most of the species in the deepwater snapper and grouper fishery. TNC used published data on each species' size at maturity to calculate these percentages for the catch of the 50 most abundant species in the deepwater snapper and grouper fishery (Table 3). A percentage of juveniles in the catch higher than 30 percent indicates that the stock is at high risk due to overfishing, and a percentage lower than 10 percent indicates that the stock is at low risk.

Although the outlook for sustainability in the deepwater snapper and grouper fishery appears bleak, at least for the most abundant species, the situation is not beyond redemption. Even in the absence of fishery-specific management measures, the sought-after *Pristipomoides* species are improving, and *Pristipomoides multidens* (goldband snapper) is approaching the medium-risk level. The important snapper species *Lutjanus malabaricus* and *Lutjanus sebae*, however, are deteriorating and show no sign of recovery.

III. Supply chain and trade

Most of the boats fishing for deepwater snapper and grouper work with business partners who they know and trust; only a minority are able to sell their fish directly upon landing to the highest bidder. Traders often advance operating expenses for each trip on the condition that the boat sells the fish to that trader. Each time a batch of fish is moved down the supply line, the fish is graded and then pooled with fish from other sources that have similar quality characteristics. The number of nodes in the supply line depends on vessel size. Small-scale, village-based fishers often sell to a neighbor, who aggregates the fish from various vessels before selling to a trader based at a local town. That trader then sells to a processing plant after grading and pooling, and the processing plant packs the product for shipping by refrigerated container. Large- and mid-sized boats may sell directly to a processing plant.

Each processing plant formats the product according to the specifications on the purchase order. Common formats are (1) whole round, (2) gutted, gilled, scaled (GGS), fresh on ice, (3) frozen fillets, skin-on, (4) frozen fillets, skin-off, (5) portion cut, and (6) "natural cut" (this term is used for whole fillets as well as for fillet portions that are cut so to resemble a whole fillet). The processing plant may treat the fillets with carbon monoxide (CO) to give the meat a pinkish color. Processing plants usually sell roe, heads, guts, scales, and bones as by-product. Fish buyers in the upstream part of the supply line may assume a variety of roles, including as (1) agents, who do not have facilities for storing, processing, or exporting, and who merely connect sellers to buyers, (2) aggregators, who store, pool, and grade, but who do not reformat the product, (3) processors, who store, pool, grade, and reformat the product, (4) exporters, who have an export license, and (5) importers, who are based in the country importing the fish. Some buyers may assume a combination of these roles (e.g., agents with an export license).

There are no official trade statistics on the deepwater snapper and grouper fishery. The Directorate-General of Competitiveness of Fisheries and Marine Products, which is responsible for collecting these statistics, reports statistics by province or by processing method (fillets, canned, dried, etc.), but not by species group.[1] There are export statistics by major commodity, but snapper and grouper are an unknown part of the category "other fish" (500,384 metric tonnes in 2014). Cawthorn & Mariani (2017)[2] conclude that Indonesia's catch statistics in their current form cannot be reconciled with trade statistics, and that trade statistics lack the granularity needed to shed light on this fishery. Important export destinations for deepwater snapper and grouper are considered to be the United States, the European Union, and China.

IV. Trade preferences: "plate size" or "golden size"

The market pays a higher price for fish of a certain size range. Differences in price for fish of the same species and quality but of different size can be extreme. In the deepwater snapper and grouper fishery, size determines the export destination and whether a fish can be exported. Sometimes, size preference is the result of a difference in consumption quality (i.e., texture, taste) between fish of different sizes. The texture of *Lutjanus bohar* (red snapper), for example, becomes tough as the fish matures. More often, however, it is simply a matter of whether consumers are accustomed to a portion of a certain size.

Many of the species caught in the deepwater snapper and grouper fishery are sold in the United States and EU as a white fillet. For this product, the preferred size is "plate size," roughly corresponding to a fish with a body weight of 0.5-1.2 kg. For many of the larger snapper and grouper species, fish of 0.5-1.2 kg are still juvenile, which means that the market puts a price premium on an unsustainable practice, namely taking fish that have not yet reached their growth potential and have not yet reproduced. Since each of the species in the deepwater snapper and grouper fishery matures at a different size, the severity of this problem differs between species. Species that mature at a small size, such as the abundant *Epinephelus areolatus*, are less affected, while larger snapper species, such as *Lutjanus malabaricus*, are more affected. Table 4 compares plate size with the size at first maturity for the most abundant species, showing how market preference impairs sustainability of the fishery.

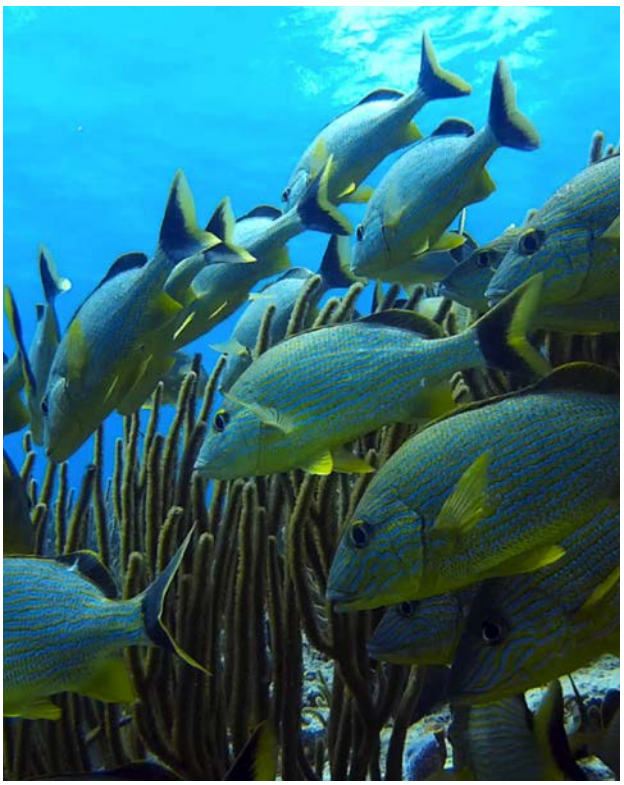
Table 4. Size at First Maturity and Preferred Weight and Size Ranges for the Most Abundant Species In The Dropline and Longline Fisheries

	PREFERRED WEIGHT RANGE (IN G)	PREFERRED LENGTH RANGE (TOTAL LENGTH, IN CM)	SIZE AT FIRST MATURITY (TOTAL LENGTH, IN CM)	RISK LEVEL DUE TO SIZE PREFERENCE OF THE TRADE
Pristipomoides multidens	500 – 1,200	35 - 46	48	high
P. typus	500 – 1,200	35 - 49	45	high
P. filamentosus	500 – 1,200	33 - 46	48	high
Lutjanus malabaricus	500 – 1,200	33 - 44	50	very high
Lutjanus sebae	500 – 1,200	31 - 44	53	very high
Epinephelus areolatus	300 – 1,200	29 - 45	21	low

The most abundant species in the dropline and longline fisheries together account for more than 50 percent of the total catch in numbers. The two species that are most at risk due to the size preference of the trade (L. malabaricus and L. sebae) also have the lowest SPR (see Tab. 2).

V. Management of the fishery

The main laws regulating fisheries in Indonesia are Law 31 of 2004 and its amendment, Law 45 of 2009. These laws concern fishery activities in marine waters and brackish waters, as well as public inland waters. Laws 31/2004 and 45/2009 provide the legal underpinning for a wide variety of management measures, including effort control (licensing), quotas, gear restrictions (such as mesh size restrictions and outright bans on certain gears), and area restrictions. In practice, the only management measures that are implemented are licensing, and, with varying effectiveness, MPA designations.



Although the intent of the licensing system is to control effort, in practice the licensing system serves only administrative purposes. One exception is MMAF's policy to address fishing by foreign vessels that have been reflagged, which was implemented through a moratorium on renewal of licenses of foreign-built fishing vessels. Only fishing vessels larger than 5 GT must have a license; boats smaller than 5 GT simply need to be registered.[i]

[i] Law 7 of 2016 on protection and empowerment of fishers, fish farmers, and salt farmers puts the boundary at 10 GT, but this law has not been implemented yet.

VI. Opportunities for management improvements

There are a number of opportunities for improving management of the deepwater snapper and grouper fishery:

1) Adjust fishing licenses. Although Indonesia's licensing system offers opportunities for regulating the deepwater snapper and grouper fleet, the system would require adjustment. First, the fishing licenses would need to specify allowed gears in more detail, so that fishing vessels targeting, for example, sharks or tuna can be differentiated from vessels targeting, say, deepwater snapper and grouper.

2) Facilitate a gradual reduction of the fleet. MMAF and provincial fishery agencies would have to take steps to freeze the number of licenses at the current level to prepare for a gradual reduction of the fleet. A gradual fleet reduction could be achieved by introducing a waiting period upon yearly reissuance of fishing licenses.

3) Regulate fishing effort using VMS. Fishing effort of boats larger than 30 GT could be regulated through the mandatory VMS. For example, MMAF could freeze and later reduce the number of operational hours that each vessel is allowed to fish.

4) Promote voluntary measures. Besides legislation, there are also opportunities to manage the deepwater snapper and grouper fishery through voluntary measures, for example as part of a sustainability certification program (e.g., MSC). There are already various industry-led fishery improvement projects (FIPs) for deepwater snapper and grouper in place, though these FIPs have stalled in recent years. TNC is currently developing a FIP[3] that aims to improve traceability and transparency in fishing practices and trade, in combination with voluntary minimum size to reduce the price premium for juvenile fish.

CASE STUDY

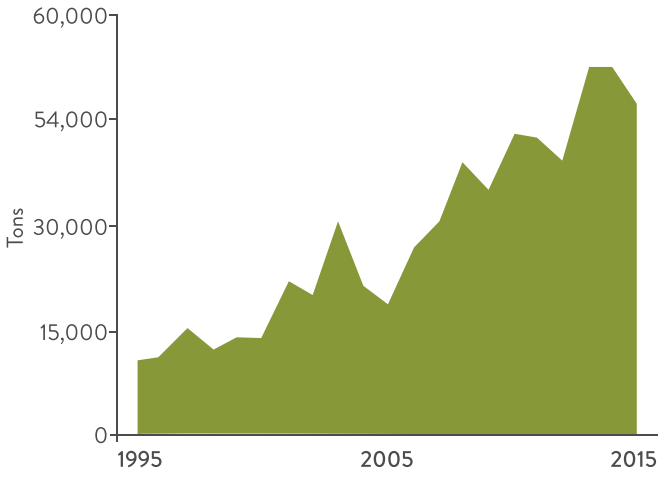
Blue swimming crab fishery

Prepared by
CEA and Stuart J. Green with contributions from Starling Resources, Environmental Defense Fund, and Sustainable Fisheries Partnership

I. State of the fishery

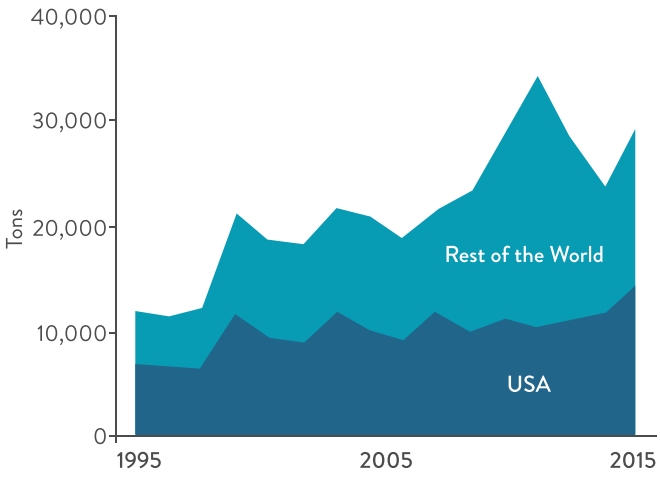
The blue swimming crab (BSC) (Rajungan) fishery in Indonesia is the country's third-highest-value fishery, following tuna and shrimp. Reported catch has increased by almost 350 percent since 1995 (Fig. 1),[1] and export volume has tracked catch, tripling between 2003 and 2013 (Fig. 2).[i],2 In 2015 Indonesia was the second-largest supplier of BSC (52,000 tons), providing about 25 percent of global supply. Indonesia was second only to China, which accounts for over 35 percent of global supply. The BSC fishery in Indonesia supports an estimated 65,000 full time fishers and 13,000 pickers.[3]

Figure 1. Catch of Indonesian BSC



Source: FAO FishStatJ

Figure 2. Export of Indonesian BSC



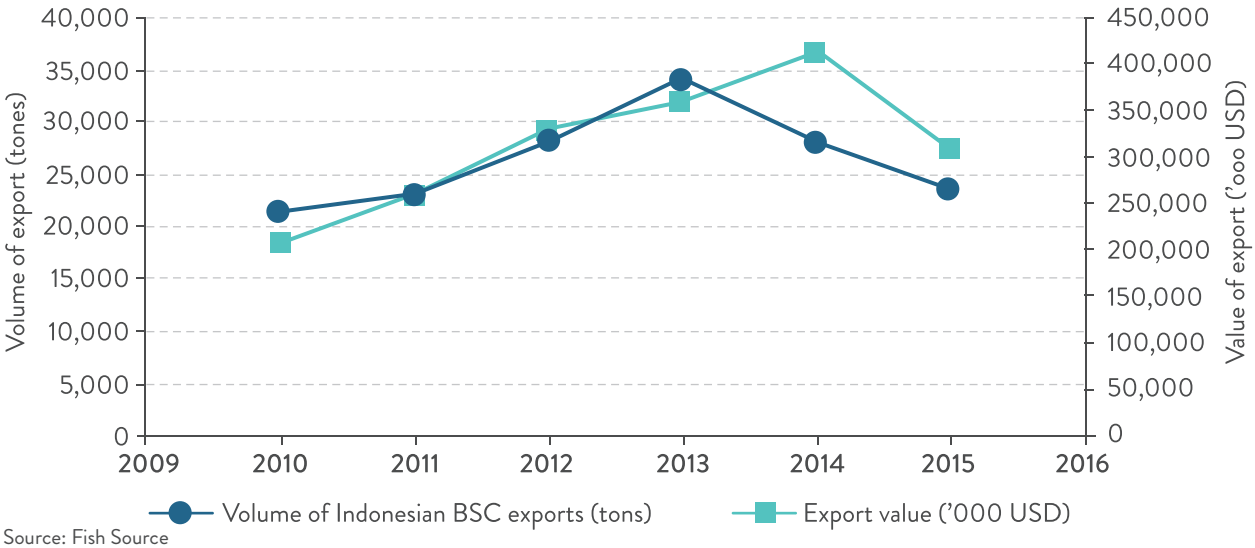
Source: Trade Map

BSC exports totaled USD 321 million in 2016 (Fig. 3), with nearly three quarters of the value coming from trade with the United States (Fig. 4).[4,5] BSC is an effective substitute for the highly prized Chesapeake blue crab (Callinectes sapidus). There is a clear correlation between the significant drop (70%+) in Chesapeake Bay crab production since the 1990s and the expansion of the crab industry in Asia. While the Indonesian market has grown, global demand has increased at an even faster rate, and prices hit an all-time high in summer 2017, leading to increased fishing effort.[6]

FAO data shows a 400 percent increase in tonnage of crab captured in Asia since the late 1980s, with more than 200,000 tons landed in 2015. This steady increase masks a series of boom and busts of the BSC fishery across Asia, including in Indonesia, Thailand, Vietnam, and the Philippines.

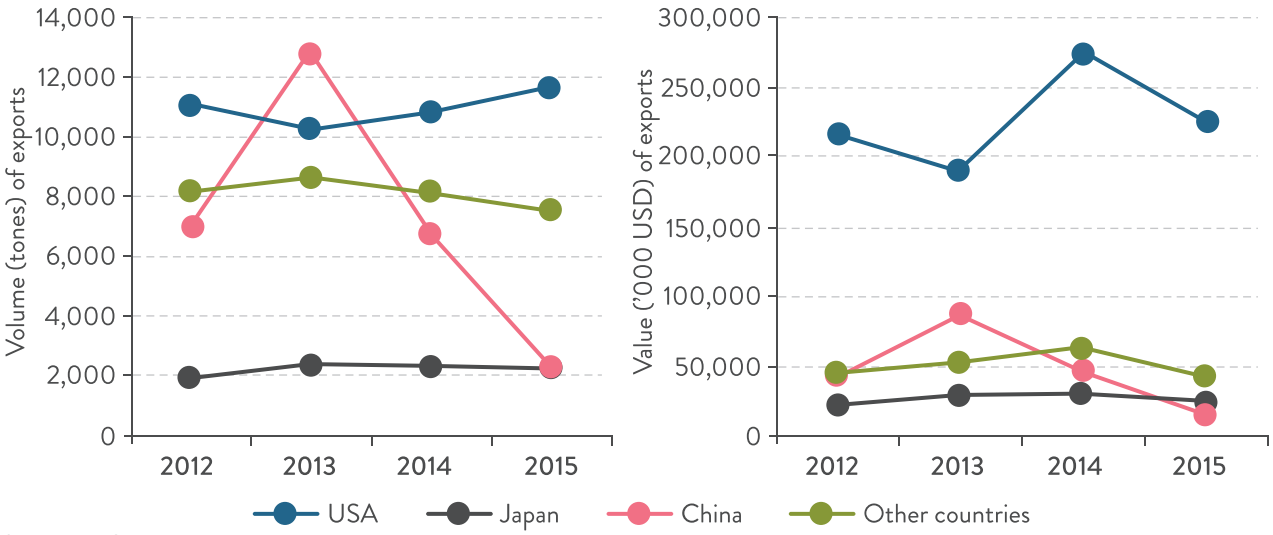
[i] Trade Map, an initiative of the International Trade Center, draws its annual data from UN Comtrade, the world's largest database on trade statistics, which is maintained by the UN Statistics Division. The data is also complemented by national sources; in the case of Indonesia, BPS-Statistics Indonesia provides data when the information is not available in UN Comtrade.

Figure 3. Total Volume (tons) and Value ('000 USD) of Indonesian BSC Exports



Source: Fish Source

Figure 4. Volume and Value of Indonesian BSC Exports, by Importing Country



Source: Fish Source

The increasing export demand for crab meat has expanded intensive BSC fishing from Java Island in the mid-1990s to other areas more recently, such as Sulawesi and Kalimantan.[7]

BSC have a flat fifth pair of legs that act as paddles, allowing them to swim. The crab has strong, sharp claws, housed within a protective armor shell; they are fast and aggressive predators that will feed on each other, grow quickly, and breed regularly. The crab is biologically fecund and can theoretically bounce back from overharvesting, given the right management and given time.[8]

While no comprehensive countrywide stock assessment has been completed, the BSC fishery in Indonesia is known to be systematically overfished in certain grounds.[9] Commercial exploitation of BSC in Indonesia began in the Java Sea, but the fishery continues to expand across the country.

Anecdotal data suggests that while fishing effort has increased, the overall size of BSC catch is decreasing. The decline in the BSC stock is due to overcapacity in the fishing fleet in terms of the number of boats, gears, and fishers engaged. According to MMAF, blue swimming crab is overexploited in seven of the country's eleven fisheries management areas, fully exploited in three, and moderately exploited in one (Fig. 5).[10] MMAF estimates a total catch potential of 43,446 tons per year and a total allowable catch (TAC) of 34,753 tons, which the Indonesian fishery has exceeded since 2010.[10,11]

Figure 5. MMAF Exploitation Status and Total Allowable Catches, by WPP (2017)

Indonesian WPP (Fisheries Management Area)		BLUE SWIMMING CRAB	Indonesian WPP (Fisheries Management Area)		BLUE SWIMMING CRAB
Strait of Malacca and Andaman Sea	Potential catch (ton)	12,829	**Banda Sea and Tolo Bay**	Potential catch (ton)	1,145
	Total allowable catch (ton)	10,263		Total allowable catch (ton)	916
WPP 571	Utilization rate	1	WPP 714	Utilization rate	1.55
Indian Ocean: West of Sumatra and the Sunda Straight	Potential catch (ton)	9,543	**Tomini Bay**, Maluku Sea, Halmahera Sea, Seram Sea, and Berau Bay	Potential catch (ton)	891
	Total allowable catch (ton)	7,634		Total allowable catch (ton)	712
WPP 572	Utilization rate	0.18	WPP 715	Utilization rate	1.19
Indian Ocean (South of Java)	Potential catch (ton)	526	**Sulawesi Sea** and North of Halmahera	Potential catch (ton)	2,196
	Total allowable catch (ton)	421		Total allowable catch (ton)	1,756
WPP 573	Utilization rate	0.28	WPP 716	Utilization rate	0.38
South China Sea: Karimata Strait, Natuna Sea	Potential catch (ton)	2,318	**Pacific Ocean**, Cendrawasih Gulf	Potential catch (ton)	489
	Total allowable catch (ton)	1,854		Total allowable catch (ton)	391
WPP 711	Utilization rate	1.09	WPP 717	Utilization rate	0.87
Java Sea	Potential catch (ton)	7,664	**Arafuru Sea**, East Timor Sea, Aru Sea	Potential catch (ton)	1,498
	Total allowable catch (ton)	6,131		Total allowable catch (ton)	1,198
WPP 712	Utilization rate	0.7	WPP 718	Utilization rate	0.85
Makassar Strait, Bone Bay, Flores Sea, and Bali Sea	Potential catch (ton)	4,347	**TON**		**34,753**
	Total allowable catch (ton)	3,477			
WPP 713	Utilization rate	0.83			

(0 < 0.5) (0.5 < 1) (<1)

BSC caught in Indonesia (and Southeast Asia) with bottom gill nets, fish traps, and trawl are all on the Red "Avoid" list maintained by Seafood Watch.[ii] The Seafood Watch profile for BSC harvested from Indonesian waters states the following: *"The ineffective management of this fishery is a serious concern. Information about bycatch is lacking, but Irrawaddy dolphins and other at-risk turtles and sharks are caught in this fishery. Blue swimming crab has not been formally assessed, so it is unknown if overfishing is occurring."*[13] Seafood Watch staff are currently working with FIP managers to improve the quality of data for updating BSC status in the Seafood Watch Report.

[ii]A red listing on the Seafood Watch list reflects the Monterey Bay Aquarium's recommendation that consumers completely avoid certain seafood products, by fishing method and location, due to concerns about overfishing and/or environmental impacts from harvesting practices.

II. Management of the BSC fishery

MMAF has instituted several regulations and policies relevant to the BSC fishery, including a trawling ban[iii] and minimum size limit, and the agency recently published a management plan.[iv] The size limit, which was supported by the BSC industry association, *Asosiasi Pengelolaan Rajungan Indonesia* (APRI), prohibits the capture of BSC with carapace size of less than 10 cm or less than 60 grams. The regulation for banning the capture and processing or undersized crabs (less than 10 cm carapace width) and egg berried females is under Ministerial Decree No. 56/2016 on the Prohibition of Capture and/or Export of Lobster (*Panulirus spp.*), Mud Crab (*Scylla spp.*), and Blue Swimming Crab (*Portunus pelagicus spp.*) from Indonesian waters.

Given the lack of selectivity of the different gears in use for the fishery as well as limited capacity for enforcement, this policy has been difficult to implement and enforce. Only traps (modified with escape gaps) could enable smaller crabs and gravid females to escape from the trap. Trawl and gillnet harvest indiscriminately; most crabs drown if the soak time of the net is more than a few hours.

Though there is little literature on the impact and stress on BSC when they are captured, some anecdotal evidence suggests that in some cases the eggs may be reabsorbed by the female crabs when captured. The trawling ban applies to all Indonesian fisheries, including BSC, and is intended to mitigate some of the negative impacts of trawling, such as bycatch and habitat destruction.

III. Attempts at fishery improvements

Many initiatives for BSC reform are in place in Indonesia at present. There are three efforts to improve the management of the Indonesia BSC fishery: a) a FIP led by APRI, the association for BSC processing and exporting companies in Indonesia that has excellent links with the MMAF, supported and funded by the Crab Council (NFI) from a 0.02$ "sustainability fund" per lb of crab imported into the USA which strongly collaborates with the Sustainable Fisheries Partnership and b) the Blue Swimming Crab Sustainable Fishery Initiative (IPPRB) led by the Directorate of Fishery Resources (SDI) of the MMAF, which is modeling fisheries management starting in Lampung, with leadership from the Lampung provincial government and support from Starling Resources and Environmental Defense Fund.

The Diponegoro University (UNDIP)—a public university in Semarang, Central Java—is a key entity that continues to provide literature on the gap in understanding BSC biology and fishers' behavior. The institution is in the process of showcasing management in Betahwalang (and several expansion sites) as part of its work on co-management in the Java Sea. Another university, the Institute Pertanian Bogor, has also contributed considerably to the literature and information about the fishery.

A. BSC FIP

BSC is considered a high-value product, and a significant portion (>70%) of BSC product is exported to the United States as a substitute for U.S.-produced blue crab. In 2009, a large number of U.S. importers committed to sustainability in BSC fisheries around the world formed the NFI Crab Council. This council oversees 85 percent of the crab imported into the United States and has implemented industry-led stewardship, influencing crab management in Indonesia and four other countries in Asia. The council implements a levy fee of $0.02 per pound of crab imported; those funds are then used to support the council's sustainability work in five countries, one of which is Indonesia.

APRI (*Asosiasi Pengelolaan Rajungan Indonesia,* the BSC industry association) includes members from more than 30 seafood industry businesses and processors, covering more than 85 percent of purchased crab in Indonesia. Members receive NFI Crab Council funds (allocated from the $0.02 levy fee) and other support. A FIP was co-created with APRI and Sustainable Fisheries Partnership (SFP) in 2008 with the goal of sustainable procurement from healthy stocks, but actions have thus far been insufficient to yield meaningful improvements in stock health. For this reason, SFP has now embarked upon its own co-management efforts, working with fishers in selected sites of the Java Sea, including Demak.

[iii] This has recently been lifted for fishers in certain geographies due to political pressure and pushback from owners and users of the banned gears. See page 31 for additional detail on the cantrang ban.

[iv] Regulations with potential impacts related to BSC include the following: a) trawl ban (Permen KP 2/2015); b) fishing lines zone (Permen KP 71/2016); c) size limit/berried crab (Permen KP 45/2017); d) RPP Rajungan/BSC management plan (Kepmen KP 70/2016); e) RPP WPP 712/ 712 management plan (Kepmen KP 79/2016); and f) stock estimation, TAC, and exploitation rate (Kepmen 50/2017).

The goal of the FIP is to obtain Marine Stewardship Council (MSC) certification for the BSC fishery. To date, efforts to achieve MSC certification have been unsuccessful due to signs of depleting stocks, poor data quality on stock status, a lack of concrete management plans to achieve and demonstrate improvement,[14] and limited implementation and compliance with existing regulations. APRI has developed and has been implementing a FIP action plan to address these gaps. The FIP has been regularly reported on FisheryProgress.org, an online resource for tracking the progress of FIPs across the globe.[15]

APRI operates a large number of initiatives, including technology support in the creation of an application to help gather data on the fishery. A recent initiative that was conducted by APRI in coordination with the NFI Crab Council was a "Coordination Meeting of Blue Swimming Crab Fishery in Indonesia"; among the stakeholders involved were MMAF, central and local government agencies, universities, NGOs, and buyers.[16] The initiative held a meeting in Jakarta in February 2018, and activities are ongoing to improve coordination among the stakeholders.

To improve compliance with existing regulations, the NFI Crab Council and APRI (supported by SFP) have developed a Control Document, which is adopted on a voluntary basis by producers, traders, and/or suppliers who seek to ensure a sustainable supply of marine products, while combating IUU fishing effectively and supporting livelihoods in producer countries. The Control Document implementation and supporting audit will require effective oversight and monitoring; the establishment of the steering committee (with representation from MMAF, APRI, and SFP) has been key for this reason.

The Control Document is a catch and purchase documentation system that requires miniplants and processors to verify that traded crab products originate from legitimate producers operating legal fisheries with legal gear types that adhere to national and international legislation. The document is then independently audited for compliance. NFI, APRI and SFP are planning on rolling out this system industry-wide within 2018. An Indonesian umbrella program for BSC coordination chaired by MMAF has also been established, and the Village of Betahwalang was recognized as a "BSC Village." In addition to improving compliance, APRI members will benefit from complying with the traceability and documentation practices required under the Control Document, because those practices will serve as valuable preparation for the possibility that BSC may be integrated into the U.S. Seafood Import Monitoring Program (SIMP).

At the provincial level, APRI has been working with provincial governments to establish a BSC Fishery Management Committee and Action Plans in Central Java Province, East Java Province, and Southeast Sulawesi Province through the establishment of governor decrees and regulations.

B. Provincial-level BSC management

MMAF-SDI is leading a BSC management initiative at the national scale, with the aim of implementing provincial-level BSC management in several sites. An initiative is underway in Lampung Province to implement the BSC management plan at a sub-WPP scale. At the pilot site in Lampung, the Lampung Province is leading specific and actionable approaches for BSC management to match the needs of the local BSC fishery. This work is supported by Starling Resources and Environmental Defense Fund, which provide technical support and facilitation to government partners.

Several project steps have been completed to date, including: a) site selection, b) site characterization to understand local fishery dynamics in preparation for management planning, and c) launch of the Lampung BSC management team by the Lampung governor. The management team is composed of various types of stakeholders, including fishers, fish receivers, mini-plant and processor representatives, APRI, academics, NGOs, and government agencies. The Governor of Lampung, Muhammad Ridho Ricardo formed the management committee which should help encourage essential stakeholders to acknowledge and enforce the management rules.

Complementary coordinating efforts are also underway with SFP and market actors to further strengthen the pilot. Initiatives similar to the pilot in Lampung—featuring a provincial Governor's Decree with the establishment of a management committee including key stakeholders—are being implemented in other provinces. These efforts are led by MMAF, with active participation by APRI.

IV. Barriers to compliance

The impacts of the trawl ban, size limits, and a prohibition on landing berried females have been limited due to weak implementation, low compliance, and limited political will and stakeholder support. Benefits from the policies scale linearly with compliance, so stricter compliance is critical to the health of the fishery. Despite industry efforts to improve compliance through a policy to refuse crabs smaller than 10 cm for processing, there are a number of hurdles to full adoption of the policy. These challenges include:

1) **Fishing practices.** Small-scale fishers tend to dominate the BSC fishery. It can be particularly difficult for small-scale fishers to change both fishing gear and practices. Small-scale fishers with vessels less than 5 GT often fish alone, nearshore, and using gill nets; in contrast, trap fishers tend to fish in groups on larger boats that are financed by third parties. Switching to gill nets would be cost-prohibitive for many small-scale fishers. In addition to requiring new gear, the transition would require new vessels, financing relationships, and changes in fishing practice (given that two people are needed to operate traps).

2) **Gear selectivity.** For those fishers for whom alternative gear is a possibility, the more selective gear could help address underlying problems of bycatch and the capture of juvenile crabs (as long as the fishing effort is also regulated). Some traps and gillnets with small mesh sizes catch BSC smaller than the legal size limit, and any crabs captured will have died by the time they can be released.[17]

3) **Demand from non-U.S. markets.** Although the price for small crabs is low, they are often consumed in the domestic market or in fisher households in violation of the ban.[18] Admittedly, this proportion is comparatively low (accounting for less than 10 percent of landings). Given that 50 percent of landings go to the U.S. market, there is a need to better understand the demand from non-U.S. markets.[19]

4) **Compliance from processing companies.** While APRI has instituted a policy to not accept crabs smaller than 100 mm, only 85 percent of the Indonesian processing companies are part of APRI. Many non-APRI firms accept crabs below the acceptable size limit,[20] and compliance is limited even among APRI firms. Supported by SFP, APRI is currenty collaborating with MMAF to require a Control Document as part of the process for acquiring a health certificate, which means compliance with the Control Document would also apply to non-APRI members.

5) **Poor implementation and enforcement.** There is evidence of limited compliance with management measures, at least in Lampung. An underlying reason appears to be the natural hurdles to compliance, including the challenges of salvaging small crabs for gill net fishers and the expense of changing fishing gear. Additionally, reports suggest that enforcement is hampered by poor understanding of the ban by fishers and a lack of government monitoring due to resource limitations and political challenges in implmenting the ban.[21] On the other hand, Control Document trials during 2017 with three supply chains in Madura, Southeast Sulawesi, and Lampung—as well as early 2018 trials of three supply chains in Java—demonstrated that APRI-affiliated companies had a compliance rate of 85 percent. Thus, there are signs that some companies are attempting to comply with both traceability policies and regulations.

In addition to limiting fishing mortality, which may take the form of no-take zones in certain fishing grounds, bio-economic modeling from SFP suggests that simply following the regulation on minimum legal size would have a significant impact on stock recovery and health.[22] As such, limiting fishing effort and enforcing size limits will be essential for protecting fish stocks while continuing to support an increase in the value of the BSC fishery. The capacity to fish—both the number of boats and fishers—far exceeds the stock's ability to regenerate for large portions of the country.

Other macro issues that hamper governance of the fishery include unclear jurisdictions and roles of government entities involved in the management of the fishery. The ability of fishers below 10 GT to fish anywhere without a license is also a significant problem that requires attention. Spatial management plans will also be an important component of BSC management plans. Although there are many concurrent attempts at management being supported at present, there is no clear roadmap or vision that cuts across government, industry, civil society, communities, and BSC fishers. A systematic approach to coordinated planning and management that incorporates all stakeholders will be an important success factor for the BSC fishery in Indonesia.

V. Opportunities for management improvements

Although the BSC fishery does appear to be more complex and complicated than first envisioned, it is most definitely an archetype "microcosm" of the ecological, economic, and political dynamics encountered across all of Indonesia's fisheries. The fast-growing coastal areas of Indonesia are witnessing shifting incentives, patterns of fisher movements, economic interests and incentives, and jurisdictional rules, while also experiencing over-capacity and over-investment in fisheries. As such, the BSC fishery serves as an excellent model within which to test management approaches that could ultimately be scaled across fisheries in Indonesia.

The BSC fishery in Indonesia is generally characterized by relatively small, coastal fishery areas with limited and unknown connectivity. The primary fishers are local or quasi-local small-scale fishers. As such, management efforts must be implemented on a sub-WPP jurisdictional level rather than at the WPP or national level. This localized management will need to "nest" itself within the higher layers of management.

Opportunities for improving the health of the fishery include:

1) **Regulate fishing effort.** As described above, the trawl ban and size limit are not sufficient to enable the BSC fishery to reach sustainability. In addition to those policies, a limit on fishing effort (including through territorial use rights for fishing programs or other culturally appropriate forms) is required to allow the fishery to maintain both profitability and biomass. Given the dynamics of the BSC fishery described above, limits on fishing effort will be required at a sub-WPP level.
2) **Engage fishers in adaptive, community-based management.** Obtaining support from fishers through outreach programs is crucial for both educating fishers and increasing compliance with the rules. This can happen by engaging stakeholders in evidence-based and science-based management planning. Furthermore, using fishers as monitoring and enforcement agents as well as data collectors can help improve data quality and compliance for the fishery. Management must occur at the approriate scale to allow for measures that are adaptive to local dynamics and offer opportunity for participation by appropriate stakeholders.
3) **Improve catch documentation.** Improved catch documentation could aid MMAF and local communities in the design, implementation, and enforcement of BSC regulations. Improved catch documentation may also hold the potential as a marketing tool. One crab processing company in Indonesia, Phillip Seafood Indonesia, recently engaged in a traceability endeavor called "bait to plate" that documents where crab was caught and where it was processed for the consumer. The Control Document process will also include documentation and traceability requirements that will support management of the fishery.
4) **Align incentives through price signals and well-enforced regulations.** Price signals are needed for multiple stakeholders.
   - Fisher engagement: Currently there are too many fishers on the water; many of these operators are mobile and can move across geographic areas. In some areas, price signals are in place to encourage the sale of large crabs. These price signals can be helpful but have typically resulted in sorting of the product as opposed to reducing the volume of undersized crabs landed. Ultimately, well-enforced policies that compel processors to reject undersized crabs and discourage fishers from capturing undersized crabs are needed to ensure that juvenile crabs reach maturity and reproduce.
   - Industry self-regulation: In order for the BSC stock to succeed, industry pressure must occur all the way down the supply chain—from importers to Indonesian exporters and processors; from processors to picking plant suppliers; from picking plants to collectors; and from collectors to fishers. There is opportunity for industry self-regulation through the Control Document process, which would entail enforcing government regulations for members through documentation requirements, audits, and self-imposed sanctions for non-compliance.

A higher price for larger-size crabs—and for a higher-quality product from trap capture—represent steps in the right direction. However, most collectors currently pay a higher price for good quality crabs, which is essentially only possible with traps. Thus, there is a de facto policy embedded in the supply chain to incentivize the use of the most selective and more sustainable fishing method. Nevertheless, this has not resulted in a significant impact on the stock to date. For this reason, regulatory compliance—enforced through a combination of government and industry measures—will be critical to supporting the management of the BSC fishery in Indonesia.

CASE STUDY

Tuna fishery

Prepared by
Lida Pet

Indonesia has been a major tuna-fishing nation in the Indian Ocean and West Pacific Ocean region since the early 1980s, when the Japanese government provided capacity support and financial support to develop Indonesia's tuna long-line fisheries. Numbers vary slightly between sources, but in 2015 Indonesia was believed to have accounted for 17 to 22 percent of global tuna production.[1,2 3] This high productivity is explained by the abundance of tuna in and around Indonesia's territorial waters, steadily increasing international demand,[i] and significant development of the domestic sector in the last three decades.

Many countries[ii] source Indonesian tuna or even fish the same stocks in the Indian Ocean or the West Pacific Ocean. Indonesia also launched a nationwide campaign to promote an increase of seafood protein in daily diets domestically. Thus, the state and management of this fishery is of high interest to many national and international actors and stakeholders. Anticipating a further increase in demand for Indonesian tuna and under growing pressure from regional fisheries management organizations, new management regulations were enacted during the past three years, mainly to reduce IUU fishing by foreign and domestic fleets, and to improve the global market position of Indonesia's seafood, particularly through reducing international trade tariffs.[iii,iv]

In this case study, we outline key characteristics of the fishery and relevant management measures. We also discuss impacts of recently enacted regulations and pose recommendations for further management improvements.

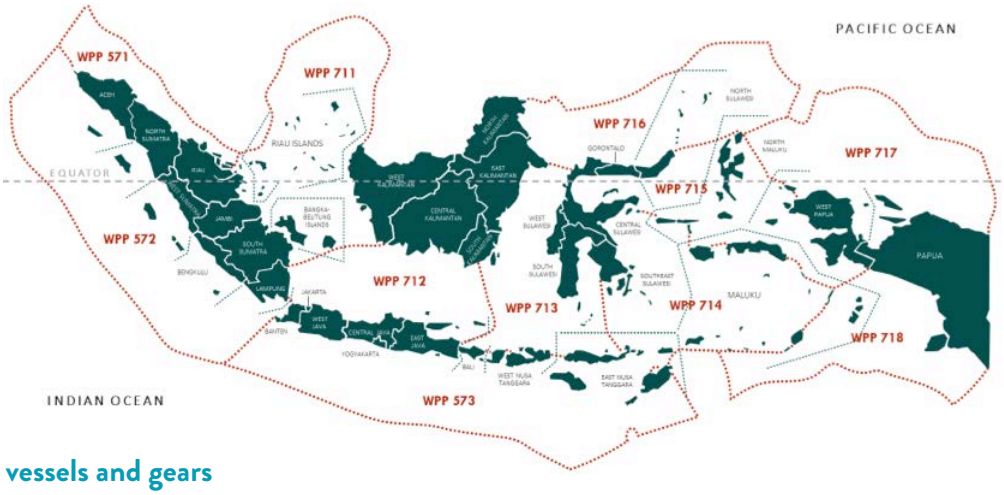
I. State of the fishery

A. Fishing areas

Though the quality of the official fisheries statistics is debated,[v] MMAF data offer the only country- and sector-wide time-series data. Over the past 20 years, international and nongovernmental organization (NGO) support has improved capacity to collect catch and effort data. Indonesia's data are now used by RFMOs[vi] to update tuna stock status. Data used here showed relatively high year-over-year variance in most time series, which may point to challenges with the data quality.

[i] Most tuna traders claim that demand for Indonesian tuna exceeds supply and that they could easily trade a higher volume given the quality of Indonesian tuna.
[ii] Indonesia is the fifth-largest provider of canned tuna into the United States, at around 9,000 MT annually. Indonesian canned tuna exports to the UK are on the decline, from around 6,000 MT in 2015 to around 3,500 MT in 2017.
[iii] Indonesian seafood carries tariffs of 14-20 percent, while tuna from the Philippines, Fiji, and PNG does not carry tariffs, according to the industry news source Atuna.com.
[iv] The need for the newer regulations was explained by MMAF, which stated that Indonesia is committed to promoting the sustainability of its fish resources so that more fish can be caught by Indonesian fishers and to supporting certification requirements for domestic and international markets.
[v] MMAF estimates that catches are underestimated at 11% of the total. Wageningen University & Research and Bogor Agricultural University estimate that catches could be 33 to 38 percent higher than reported https://www.wur.nl/en/newsarticle/New-method-offers-improved-estimations-of-unreported-fish-catch.htm
[vi] About 53 percent of the world production of tuna is from the Western and Central Pacific Ocean; Indonesia is a significant contributor to this productivity.

Figure 1. Fishery Management Units (WPPs) in Indonesia



B. Fishing vessels and gears

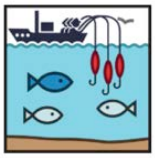
Most tuna sectors report seasonality in fishing effort, but in domestic and RFMO waters, fishing occurs year-round.

Fishing gears used mainly to catch tuna (Fig. 2) made up approximately 26 percent of the total gear units between 2006 and 2016. However, data showed a sharp drop in 2016 to 19 percent, and there has been an overall decrease in numbers of these gears over the past ten years (Fig. 3).[4]

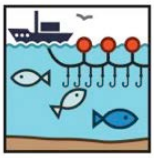
Longlines are relatively large-scale gear, operated mostly on the high seas. The cumulative number of pole-and-line gear (stick type) decreased significantly, while another type of pole-and-line gear (one-by-one gear) has been stable and increased in proportion in 2015 and 2016 (though still a relatively low proportion overall). The relative proportion of handlines increased significantly in the past six years but their importance decreased sharply in 2016 in favor of purse seine gear. The relative importance of purse seine gear increased strongly in 2016, balancing the decrease in handlines and pole-and-line.

Figure 2. Tuna Production Systems in Indonesia

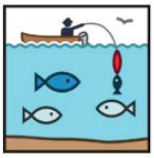
Purse seine: Skipjack, yellowfin tuna, kawakawa, frigate, bullet tuna
Purse seine fishers capture tuna schools and tuna that are drawn to floating objects including fish-attracting devices (FADs). Small purse seiners (15-30 GT) operate primarily in western Indonesia waters, while industrial vessels are mainly active in eastern waters.



Pole-and-line: Skipjack, yellowfin tuna
Pole-and-line vessels (5-30 GT) operate mainly in the Western Central Pacific. They capture tuna by luring live baitfish from the pole-and-line near tuna schools.

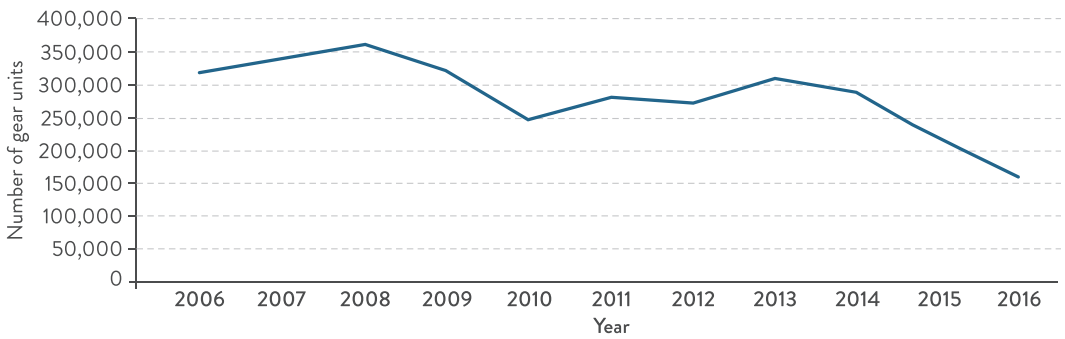


Long line: Albacore, big eye, yellowfin, wahoo, marlin, swordfish
Industrial longline tuna vessels (<200 GT) operate in the Indian Ocean. These vessels capture tuna by using drift long lines with baited hooks; this method can result in significant bycatch.



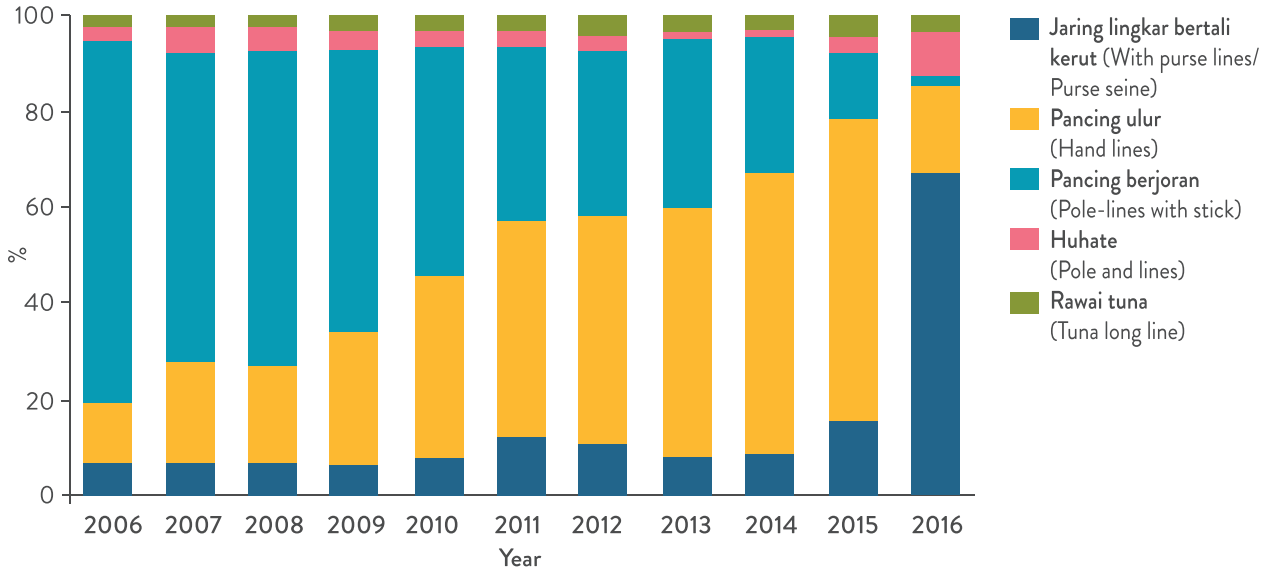
Handline: Yellowfin, skipjack, kawakawa, wahoo
Small-scale fishers use traditional handline fishing in small boats (5 GT). Key fishing areas include the Flores and Banda Sea and the Indian Ocean.

Figure 3. Total Number of Tuna Fishing Gear Units in Indonesia



[vii] Prior to developing e-log-books and observer programs, the level of catch by landing sites was the most important measure for catch recording. In 2007, an assessment of the monitoring capacity at tuna ports in eastern Indonesia was supported by the WCPFC; some process improvements were implemented.

Figure 4. Relative Importance of Different Tuna Fishing Gear in Indonesia



Not all fish caught in fishing gear are tuna, but all fishing gear that are commonly used to catch tuna experienced declines in total productivity for 2015, except for handlines and set longlines. However, the relative contribution of handline gear to the combined production of gear mostly used to catch tuna dropped in 2016. Purse seines had the highest annual productivity, but not all purse seine catch is tuna.

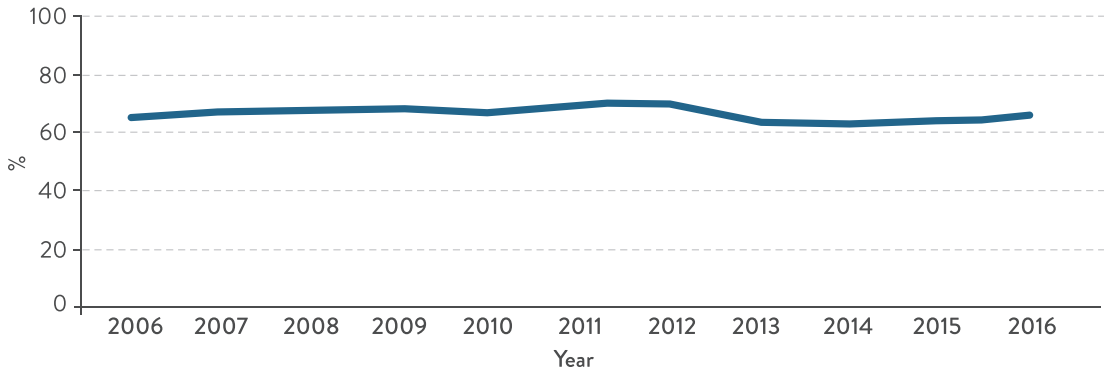
Fish-attracting devices (FADs) are an important auxiliary gear. FADs are known to attract juvenile yellowfin and bigeye tunas, mainly through their associations with schools of skipjack tunas.

Species

Indonesia reports export for tunas, skipjack tunas, and eastern little tunas under the category TCT (Tuna, *Cakalang,* and *Tongkol)*. This category makes up approximately 22 percent of all marine fish catches on average according to the official statistics for the 2006-2016 period. Looking at another way to group statistics relevant for the tuna sector, the seven most important tuna species make up on average between 60 and 70 percent of total large pelagic fish production (Fig. 5).

Production of the seven tuna species combined increased in the last ten years from approximately 600,000 in 2006 to roughly 1 million tons in 2016 (Fig. 5). Interestingly, official statistics for tunas, skipjack tunas, and eastern little tunas combined are between 15 to 20 percent higher. It is important to note that much misunderstanding and mislabeling occurs around use of the local common names of *cakalang* and *tongkol.*

Figure 5. Relative Importance of Tuna Species Catches to Total Large Pelagic Catches in Indonesia



Of the seven main tuna species, the species with highest relative proportion of catch is skipjack tuna, at 45 percent (Fig. 7). Yellowfin tuna contributes about 15 percent, and eastern little tuna about 20 percent. Dogtooth tuna[viii] is the least significant contributor. Aside from a steady decline in catches of longtail tunas, most species retained stable positions relative to each other and to the combined total production (Fig. 8).

Figure 6. Tuna Production in Indonesia, 2006-2016

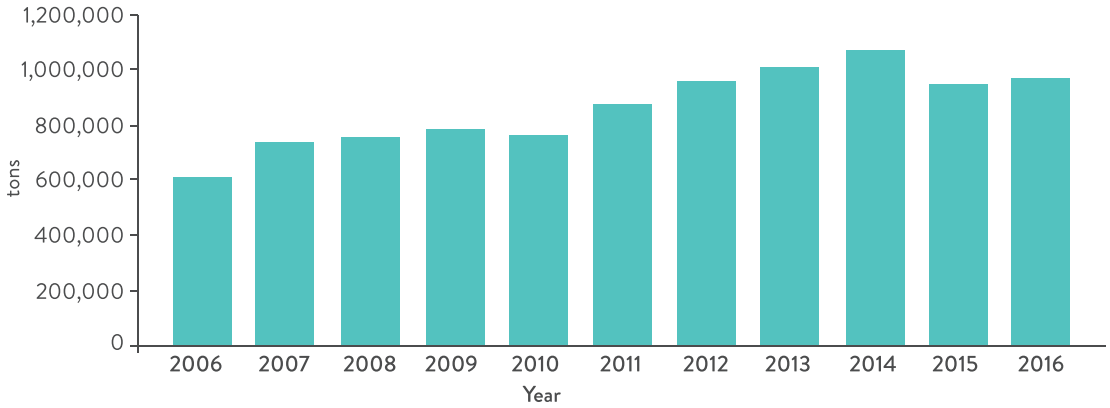


Figure 7. Relative Importance of Different Species to Total Tuna Catch in Indonesia

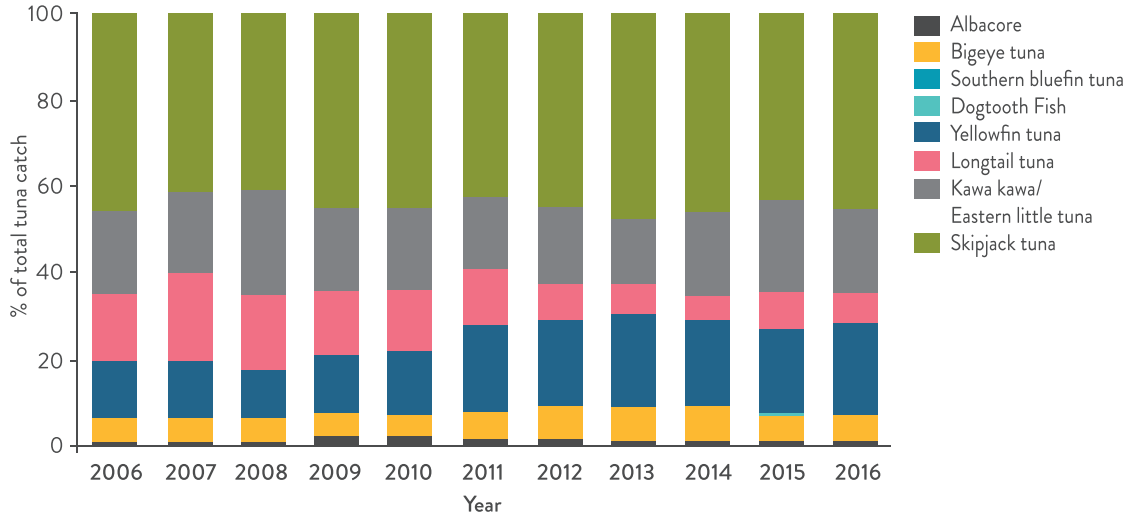
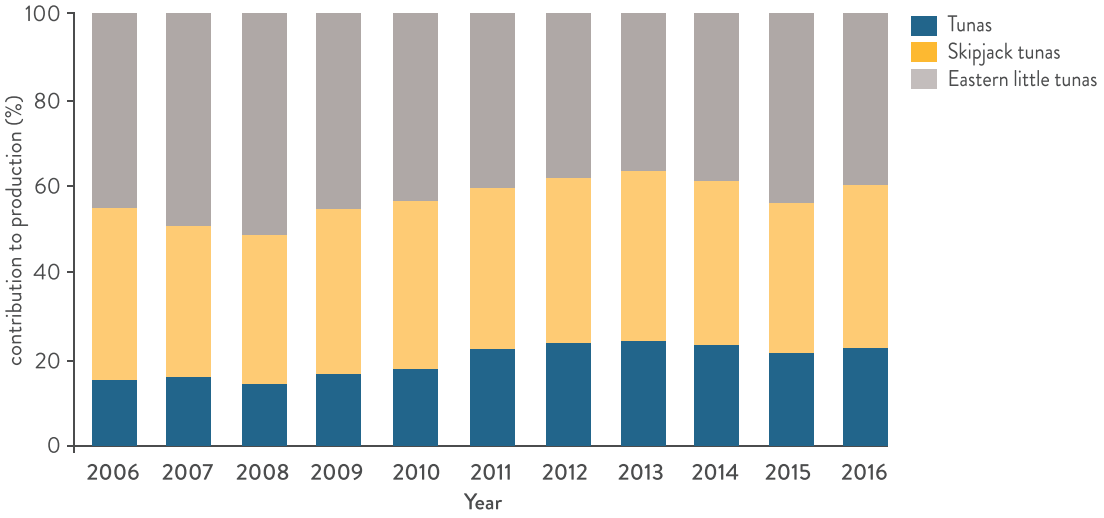


Figure 8. Relative Contribution to Total Production by Main Tuna Group in Indonesia

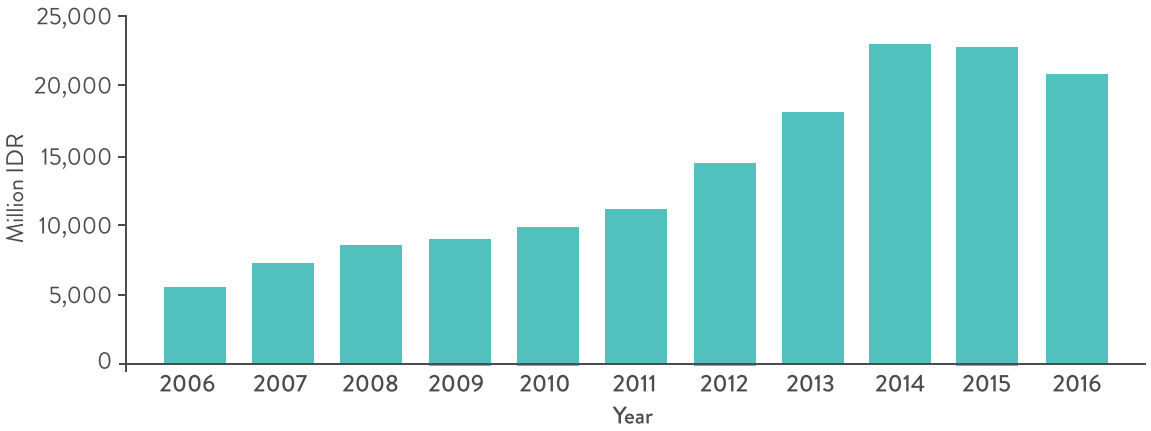


[viii] Dogtooth tuna catches often are not reported and are consumed locally.

C. Markets

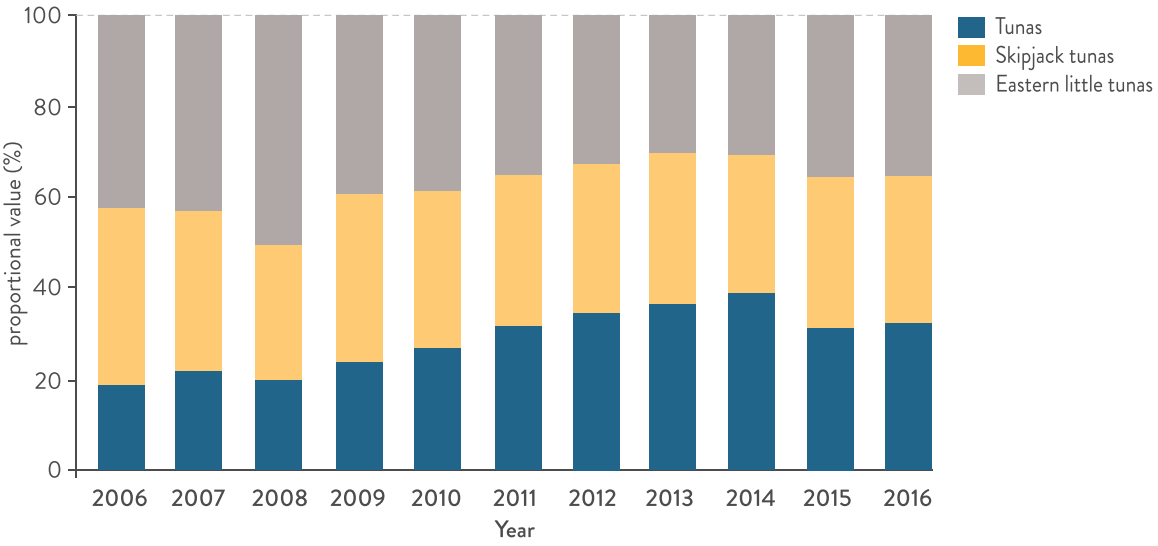
Indonesia is the fifth-largest exporter of tuna globally, and exported 4 percent of globally traded tuna, or 68,549 MT, in 2016. This was down 7 percent from 2015 values. The EU is the largest importer, importing 44 percent of globally traded tuna.[5] Indonesian tuna is mostly traded as frozen, canned, pre-cooked, fresh, loined, or katsuobushi (dried, fermented, and smoked tuna).

Figure 9. Combined Value of Tunas, Skipjack, and Eastern Little Tuna



The combined value of the main tuna categories has steadily increased, and nearly quadrupled from 5 billion IDR in 2006 to more than 20 billion IDR in 2016 (Fig. 9). The USD equivalent values for these figures started at just below USD 600,000 in 2006, peaked in 2014 at nearly USD 19 million and had a total value in 2016 of more than USD 15 million.

Figure 10. Relative Contribution of Different Tuna Species to Total Value in Indonesia



The combined value of tunas, skipjack and eastern little tuna represents approximately 23 percent of the total IDR value of the marine fish production on average, according to statistics from 2006 to 2016. The relative contribution was highest at 28 percent in 2014 and dropped in 2015 and 2016. Prices for skipjack tuna are often determined by the market in Thailand. While the relative contribution to the production is highest for eastern little tuna and skipjack, the contribution of the large tunas to the total value is significant due to their higher price per kilogram. All three groups represent about 30 percent each of the total value of these tunas.

Figure 11. Tuna Supply Chain in Indonesia

Fishing

The Indonesian tuna fishing fleet ranges from an industrial fleet (mainly purse seine and longline vessels) to a large number of smaller vessels (small purse seine vessels and handline boats). Smaller vessels fish closer to shore, while larger vessels operate in EEZ waters and on the high seas.

Landing & Trading

Given that tuna are landed at many different ports in Indonesia, the product supply chain is complex. It includes a network of miniplants, traders, domestic shipping lines, and transshipment facilities. Some ports have modern storage and processing but others are more remote and lack such features.

Processing

Processing of tuna products has primarily taken place in East and West Java. New plants are also being developed in other locations, which will affect product quality and traceability considerations.

Exports

Containers of tuna product are exported via international ports in Surabaya and Jakarta. Chilled tuna products are exported by plane primarily to Japan.

II. Management measures

The International Seafood Sustainability Foundation[6] reported that in the Indian Ocean stock abundance/spawning biomass and fishing mortality are rated green ("healthy") for bigeye, skipjack, and albacore, but orange for yellowfin.[ix] In the Western and Central Pacific Ocean, stock abundance/spawning biomass is rated yellow ("intermediate") for bigeye and green for all other large tuna species, while fishing mortality is rated yellow for bigeye and yellowfin, and green for skipjack and albacore. All species are rated yellow and orange indicating concern for environmental impacts caused through bycatch of other species and capture of significant numbers of juvenile tunas. To address some of these yellow and orange ratings, MMAF (supported by Indonesian and international scientists) has started to implement some important management measures.

Fisheries data—especially for a fishery that operates with many gears across an area as large as Indonesia's waters—are complex and interrelated, and it is therefore important to consolidate them into one Fisheries Information System. Fisheries departments within MMAF (i.e., those responsible for surveillance, capture, and research) are located in separate physical locations, which can impede the sharing of information in real time. Though a catch certification process is in place, certification of seafood from "ocean to plate" depends on a mix of paper and electronic recordings. MMAF has acknowledged these challenges and launched a policy on the "Satu Data KKP" or "One Data Program" on May 30, 2016. Through this program, all fisheries data will be housed, analyzed, and presented in a central location. In addition to setting up the software and hardware, the One Data Program involves training more than 2,500 MMAF extension officers and establishing an e-Logbook that aims to integrate fishing license data with landings declarations.

[ix] For each stock, the International Seafood Sustainability Foundation applies color ratings (green, yellow, orange) to each of three factors: stock abundance, fishing mortality, and environment. Each stock is rated separately as to these three main criteria and color-coded, to indicate not only the severity of the problem but also the likelihood that the problem will persist. An orange rating in any of these categories means that there are sustainability concerns (i.e., that the tuna stock is being overfished, is currently overfished, the bycatch rate is causing adverse population effects, and/or there is insufficient data to understand the impacts of bycatch) and there are no adequate corrective measures in place. A yellow rating means that there are sustainability concerns, but adequate corrective measures are in place. A green rating indicates that there are no sustainability concerns.

Specific to tuna management, a National Plan of Action was developed and launched in 2015. It is used as a benchmark for tracking progress and facilitates collaboration between government, NGOs, and academics toward improved tuna fisheries management. Additionally, the government of Indonesia improved the registration of fishing vessels in the country to help strengthen tuna fisheries management. This effort went hand-in-hand with the efforts of Minister Pudjiastuti to address IUU by sinking over 350 illegal foreign fishing vessels and prohibiting more than 1,300 foreign-flagged vessels from operating in Indonesia. The tuna fishery is often one of the first fisheries in Indonesia to undergo management improvements given the global attention that the fishery receives, as well as the requirements imposed by the RFMOs.

Indonesia's compliance with measures requirements imposed by the WCPFC, for example on the provision of size-at-capture data for 2013, was classified as "good" by the WCPFC Scientific Committee.[7] Also, Indonesia has undertaken research relevant to establishing harvest control rules for its tuna fisheries, which are due in 2018.

III. Impacts of the management measures

There is relatively large year-over-year variance in the numbers of motorized fishing vessels for the different size classes. This may point to challenges in data quality. However, what is particularly obvious is that notable shifts occurred after 2013. Vessels in the larger size categories reportedly dropped in number in the statistics, but vessels in the smaller size categories also dropped. The data show that in 2016, most vessel categories had more boats reported in the statistics. What this recent increase in fishing effort means for the long-term state of the tuna fishery is still yet to be determined. Although it was temporary, the relatively significant reduction in fishing effort must have benefited stock development. However, the continued high dependency on FADs, and related high volumes of juvenile tunas in the landings, remains a concern.

Data for 2014 indicate that the most productive area for big pelagic fish was WPP 573. This category does not include skipjack. The second-most productive was WPP 713 and the third- most productive was WPP 572. Since then, productivity performance appears to have shifted,[x] with the biggest relative growth in WPP 716, followed by WPP 714. WPP 572 was again third in landings. The capture of large pelagic fish was down in WPP 718. Most of the tuna processing plants were hit hard by the drop in raw material.

In the popular media, the ban of transshipment at sea was judged to be harmful to many smaller-scale fisheries.[8] The Indonesian Vice President visited affected areas and observed that there were empty cold storage facilities and hundreds of inactive vessels. Senior staff of processing plants reported that effective processing capacity dropped to less than 30 percent because of the lack of supply. Companies were forced to import fish in order fill demand or shift to processing other types of fish. It is estimated that fishing industries in North Sulawesi lost USD 630 million (IDR 8.7 trillion) worth of income and 10,502 workers during the 2014-2016 period.[9]

It is believed that this affected Indonesia's position as a global leader in tuna production in favor of countries such as Vietnam. To counter this, MMAF is actively supporting the promotion of tuna exports to new markets.

IV. Opportunities for management improvements

There are three key opportunities for improving tuna fisheries management in Indonesia:

1) **Prepare and implement the harvest control rule.** The most immediate and important opportunity to improve tuna fisheries management is adoption of the harvest control rule. To facilitate acceptance of this science-based directive, all sectors with rights to fish in Indonesian waters should be engaged in preparing allocation discussions in order to have a smooth, conducive, and fair implementation process.
2) **Implement FAD management and promote voluntary minimum sizes to reduce catch of juvenile tunas.** The most immediate threat to the healthy replenishment of the already heavily fished tuna stocks is the large catches of juvenile tunas in the purse seine and pole-and-line sectors. The most effective approach to address these unsustainable practices is to implement strict FAD management and to immediately promote voluntary minimum sizes for tuna processors and traders.
3) **Ensure adequate monitoring and enforcement with management rules and regulations.** To provide a level playing field and promote compliance with the current administration's rules and regulations, technology applications for monitoring and enforcement must be rolled out swiftly and effectively.

[x] It is not known whether the underlying reason for these shifts are actual changes in fisheries activity or the improved quality of data collection.

CASE STUDY

Shark and ray fishery

Prepared by
CEA with contributions from Conservation International and Wildlife Conservation Society

I. State of the fishery

A. Characterization of fishery

Sharks, skates, rays, and chimera (the cartilaginous fishes, collectively termed *Chondrichthyes* but referred to in this report simply as "sharks") are some of the oldest extant species on the planet. Nearly a quarter of shark species are threatened with extinction according to IUCN Red List Criteria, making them one of the most threatened vertebrate species groups in the world (Fig. 1).[1,2]

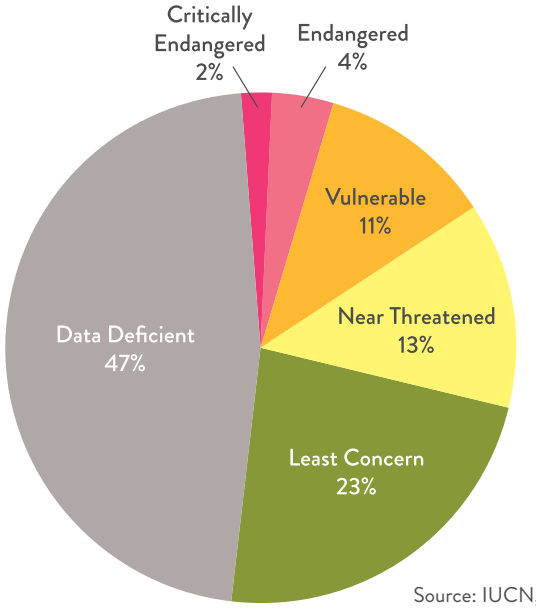

©Hollie Booth, WCS


©Tanjung Luar Rifky, INFIS

Indonesia is a global priority for shark and ray conservation, given that it is a hotspot of both diversity and pressures.[3] The country has been the world's leading shark producer since the early 2000s.

An estimated 40 percent of sharks in Indonesian waters are threatened with extinction.[4] The main threat to the survival of sharks is overfishing, both as targeted catch and as incidental catch in non-target and mixed species fisheries. Large-bodied, shallow-water species are most at risk, as they have the highest likelihood of being caught.[5] Mounting global demand for meat, fins, liver oil, gills, and other body parts is driving overfishing, and pushing species toward extinction.[6] Despite growing awareness of their depletion, most of the world's shark fisheries remain unregulated or minimally managed, and threatened shark species are still largely unprotected and overlooked in conservation planning.[7]

Figure 1. Global Conservation Status of Sharks *(Chondrichthyes)*

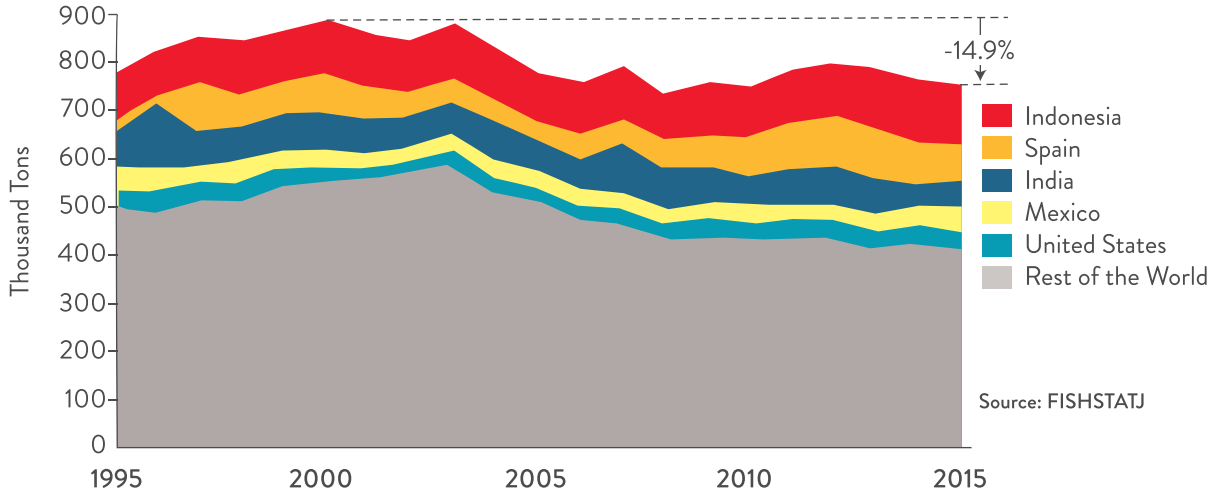


Source: IUCN, 2015

B. Landings

Global annual landings of sharks more than tripled since the 1950s to a peak in 2001 of 869,000 tons (Fig. 2).[8] Over the past 15 years, the level of shark catch has shown a steady decline despite increases in fishing effort, which suggests a pattern of overfishing.[9] The exploitation level has exceeded the average rebound potential of most species and populations for which data is available, thus explaining ongoing declines in global catch.[10] The two regional hotspots for shark and ray catch globally are Europe and Southeast Asia.

Figure 2. Global Shark and Ray Catch, 1995-2015



Source: FishStatJ

Indonesia is the largest shark producer in the world, accounting for 13 percent of global catch.[11] According to production statistics from the Indonesian government, roughly 120,000 tons of sharks and rays are landed annually in Indonesia; this value is likely to be an underestimate given levels of IUU fishing. Nonetheless, it still positions Indonesia as the leading global producer, with more than twice the reported annual capture production of China and five times that of Malaysia, the next-largest producers in the region.[12] While global shark landings have followed a pattern of decline over the past 15 years, landings in Indonesia have continued to increase in both total catch and share of shark catch relative to other species.[13]

The majority of shark fisheries in Indonesia are characterized as small-scale (<10 GT) (Fig. 3).[14] However, the commercial sector accounts for a major proportion of total production given its larger capacity and higher fishing effort, even though it uses a smaller number of fisheries. Fishing effort for sharks and rays in Indonesia is considered diffuse and fragmented, given that operations range from small-scale to industrialized and from highly targeted (i.e., species-specific) to incidental catch. The lack of comprehensive landings data makes it challenging to attribute the relative contributions of fishery types to total production and mortality levels.

Figure 3. Summary of Catch Type and Scale of Identified Shark and Ray Fisheries in Indonesia

	HIGHLY RATED	TARGETED	INCIDENTAL	TARGETED & INCIDENTAL	UNCLEAR	TOTAL
Commercial	-	1	8	4	-	13
Small Scale	2	12	29	36	27	106
Commercial & Small Scale	-	1	11	131	9	34
Unclear	-	-	5	2	34	41
TOTAL	**2**	**14**	**53**	**55**	**70**	**194**

Source: WCS, 2018

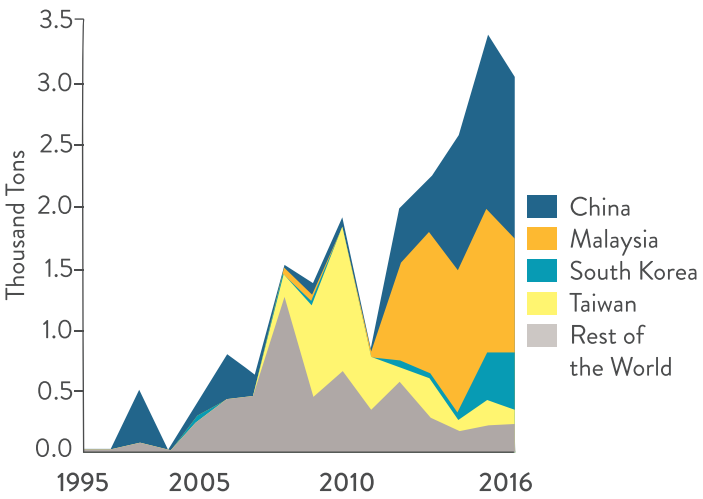
C. Exports

Available trade data on shark landings is likely incomplete, as exports of sharks from Indonesia reached approximately 3,400 tons in 2015 (just 1.5 percent of total landings).[15] Indonesia's top reported trading partners are China, Malaysia, and South Korea, although Taiwan has also become a large importer of shark products from Indonesia in recent years (Fig. 4).

Several hypotheses may help explain the substantial gap between recorded production and recorded exports:[16]

- **High domestic use:** Domestic consumption may account for a portion of the gap for shark meat. However, it seems unlikely that domestic consumption fully explains the gap for consumption of shark fins.
- **Loopholes and ambiguity in commodity codes:** Shark and ray products may be leaving the country under commodity codes that are not specific to sharks and rays.
- **Lack of reporting:** Shark and ray products may be exiting the country via unofficial channels, which means under-reporting is taking place.

Figure 4. Exports of Sharks and Rays from Indonesia



Source: Trademap, 2018

The shark trade generates over USD 100 million in export revenues for Indonesia.[17] While skin, bones, and meat are important commodities within the shark industry, the demand for shark fin continues to play a key role in driving the exploitation and trade of sharks. Even as consumer awareness campaigns have shown initial signs of reducing demand in China—where consumption of shark fin soup has fallen roughly 80 percent since 2011—demand for shark fin soup is now increasing in new markets including Thailand, Vietnam, Indonesia, and Macau.[18]

II. Management progress and challenges

Despite these challenges, there have been signs of progress in recent years, including efforts by the Indonesian national government, local provincial and district governments, and civil society to protect sharks and ray species and to better manage fisheries. These include:

1) **Full protected species status for manta rays and whale sharks:** In 2013, Indonesia declared whale sharks as a protected species throughout its entire EEZ. Following up in 2014, MMAF signed an agreement enforcing full protection of manta rays in the country, making it the largest manta ray sanctuary in the world. The protection status for manta rays has shown early signs of progress in some locations: in Lamakera, there has been a 95 percent reduction in manta landings through a partnership with the Wildlife Conservation Society (WCS), Misool Foundation, local communities, and the provincial government.[19] The government has also made efforts to prosecute illegal wildlife traders, such as a trafficking ring that was busted in 2016 for illegally capturing two whale sharks.

2) **Development of National Plans of Action for shark and manta ray conservation and management:** Indonesia has developed two five-year National Plans of Action: one for the Conservation of Manta Rays (2016-2020) and one for the Conservation and Management of Sharks and Rays (2016-2020). Although the plans have not yet been enacted via Ministerial Decree, MMAF has reached out to NGO partners for support on implementing priority programs related to the plans.[20]

3) **Trade controls for species listed under CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora):** In December 2014, MMAF issued Ministerial Decree (No. 59/2014) to ban the export of hammerhead and oceanic whitetip sharks. This decree has been annually extended and is currently effective

until December 31, 2018. Despite this reduction in the trade of shark fins on paper, some suggest that shark fins from Indonesia may continue to enter international markets via illegal channels, thus making the government's recent commitments to promoting transparency in the fisheries sector all the more important.[21]

4) **Shark and ray sanctuaries established by local governments:** The regency government of Raja Ampat declared a shark and ray sanctuary—Indonesia's first—throughout the entire extent of its coastal and marine waters (roughly 46,000 km2) in 2013. Shortly thereafter, the regency government of West Manggarai and Komodo designated the district's entire marine and coastal waters (roughly 7,000 km^2) as a shark and ray sanctuary. In each of these locations, the local governments acknowledged the opportunity to play a leadership role in protecting shark and ray populations, in addition to promoting responsible tourism. Revenues from marine- and dive-based tourism in Indonesia (estimated at USD 130-195 million/year) have surpassed the export value of shark and ray fisheries in Indonesia.[22]

5) **Collaborations between MMAF and civil society on regulations:** At the national level, MMAF is currently working with a range of civil society partners– including NGOs, research institutes, fisher communities, and exporters —to establish regulations associated with fisheries and trade management for CITES implementation. For instance, WCS is supporting the government in developing national- and provincial-level regulatory and institutional frameworks to improve shark and ray conservation and management and to implement CITES regulations. WCS is supporting the implementation of these frameworks on the ground through both site- and species-based programs within priority fishing communities.

In spite of these promising initiatives, management challenges continue to face the shark and ray fishery, including:

1) **Limitations in data availability and specificity:** Both the limited availability of data and the coarse level of data (i.e., non-species-specific trade data) hamper the ability to effectively manage Indonesia's shark fishery and implement CITES. Though capture statistics are improving, data is often aggregated in broad species groups rather than distinguished at the species level. Trade records do not provide consistent identification of product forms or species, nor do they provide reliable tracking of the value or volume traded over time. Official trade records likely capture only a portion of what is actually caught and traded.

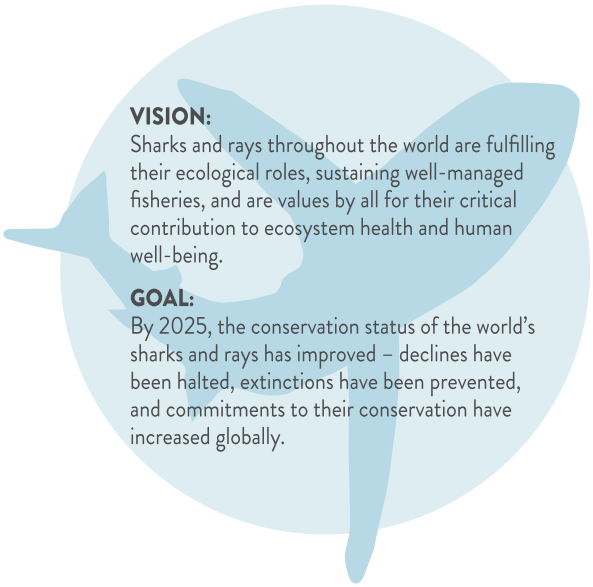
Figure 4. The Global Sharks and Rays Initiative (GSRI) Is a Partnership of:

2) **Regulations and controls remain limited:** Although progress has been made toward improving protection for several species and sites, management controls for the country's shark and ray fishery remain limited. Only a handful of species hold protected status, and fisheries management measures are yet to be developed and adopted. Without practical, comprehensive management measures, the fishery remains largely open access and prone to overexploitation, both through targeted and incidental catch. Although National Plans of Action exist for sharks and rays, there are outstanding challenges in implementing the plans.

3) **Potential implications of regulations on livelihoods:** Many small-scale fishing communities in Indonesia rely on the shark industry for food and income. As such, some officials are concerned that strict controls on shark fishing would detrimentally impact the livelihoods of small-scale fishers heavily dependent on the fishery. Some conservationists suggest that applying catch restrictions and promoting alternative livelihoods

for small-scale fishers is a necessary step toward improving management of the fishery. However, it can be difficult to secure livelihood alternatives in practice given the lack of legal and feasible livelihood options that offer similar financial returns. It is not immediately clear how to make shark and ray fisheries sustainable in places like Indonesia. However, the needs of local fishers require careful examination given livelihood implications. In fact, one study found that declines in the shark fin trade in communities in Eastern Indonesia led fishers to pursue high-risk activities, including blast fishing, illegal transboundary fishing, and people smuggling.[i, 23] Given the complexity of these socioeconomic conditions, additional research is required to identify practical fisheries management measures that can reduce pressure on the most vulnerable species and populations while also supporting sustainable use of species that are less susceptible to overfishing, thus protecting coastal livelihoods.

Figure 5. GSRI's Global Vision and 2025 Goal



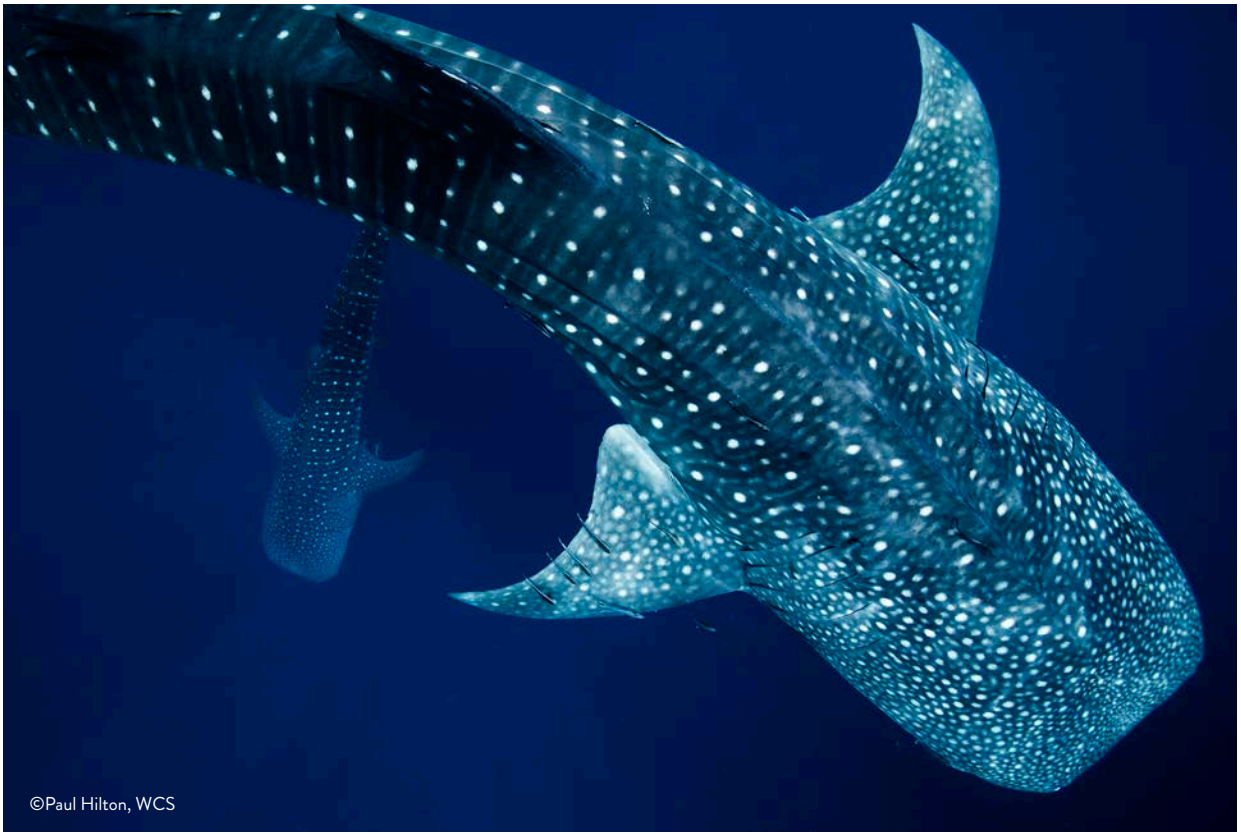

©Hollie Booth, WCS

III. Landscape of players

As attention to the threatened status of sharks and rays has increased, marine funders and NGOs have strengthened their efforts to conserve these species. From 2010 to 2015, a number of marine funders—including the Leonardo DiCaprio Foundation, Marisla Foundation, Oceans 5, and the Packard Foundation—gave more than half a million dollars each to conserve sharks.[24] Other important funders have included the Walton Family Foundation, FinPrint (a Paul G. Allen Initiative), and Shark Conservation Fund, a collaboration of philanthropies, which began investing in 2017. The top NGO recipients of that funding included WildAid, WCS, Ocean Foundation, and the Wildlife Conservation Network.[25]

The largest coalition of organizations working on the protection of sharks and rays is the Global Sharks and Rays Initiative (GSRI), whose members include the Shark Specialist Group, IUCN, Species Survival Commission, Shark Advocates International, Shark Trust, TRAFFIC, WCS, and WWF (Fig. 4). WildAid, the largest single recipient of philanthropic funding for shark and ray conservation, is focused on decreasing demand for shark and ray products in East Asia. WCS, on the other hand, is focused on the supply side, working to strengthen management of shark and ray capture and trade in Indonesia and elsewhere, and to bolster compliance with and enforcement of regulations on the ground.

[i] People smuggling and human trafficking are linked but distinctly different. People smuggling involves facilitating the entry of migrants into a state through illegal means. Victims of human trafficking are recruited and trafficked between countries and regions with the threat of or use of force, coercion, or deception.


©Paul Hilton, WCS

IV. Intervention strategies

While a number of organizations are working individually to address the challenges facing sharks and rays, GSRI established an overarching ten-year strategy for the coalition to tackle the problem holistically. Its vision, goals, and tactics are outlined in its 2015 document "Strategies for the Conservation of Sharks and Rays" (Fig. 5).

The GSRI Global Strategy includes four interconnected sub-strategies, implemented at the species, country, and regional levels, to protect at-risk species and to shift fisheries, trade, and demand from overexploitation to sustainable management. Goals for the four sub-strategies include:

- **2025 Saving Species Goal:** Declines of the most endangered shark and ray species have been halted, and the conservation status of "data deficient" species is understood.
- **2025 Sustainable Fisheries Goal:** Fisheries-driven overexploitation and waste of sharks and rays are substantially reduced through increased adoption and implementation of sound, science-based fisheries management measures in at least 40 priority countries and in areas beyond national jurisdiction.
- **2025 Responsible Trade Goal:** Effective trade controls are in place to ensure that international trade in sharks and rays, and the products derived from them, is legal, sustainable, and traceable.
- **2025 Responsible Consumption Goal:** The demand for (largely unsustainable) shark and ray meat, fins, squalene, manta and devil ray gill plates, and freshwater stingrays is significantly reduced in the most important global markets, while markets increasingly demand that any shark and ray products are sustainably produced and traceable.

For each of these sub-strategies, Indonesia is listed as a priority country for GSRI's engagement given the country's position as the largest producer of sharks and rays in the world.

07
Public revenue and funding

Public revenue and funding

Prepared by
Sarah Conway

This chapter reviews the tax and non-tax revenue that the government of Indonesia secures from the fisheries sector and highlights key elements of government support for the sector (e.g., the MMAF budget, including its support of fishers and other aspects of the sector, the MEF, and loan subsidy programs).

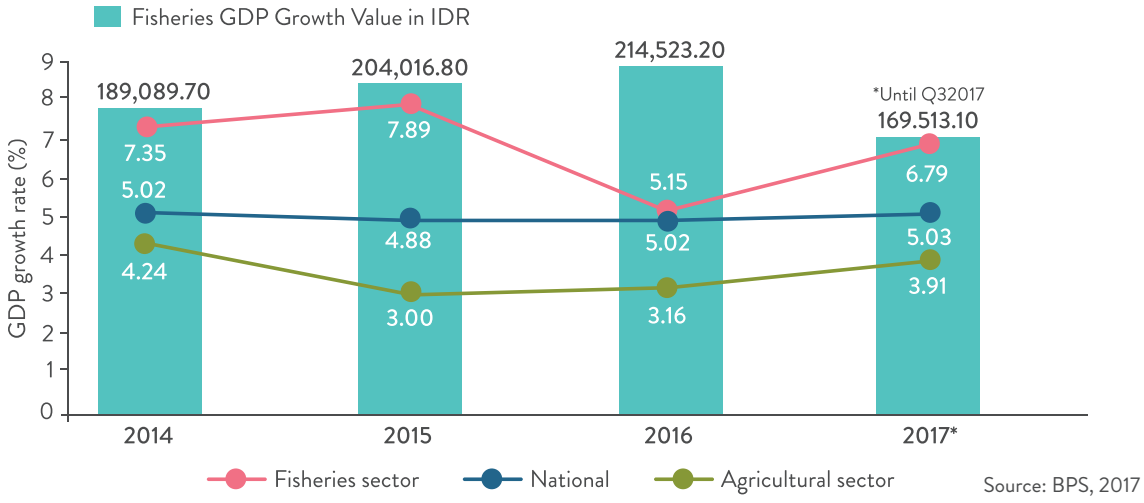
The fisheries sector, including wild capture fisheries and aquaculture, is important for Indonesia's food security, Indonesians' livelihoods, and the country's overall economic development. It serves as a source of both tax revenue and non-tax state revenue, and is the target of government grants, loans and loan subsidies, and other forms of support. The government support is channeled via a range of entities, especially those included in Presidential Instruction No. 7/2016 and accompanying Presidential Decree No. 3/2017 regarding the Acceleration of the Development of the National Fishing Industry.[i]

I. Fisheries sector revenues

A. Contribution to gross domestic product

Indonesia's fisheries sector grew 7.3 percent in 2014 and 6.8 percent in 2017 (through Q3 2017). The growth of the fisheries sector GDP exceeded the growth rate of the national GDP and agricultural sector GDP between 2014 and Q3 2017 (Fig. 1).[1]

Figure 1. GDP Growth Rate (%), by Sector



Source: BPS, 2017

[i] The positions named: Coordinating Minister for Political, Legal, and Security; Coordinating Minister for Maritime; Coordinating Minister for the Economy; Coordinating Minister for Human Development and Culture; Minister of Internal Affairs; Minister of Foreign Affairs; Minister of Finance; Minister of Transportation; Minister of Industry; Minister of Trade; Minister of Energy and Mineral Resources; Minister of Public Works and Housing of the Republic of Indonesia; Minister of State-Owned Enterprises; Minister of Research, Technology, and Higher Education; Minister of Maritime and Fisheries; Minister of Co-Operations and Small-Medium Enterprises; Commander of the Indonesian National Defense Forces; Head of Police for the Republic of Indonesia; Attorney General of the Republic of Indonesia; Head of the Maritime Security Agency; Head of the Indonesia Investment Coordinating Board; Head of the National Agency for Border Management for the Republic of Indonesia; Head of the National Agency for Food and Drug Control; Governors; and Regents/Mayors.

That said, the sector's contribution to national GDP has remained small and relatively flat over the past several years (Table 1). Put differently, the fisheries sector has exhibited growth in recent years, but it has not been a growth sector itself.

Table 1. Fisheries Sector Contribution to National GDP

	2010	2011	2012	2013	2014	2015	2016
Current prices	2.09	2.12	2.13	2.16	2.21	2.27	2.27
Current prices	2.12	2.09	2.14	2.21	2.32	2.51	2.56

Of course, the value of the sector to Indonesia extends well beyond its direct contribution to GDP; fisheries also contribute to food security and enable enterprises in supporting sectors such as energy, telecommunications, logistics, and ecotourism.

B. Non-Tax State Revenue (PNBP)

The two primary sources of non-tax state revenue (*penerimaan negara bukan pajak* (PNBP)) in the fisheries sector originate from the retribution/charges from fisheries businesses (PPP)[ii] and retribution/charges from fisheries products and catch (PHP).[iii] These two types of PNBP are collected by three Directorate Generals (DGs) within MMAF: DG Capture Fisheries, DG Aquaculture, and DG Business Competitiveness. The revenue is ultimately channeled to the State Treasury.

In 2015, MMAF issued Regulation No. 75/2015 to increase these PNBP tariffs. The new tariffs included a 100 percent increase for 30-60 gross ton (GT) boats, a 400 percent increase for 60-200 GT boats, and a 1,000 percent increase for boats over 200 GT. As a result of the new tariffs, fisheries sector PNBP from the DGs noted above rose from USD 5.86 million in 2015 to USD 26.82 million in 2016. In 2016, USD 26.80 million, or 99.9 percent of the total, originated from DG Capture Fisheries. In 2017, fisheries PNBP amounted to USD 36.38 million, the highest level in the last ten years.

Registered and licensed boats in Indonesia

There are approximately 630,000 registered boats, 89 percent of which are < 10 GT. Around 8,900 vessels > 30 GT are operational, but only 3,600 are legally licensed.

Source: Jakarta Post, 2017

Table 2. Non-Tax State Revenue by Source, 2015 and 2016

SOURCES	2015 (USD)		2016 (USD)	
	TARGET/ ESTIMATION	REALIZATION	TARGET/ ESTIMATION	REALIZATION
Fisheries	42,873,781.41	5,861,380.06	51,375,824.12	26,823,496.98
Mgmt of state asset (sale, rent, etc.)	1,258,303.56	1,968,467.68	1,573,548.63	1,847,538.04
Revenue from service	2,053,013.71	2,644,763.21	3,805,334.08	5,718,143.24
Revenue from education service	78,928.15	81,565.19	93,238.75	95,424.33
Auction from gratification	-	-	-	10,935.61
Fines	2,189.38	556,232.23	-	670,831.04
Others	-	3,252,751.33	-	5,838,735.25
Total	**46,266,216.21**	**14,365,159.71**	**56,847,945.58**	**41,005,104.49**

This categorizes PNBP based on the source of revenue. For "fisheries," including PPP and PHP, this originates from three DGs: Capture Fisheries, Aquaculture, and Business Competitiveness. However, these three DGs do not only collect from "fisheries." For example, if a staff member from DG Capture Fisheries gives a seminar/certification and receives revenue, the DG Capture Fisheries will receive PNBP in the source category "education service."

[ii] *Pungutan pengusahaan perikanan* (PPP) is applied to fisheries business entities that hold a fisheries business license.

[iii] *Pungutan hasil perikanan* (PHP) is applied to entities that hold a license to catch.

Table 3. Breakdown of Non-Tax State Revenue for Fisheries, 2016

SOURCE	REALIZATION USD	REALIZATION (% OF TOTAL)
Capture Fisheries	26,796,295.26	99.9%
Aquaculture	24,331.91	0.09%
Business Competitiveness	2,869.81	0.01%
	26,823,496.98	

The vast majority (99.9 percent) of PNBP from fisheries originates from Capture Fisheries.

Table 4. Non-Tax State Revenue by Program, 2015 and 2016

IMPLEMENTING UNIT	2015 (USD)		2016 (USD)	
	TARGET/ ESTIMATION	REALIZATION USD	TARGET/ ESTIMATION	REALIZATION USD
Secretariat General	-	53,032.98	-	99,430.00
Inspectorate General	-	18,651.49	1,448,937.40	11,634.10
DG Capture Fisheries	43,916,464.10	9,372,729.90	1,351,513.57	31,234,577.70
DG Aquaculture Fisheries	907,298.50	2,255,966.87	-	2,034,791.90
DG Marine and Fisheries Resources Surveillance	2,195.70	44,213.05	-	501,180.50
DG Fisheries and Marine Product Competitiveness Improvement	-	125,270.39	-	369,931.80
DG Sea Space Management	-	359,010.58	-	516,418.60
Research and Development Agency	186,507.70	347,602.81	160,370.67	291,399.20
Human Resources Development Agency	95,884.30	259,397.08	106,547.64	1,951,637.20
Fish Quarantine and Inspection Agency	1,157,865.80	1,529,287.85	2,447,219.96	3,994,103.50
	46,266,216.21	**14,365,163.00**	**5,514,589.24**	**41,005,104.50**

Beside PNBP from fisheries, MMAF also collects non-fisheries PNBP from the services provided by Implementing Units. There are currently ten programs, each governed by an Implementing Unit.

While the increase in fisheries sector PNBP from 2015 to 2016 is notable, the fisheries sector contribution to overall PNBP remains very low compared to other sectors. It increased from 0.03 percent of the total PNBP in 2015 to 0.14 percent in 2016.

Table 5. Contribution to PNBP, 2015 and 2016

CONTRIBUTION BY SOURCE	2015	2016
1. Natural Resource Revenue	40%	25%
a. Petroleum Income	18.78%	12.01%
b. Natural Gas Income	11.81%	4.83%
c. General Mining Revenue	6.92%	6.02%
d. Forestry Revenue	1.63%	1.43%
e. Fishery Income	**0.03%**	**0.14%**
f. Mining Revenue – Geothermal	0.35%	0.36%
2. Profit of State-Owned Enterprises	15%	14%
3. Public Service Agency Revenue	14%	16%
4. Other PNBP	32%	45%

One factor driving the low PNBP from the fisheries sector may be the rampant mischaracterization of vessel GT size. If classified as under 30 GT, for example, then a vessel has no obligation to pay PNBP. In recent years, MMAF has made efforts to re-measure vessels. This should help to boost PNBP for the sector in the future.

II. Tax revenue

As of March 2017, there were 3,910 listed taxpayers in the fisheries sector. However, there were approximately 2.7 million fishers. Nearly 90 to 95 percent of fishing vessels are small-scale (i.e., less than 10 GT), and these fishers often live below the poverty line, but the number of listed taxpayers is nonetheless quite low. Tax revenue from the fisheries sector is also quite small; in 2016, approximately USD 62.19 million was collected from the sector, with a subsector breakdown of 5.84 percent from capture fisheries, 9.15 percent from aquaculture, and 85.01 percent from others (e.g., fish processing and trading). In 2017, tax revenues from the fisheries sector amounted to USD 80.15 million.

Table 6. Tax Revenue by Sector, 2011-2016

SECTOR	2011	2012	2013	2014	2015	2016
Capture fisheries	1.40	3.30	5.13	6.73	5.56	3.63
Aquaculture	2.11	3.82	3.16	5.30	6.39	5.69
Others*	17.67	21.47	28.98	42.05	57.81	52.87
USD (millions)	**21.19**	**29.03**	**37.27**	**54.08**	**69.77**	**62.19**

*Taxes from "others" include income tax, land and building tax, and value added tax from the fisheries sector, which are not recorded in the MMAF financial report.

In terms of the tax-to-GDP ratio, the fisheries sector is significantly below the national level. From 2011 to 2016, the average national tax-to-GDP ratio was 11 percent, while the average fisheries sector tax-to-GDP ratio was 0.26 percent. This means that the tax collected from the sector did not even extend to 1 percent of the overall size of the sector, as measured by GDP.

Table 7. Fisheries Sector and National-Level Tax-to-GDP Ratios[10]

	2011	2012	2013	2014	2015	2016
Fisheries sector tax-to-GDP ratio	0.18%	0.21%	0.24%	0.30%	0.30%	0.26%
National tax-to-GDP ratio	11.2%	11.4%	11.3%	10.8%	10.8%	10.3%

III. Government support for the fisheries sector

The Indonesian state budget is enacted by law (Undang-Undang (UU)) and is presented with an explanatory chapter (Nota Keuangan) detailing the budget plan and allocation for each Ministry and National Government Agency. The 2018 state budget is Law No. 15/2017, approved by Parliament in October 2017. While the state budget is formalized in a legal document, the allocation for each Ministry and National Government Agency is subject to revision, most commonly after the Ministry of Finance submits to the Parliament the half-year report, including state budget realization (i.e., actual budget spent) for the January-June semester.

A. Review of MMAF budget

The initial budget plan for the last several years shows declines in MMAF's allocation: the allocation was USD 790.56 million in 2015, USD 786.28 million in 2016, USD 688.87 million in 2017, and USD 539.83 million in 2018. Taken alone, this trend would imply a de-prioritization of the fisheries sector, but it is not that simple.

One issue is that MMAF was unable to spend its allocated budget in prior years, resulting in a ratcheting down of its planned budget over time. For example, in 2016, actual spending amounted to only 61 percent of the planned budget. This is the average spending of the 10 DGs. The DG Capture Fisheries had the lowest rate of budget absorption, spending only 41 percent of its allocated budget. While there are likely several explanations for the low spending rate in 2016, one factor is that implementation of a new electronic procurement system (i.e., e-catalogue) by Capture Fisheries for vessels and fishing gear resulted in delays as partners adjusted to the new technology.

At the end of the first semester of 2017, MMAF had only spent 15 percent of its planned budget for the year. Again, if taken alone this would be cause for concern, but it is not uncommon for ministries and agencies to not use all of their planned budgets, and also to spend more heavily during the latter half of the year, once they have had sufficient time to procure goods and services from third-party vendors. As of mid-2017, MMAF remained optimistic that it would be able to spend 94.1 percent of its allocated budget by year's end, though data about MMAF's actual 2017 spending is not yet available.

Table 8. MMAF Budget Expenditures by Program, 2015-2018 (USD millions)

		2015			2016			2017			2018
PROGRAM	IMPLEMENTING UNIT	BUDGET	ACTUAL	ABSORPTION	BUDGET	ACTUAL	ABSORPTION	BUDGET	ACTUAL (1ST SEMESTER)	ABSORPTION	BUDGET
General management and technical supports	Secretariat General	33.19	32.98	32.98	29.01	25.67	88.46%	40.58	9.53	23.49%	31.37
Improvement of internal audit performance and accountability	Inspectorate General	5.57	5.51	5.51	5.70	4.86	85.25%	5.84	1.56	26.74%	5.41
Improvement and management of capture fisheries	Improvement and management of capture fisheries	57.68	46.29	46.29	204.34	84.82	41.51%	149.95	17.38	11.59%	93.70
Management of aquaculture fisheries resources	DG Capture Fisheries	67.43	65.48	65.48	106.30	70.95	66.75%	80.61	12.67	15.72%	69.99
Marine and fisheries resources monitoring and surveillance	DG Marine and Fisheries Resources Surveillance	198.11	166.12	166.12	84.99	54.65	64.30%	63.36	14.28	22.54%	60.26
Business improvement and fisheries product competitiveness	DG Fisheries and Marine Product Competitiveness	101.17	93.62	93.62	96.46	52.96	54.90%	98.02	5.44	5.55%	58.15
Management of sea space	DG Marine, Coastal, and Small Islands	74.73	66.16	66.16	67.85	47.15	69.49%	74.59	5.81	7.79%	49.40
Research and development of marine and fisheries technology	Research and Development Agency	102.40	85.32	85.32	53.95	42.77	79.28%	54.56	8.55	15.67%	132.30
Development of human resources	Human Resources Development Agency	113.30	90.54	90.54	91.64	58.52	63.85%	82.74	18.90	22.85%	
Improving fisheries quarantine, quality assurance, and safety	Inspection Agency	36.97	35.90	35.90	46.03	37.83	82.19%	38.61	14.47	37.47%	39.24
TOTAL		790.56	687.93	87.02%	786.28	480.18	61.07%	688.87	108.60	15.77%	539.83

Spending is shown for 2015 and 2016 (audited) and 2017 (unaudited) in budgeted and actual spending (in USD millions), and budget absorption (%). Figures for 2018 reflect budgeted spending (in USD millions).

Table 9. MMAF Actual Spending by Category, 2015-2016, (USD millions)

CATEGORY	2015	2016	YEAR-OVER-YEAR CHANGE (%)
Salary and allowance	78.63	62.78	-20%
Capital	150.96	84.09	-44%
Goods and services	-	-	
Operational	22.92	24.79	8%
Non-operational	78.77	56.52	-28%
Inventory	8.82	22.10	150%
Services	53.99	34.71	-36%
Maintenance	16.18	16.25	0%
Domestic business travel	72.02	66.92	-7%
International business travel	2.14	1.99	-7%
Goods for communities/regional government	170.63	98.47	-42%
Goods for decentralization support to regional government	0.77	0.43	-44%
Others	32.10	11.14	-65%
TOTAL	**687.93**	**480.18**	**-30%**

Note: 2017 spending by category was not available at the time of writing.

Even though 2016 spending for "goods for communities/regional government" declined by 42 percent relative to 2015 spending, this still constitutes a significant portion of the overall budget and represents a large and important source of funding for communities.

Table 10. Budget and Actual Spending for Capture Fisheries, 2016, (USD millions)

SUBPROGRAM	2016 BUDGET	2016 SPENDING	PERCENT SPENT
Management of fishing fleets, fishing gear, and vessel crew certification	142.21	40.83	28.71%
Fishing port management	6.92	5.65	81.66%
Catch control	4.81	2.99	62.25%
Fishers management	17.02	7.76	45.56%
Fisheries resources management	6.88	4.83	70.23%
Management and other technical supports	26.49	22.75	85.86%
Funding from foreign loans	-	-	0%
TOTAL	**204.34**	**84.81**	

In 2016, MMAF allocated USD 204.34 million for the Capture Fisheries Program, or 26 percent of its total budget. This is the largest allocation across the ten programs. However, this program has the lowest budget absorption, spending only 42 percent of its planned budget. The lowest levels of spending within this program were seen in the sub-category for management of fishing fleets, fishing gear, and vessel crew certification. Only 29 percent of the budget for this sub-category was spent.

Table 11. Budget and Actual Spending for Aquaculture Program, 2016, (USD millions)

SUBPROGRAM	2016 BUDGET	2016 SPENDING	PERCENT SPENT
Fish health and aquaculture breeding environment	4.62	3.53	76%
Aquaculture nursery system	18.70	13.80	74%
Aquaculture development zone	21.21	13.59	64%
Aquaculture production and business development	29.61	15.42	52%
Management and other technical supports	26.78	22.46	84%
Management of aquaculture feeds	5.38	2.15	40%
TOTAL	**106.30**	**70.95**	**67%**

The Aquaculture Program was allocated a 2016 budget of USD 106.30 million, and spent USD 70.95 million, or 67 percent.

Table 12. Budget and Actual Spending for Surveillance Program, 2016, (USD millions)

SUBPROGRAM	BUDGET	SPENDING	PERCENT SPENT
Marine and fisheries resources monitoring and surveillance	-	-	0%
Marine patrol ship/boat operations	26.22	19.37	74%
Marine and fisheries violation resolution efforts	2.64	1.68	64%
Marine resources surveillance	1.44	1.16	81%
Fisheries resources surveillance	1.93	1.54	80%
Marine and fisheries resources monitoring and infrastructure improvements	16.28	14.74	91%
Management and other technical supports	36.49	16.15	44%
TOTAL	**84.99**	**54.65**	**64.30%**

The Surveillance Program was allocated a 2016 budget of USD 84.99 million, and spent USD 54.65 million, or 64 percent.

Table 13. Budget and Actual Spending for Business Competitiveness, 2016 (USD millions)

SUBPROGRAM	BUDGET	SPENDING	PERCENT SPENT
Improvement of business and fisheries product competitiveness	-	-	-
Logistics improvement for fisheries and marine products	19.73	111.46	58%
Market access and marketing improvement	22.66	8.72	38%
Quality improvement and diversification of fisheries products	25.74	14.08	55%
Quality improvement and diversification of marine products	14.17	9.68	68%
Investment and sustainability of fisheries and marine industry	3.12	1.59	51%
Management and other technical support	8.55	5.54	65%
Fisheries product testing	2.49	1.90	76%
TOTAL	**96.49**	**52.96**	**55%**

The Business Competitiveness Program was allocated a 2016 budget of USD 96.49 million, and spent USD 52.96 million, or 55 percent.

Table 14. Budget and Actual Spending for R&D of Marine and Fisheries Science and Technology, 2016 (USD millions)

SUBPROGRAM	BUDGET	SPENDING	PERCENT SPENT
Product competitiveness and biotechnology	3.38	2.86	85%
Socioeconomic and policy analysis	2.05	1.81	88%
Fisheries science and technology	21.44	19.58	91%
Marine and fisheries instrumentation	131.97	-	0%
Marine and coastal resources science and technology	21.27	15.13	71%
Management and other technical support	5.37	15.12	0%
Marine and fisheries zone and climate	295.51	-	0%
TOTAL	**53.94**	**39.39**	**73%**

The Research & Development Program of Marine and Fisheries Science and Technology was allocated a 2016 budget of USD 53.94 million, and spent USD 39.39 million, or 73 percent.

A few of the priority areas for directly supporting fishery workers in 2017 included:

- MMAF allocated USD 28.88 million to procure fishing vessels as follows: 243 units of <5 GT vessels; 384 units of 5 GT vessels; 134 units of 10 GT vessels; 15 units of 20 GT vessels; and 6 units of 30 GT vessels. While only a small fraction had been delivered by November 2017, MMAF remained confident that it would reach its target of disbursing 782 vessels by the end of 2017.
- The insurance scheme, which started in 2016 with a budget of USD 12.96 million, provides compensation for fishers who die or experience an accident. The compensation amounts include: USD 14,815 if a fisher dies in a fishing accident; USD 7,407 for fishers who suffer permanent disabilities; USD 1,481 for fishers' medical treatment due to injuries; and USD 11,852 for fishers killed in an accident unrelated to fishing activities. The scheme is only provided to fishers and not to crew members, who are covered by the Social Security Management Agency and other insurance schemes provided by ship owners.

Table 15. Planned Support for Workers in the Fisheries Sector, 2017[19]

	PLANNED SUPPORT (2017)
Fishers	• 665,746 to receive fisher insurance • 6,853 units of fishing gear • 782 units of fishing boats
Aquaculture Farmers	• 2,915 units of aquaculture infrastructure • 297.3 million fish seeds • 392 packets of fish food
Salt Farmers	• 12 units of storage • 939 hectares of salt-making tarps (geoisolator) • 21 districts to receive assistance with production infrastructure
Support for Processing and Marketing	• 67 units of cold storage • 243 ice flake machines • 15 integrated cold storage units • 150 units of cold chain system infrastructure
Support for Information and Training	• 157,000 groups to receive guidance briefings • 42,000 people to receive competency certificate

B. Integrated Fisheries Centers

In 2017, MMAF supported the development of 12 Integrated Fisheries Centers (SKPT).

Figure 2. Planned Locations for 12 SKPT in 2017

1. Natuna
2. Saumlaki
3. Merauke
4. Mentawai
5. Nunukan
6. Talaud Locations
7. Morotai
8. Biak Numfor
9. Mimika
10. Rote Ndao
11. Sumba Timur
12. Sabang

C. Review of Ministry of Environment and Forestry (MEF)

There are more than 50 national parks (Balai Taman Nasional) in Indonesia, including ten that are either exclusively marine parks or that contain significant marine ecosystems within their boundaries. At present, the MEF holds management authority for all national parks.

The MEF spent USD 42.28 million for management of national parks in 2016, or about half of the Natural Resources and Ecosystem Conservation Program expenditures of USD 83.47 million (Table 16). This included USD 8.29 million for the ten national parks with significant marine areas (Table 17). The 2017 budget for the Natural Resources and Ecosystem Conservation Program was increased to USD 135.25 million, but the budget for management of national parks declined to USD 39.86 million. While the breakdown by national parks is unknown for 2017, the MEF spent USD 36.84 million on management of national parks, a 13 percent decline from 2016.

Table 16. MEF Budget and Actual Spending, 2016 and 2017

SUBPROGRAM	BUDGET	SPENDING	BUDGET	SPENDING
General management and other technical support	4,425,038	4,297,239	69,337,300	63,976,363
Management of national parks	43,058,835	42,280,634	39,855,972	36,843,800
Natural resources conservation	33,709,087	33,185,982	20,287,134	18,712,516
Management of essential ecosystem conservation	442,867	414,288	392,592	367,473
Utilization of ecosystem services in conservation area	504,979	498,773	677,191	654,507
Species and genetic conservation	1,084,080	1,223,763	1,957,963	1,860,995
Management of conservation areas	644,188	626,780	1,287,478	1,247,950
Management and natural conservation information	-	-	1,453,907	1,365,720
Management of natural reserves and national hunting parks	1,901,996	944,281		
TOTAL	**85,771,073**	**83,471,742**	**135,249,540**	**125,029,328**

Table 17. Management Budget for Marine National Parks, 2016

SUBPROGRAM	BUDGET	SPENDING	% SPENT
1. Teluk Cenderawasih National Park	1,150,735	1,061,712	92.26
2. Kepulauan Seribu National Park	820,109	796,333	97.1
3. Karimun Jawa National Park	861,140	809,360	93.99
4. Bunaken National Park	582,238	535,370	91.95
5. Kepulauan Togean National Park	431,197	404,845	93.89
6. Takabone Rate National Park	582,332	561,601	96.44
7. Bali Barat National Park	1,517,163	1,385,116	91.3
8. Komodo National Park	935,304	811,729	86.79
9. Ujung Kulon National Park	1,425,514	1,277,791	89.64
10. Wakatobi National Park	694,118	650,133	93.66
	8,999,849	**8,293,990**	

D. Loan subsidy programs

About 61 million micro, small, and medium enterprises (MSMEs) operate in Indonesia. Collectively, MSMEs represent more than 60 percent of Indonesia's GDP and employ over 114 million people (~97 percent of total private sector employment). It is believed that about 85 percent of all enterprises operating in the fisheries sector are MSMEs. Despite their critical role in the Indonesian economy, MSMEs struggle to access finance due to requirements (e.g., collateral) imposed by commercial banks.

To facilitate access to finance for MSMEs, the Indonesian government operates a number of credit guarantee and loan subsidy programs. The main ones relevant to the fisheries sector are the People's Business Credit Program (Kredit Usaba Rakyat (KUR)), the Ultra-micro Credit Program (Pembiayaan Ultra Mikro), and The Institute for Capital Management of Maritime and Fishery Enterprises (Lembaga Pengelola Modal Usaha Kelautan dan Perikanan (LPMUKP)). At present, none of these programs link stock health or sustainability of fisheries practices to loan amounts or interest rates. It may not be feasible for political or practical reasons, but subsidized loans could be better targeted so as to support the transition to sustainable fisheries. Certain positive or negative screening tools could be used to allocate these concessional sources of public money, for example, to incentivize the use of certain gear or fishing practices, or to decline loans in certain geographic areas where species are overexploited.

i. People's Business Credit Program

The People's Business Credit (KUR) Program was established by the Indonesian government in 2007 with the initial goal of enhancing MSMEs' access to bank loans by providing subsidized, partial-credit guarantees. It represents one of the largest subsidized loan programs for MSMEs in emerging markets.

The KUR program was set to end in 2014, but the government decided to extend and refine it. Under President Jokowi, the program was reformed in late 2015 and now provides interest rate subsidies to participating banks, allowing them to lend to MSMEs at capped interest rates. The rate is currently 9 percent, well below average commercial lending rates for MSMEs, and is scheduled to drop to 7 percent in 2018. In 2017, the Indonesian government allocated USD 1.17 billion in interest rate subsidies in the state budget. This compares with USD 933.33 million in 2016.

The KUR loan target was USD 2.22 billion in 2015; USD 7.41 billion in 2016; USD 8.15 billion in 2017; and USD 8.89 billion in 2018. The proportion of the KUR program that channeled to the fisheries sector in 2016 was small; the fisheries sector received USD 74.07 million, or 1.1 percent of the total KUR realization of USD 6.99 billion in 2016. As of August 31, 2017, the fisheries sector had received USD 88.89 million, or 1.7 percent of the year-to-date total of USD 5.18 billion. To accelerate disbursement of KUR loans, the fund's policy committee also prepared three new KUR schemes for plantations, livestock farms, and fisheries.

World Bank Analysis of the New KUR Program

The new program represents a paradigm shift from enhancing MSMEs' financial access to providing deeply concessional loans to MSMEs. It used to rely on a partial credit guarantee program intended to build the credit history of first-time borrowers and thus improve their bankability. Now it focuses on providing interest rate subsidies intended to create better loan conditions for borrowers, including first-time and repeat borrowers.

There are four key reasons to doubt the effectiveness of the new approach:

1. Subsidies crowd out commercial lending, particularly in the micro segment;
2. For MSMEs, sustainable access to loans is usually more important than lower interest rates;
3. The current KUR interest rates are not financially self-sufficient, meaning that the rates require ongoing government subsidy;
4. Interest rate subsidies are a regressive form of assistance (i.e., a larger percentage of government assistance is directed to larger businesses compared to smaller businesses).

Source: Industri, 2017

According to M. Abdi Suhufan, the National Coordinator of Destructive Fishing Watch, there are several obstacles to the absorption of KUR by the fisheries sector, including key program requirements. For example, bank officials ask for land ownership certificates of at least USD 1,852 in land value, but fishers often do not own land and/or possess a certificate to demonstrate ownership of this value. Separately, bank officials require proof of relevant licenses, such as the trade business license (Surat Izin Usaha Perdagangan). Many fishers do not possess this license. In fact, small-scale fishers (i.e., operating boats without engine, boats with outboard engines, and motorized boats less than 10 GT) are not required to have the license, meaning that nearly 90% of the national fishing fleet is not able to access KUR resources.

ii. Ultra-micro Credit Program

In August 2017, the Indonesian government launched the Ultra-micro Credit Program to enhance access to ultra-micro finance across the country. The program endeavors to reach the approximately 44 million MSMEs not serviced by the KUR, and will provide financing in the range of USD 74-370 per enterprise. Unlike KUR, it will not require collateral. A number of government institutions are involved in the program, including MMAF, and the financing will be disbursed by three state-owned companies. A pilot project of USD 111.11 million will target 19 villages across the country and is expected to reach 300,000 micro-entrepreneurs.

iii. The Institute for Capital Management of Maritime and Fishery Enterprises

The Institute for Capital Management of Maritime and Fishery Enterprises is a public service agency (Badan Layanan Umum) under MMAF. Officially created in September 2016, LPMUKP oversees a financing facility that targets small- to medium-sized fishery businesses. As a nonstructural body, LPMUKP has a certain degree of autonomy from MMAF in terms of policy decision-making, including its business plan and budget.

LPMUKP's funding comes from the government's revolving budget (dana bergulir) and is considered as an investment. In other words, it operates as a revolving fund and must replenish itself by offering loans rather than grants. In 2017, working with Bank Negara Indonesia, the facility aimed to loan USD 37.04 million: USD 18.52 million for fishery businesses, USD 7.41 million for aquaculture, USD 5.93 million for processing businesses, and USD 5.19 million for salt businesses.

The 2018 State Budget aims to invest USD 446.67 million into four public service agencies, out of which USD 62.96 million will be channeled to LPMUKP. The output targeted is assistance to 5,354 to 6,414 MSMEs or business groups across capture fisheries, aquaculture, processing and marketing, salt producers, and other coastal communities.

Table 18. DG of Capture Fisheries Sub-program (Ministry Regulation No. 23/2015)

NO	SUB-PROGRAM	UNIT (ECHELON II)	TASK AND FUNCTION	ARTICLE
1	**Management of fishing fleets, fishing gear, and vessel crew certification**	Directorate of Fishing Vessels and Gear *(Direktorat Kapal Perikanan dan Alat Penangkapan Ikan)*	Formulation and implementation policies; norms, standards, procedures, criteria, and technical guidance for fishing vessels design and machinery, fishing gear, vessel registration, and certification, and operations and productivity of fishing vessels	297
2	**Fishing port management**	Directorate of Fishing Harbor *(Direktorat Pelabuhan Perikanan)*	Formulation and implementation of policies; norms, standards, procedures and criteria, and technical guidance, evaluation, identification for the development of fishery ports, fishery port operational procedures, development and management of fishery harbor integrated fishery center	321
3	**Catch control**	Directorate of Fisheries Catch Limit *(Direktorat Pengendalian Penangkapan Ikan)*	Formulation and implemenation of policies, coordination of fishing control policies in fisheriess business, analysis of fishing business documents, business licenses, data and information, harmonization and evaluation of licensing centers and regions	345
4	**Fishers management**	Directorate of Fishers' Affairs *(Direktorat Kenelayanan)*	Formulation and implementation of policy, norms, standards, procedures and criteria as well as providing technical guidance and evaluation for fisher protection program, fisher business institutions, fisher funding, management and diversification of fisher business, as well as information development and fishery center	369
5	**Fisheries resources management**	Directorate of Fisheries ResourcesManagement *(Direktorat Pengelolaan Sumber Daya Ikan)*	Formulation and implementation of policies; of norms, standards, procedures, criteria, technical guidance, evaluation and reporting of data and statistics of capture fisheries, sustainable management of fisheries resources in inland waters, territorial waters, archipelagic waters, Indonesia (ZEEI), and high seas, as well as monitoring and evaluation of fish resources management	273
6	**Management and other technical supports**	Secretariat of Directorate General (Sekretariat Direktorat Jenderal)	Carry out technical and administrative services for all organizational units within the directorate general of capture fisheries	254

08
Private sector investments

Private sector investments

Prepared by
Sarah Conway

This chapter considers the scale and composition of private investment into the fisheries sector in Indonesia and highlights investment funds and industry investments specifically focused on the transition to sustainable fisheries.

I. Business environment and private sector investment priorities

Indonesia's economy grew 5 percent in 2016, up from a 4.8 percent growth rate in 2015, due in large part to revised economic policies and increased household consumption.[1] On the policy side, efforts to deregulate and enhance the quality of the business environment improved Indonesia's ranking in the World Bank 2017 *Ease of Doing Business* report to 91, up from 106 in 2016.[2,i] In the fisheries sector, Indonesia has opened up new areas of the economy to foreign direct investment (FDI), including cold storage for fish products—an area in which 100 percent FDI ownership is now allowed.[3] Previously, foreign ownership of cold storage facilities was limited to 33 percent in Sumatra, Java, and Bali, and 67 percent in other areas.[4] At the same time, wild capture fishing was added to the Negative Investment List[ii], which restricted investment in boats and harvesting to domestic sources only. Domestic (fisher) cooperatives are also on the negative list, making it impossible for foreign investors to make direct investments into cooperatives.

In terms of private sector investment priorities, Indonesia remains focused on increasing its wild capture and aquaculture export values. Indonesia targeted an export value of USD 7.62 billion of fish and other sea catch in 2017, an ambitious target given an actual export value of about USD 3.8-4.2 billion in 2016, and ultimately only exported USD 3.2-4.1 billion in 2017 (Table 1).[5]

Table 1. Indonesia Fisheries Export Value Targets Versus Actual (USD billion)[6]

	2015	2016	2017
Target	5.86	6.82	7.62
Actual	3.95	3.78-4.17*	3.17-4.09*
% of Target	67.4%	55.4-61.1%	41.6-53.7%

*Ranges are due to conflicting data sources; differences may be due to exchange rate assumptions.

[i] Economies are ranked on their ease of doing business on a scale from 1 to 190. A high-ease ranking means that the regulatory environment is more conducive to starting and operating a local firm. The rankings for all economies are benchmarked to June 2017.
[ii] The Indonesian Government's Negative Investment List specifies which business activities are closed or conditionally open to foreign investment. The objective of this list is to encourage FDI while simultaneously maintaining protections for domestic businesses.

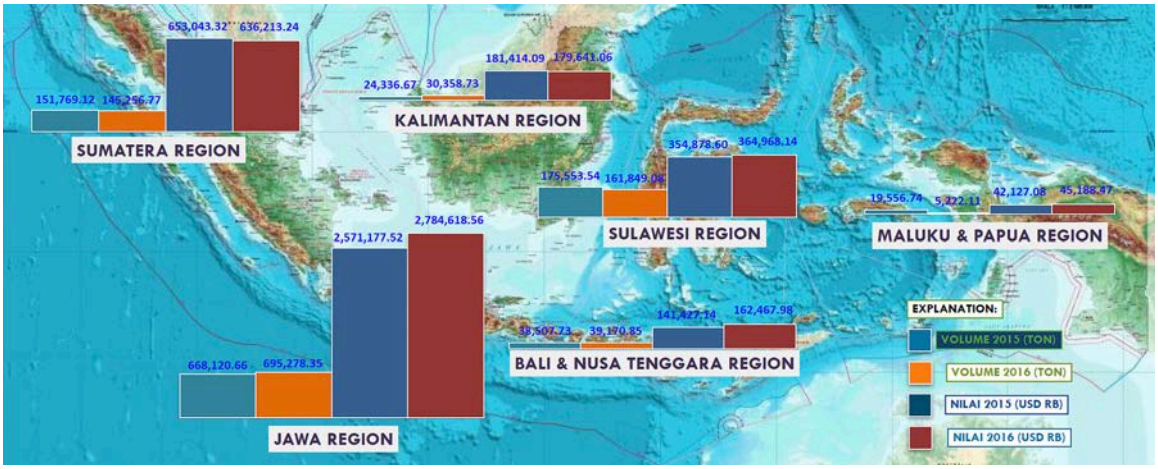
Table 2. Fish Harvesting Volume and Value, 2015 and 2016

	VOLUME (TONS)		VALUE (USD)		TREND 2015-2016*	
REGION	2015	2016	2015	2016	VOL (%)	VALUE (%)
Sumatra	151,769.12	145,256.77	653,043.32	636,213.24	-4.29	-2.58
Java	668,120.66	695,278.35	2,571,177.52	2,784,618.56	4.06	8.30
Kalimantan	24,336.67	30,358.73	181,414.09	179,641.06	24.74	-0.98
Bali & Nusa Tenggara	38,507.73	39,170.85	141,427.14	162,467.98	1.72	14.88
Maluku & Papua	19,556.74	5,222.11	42,127.08	45,188.47	-73.30	7.27
Sulawesi	175,553.54	161,849.08	354,878.60	364,968.14	-7.81	2.84
TOTAL	1,077,844.47	1,077,135.89	3,944,067.75	4,173,097.44	-0.07	5.81

* Initial data from BPS, processed by MMAF DG of Competitiveness Improvement

The trend in fish harvesting volume and value varied from region to region in 2015 and 2016 (Table 2). It is worth noting that there is not always a positive correlation between volume and value. In other words, even though the volume of fish harvested in Maluku & Papua declined by 73.3 percent from 2015 to 2016, the value actually increased 7.27 percent. Meanwhile, in Kalimantan, the volume increased by 24.74 percent but the value declined by about 1 percent. Among other things, this shows that enhancing sector value is less about increasing the overall volume of harvested fish than it is about increasing the *quality* of the fish harvested.

Table 1. Indonesia Fisheries Export Value Targets Versus Actual (USD billion)



II. Summary of private investments in the fisheries sector, 2016-2017

Private investment in the fisheries sector can be broken down into two forms of capital: loans and direct investment (i.e., equity). Loans originate from domestic banks via the KUR program (see pages 98-99 for more information) or as commercial credit (e.g., tracked through the JARING program (see below)), or from domestic non-banking institutions (e.g., microfinance institutions, cooperatives). Both foreign and domestic institutions can make equity investments, with the former being subject to additional requirements and restrictions. Data regarding loans is reported to and tracked by the Financial Services Authority (*Otoritas Jasa Keuangan* (OJK)), and oversight for equity investments is provided by the Indonesia Investment Coordinating Board (*Badan Koordinasi Penanaman Modal* (BKPM)). The publicly available information is generally limited to the topline figures and subsector or regional breakdowns. Neither OJK nor BKPM collect or report information on whether these investments are made with sustainability considerations in mind.

Fishers and debt bondage

The new program represents a paradigm shift from A large number of fishers struggle to access debt and equity capital from commercial sources (e.g., banks and non-banking institutions), in large part due to their lack of collateral. As a result, many fishers find themselves borrowing money from middlemen (*tengkulak*) with the expectation of paying the loan back with fish (*sistem ijon*). The middlemen set the price for the fish, often at below-market rates.

Source: Khomsatun, 2012

In 2016, reported foreign and domestic private investment in the Indonesian fisheries sector amounted to approximately USD 406.4 million: USD 164.9 million in new loans and USD 241.4 million in new equity investments. These figures likely underestimate the actual scale of investments in the fisheries sector; while it is difficult to know the extent of underreporting to OJK and BKPM and the extent to which investments are made outside of the formal system (e.g., by middlemen or boat owners to fishers), it is safe to assume that these figures do not capture all fisheries sector investments. In terms of the subsector breakdown, more than half of all investment was made in the processing industry.

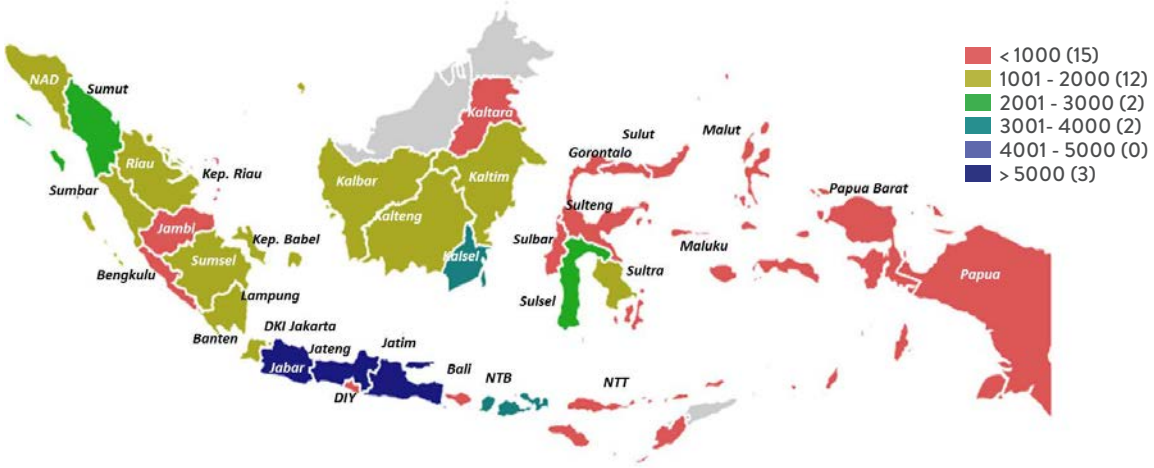
Table 3. Investment Summary, 2016 (USD)

	LOANS FROM BANKS	EQUITY	TOTAL AMOUNT	% OF TOTAL
Aquaculture	14,361,481	44,534,689	58,896,170	14%
Wild capture fishery	42,560,815	548,170.37	43,108,985	11%
Processing	19,990,000	190,455,770.37	210,445,770	52%
Trade	51,481,111	5,897,177.78	57,378,289	14%
Fishery services	36,537,481	-	36,537,481	9%
TOTAL	**164,930,888.89**	**241,435,807**	**406,366,696**	

Of course, it is not the size of investment flows but what the investment actually does that matters for the creation of sustainable and productive fisheries. Nearly half of Indonesia's wild capture fish stocks are overexploited, and at least seven out of Indonesia's 11 WPPs show no opportunities for an immediate expansion of production.[9] For example, key centers (e.g., Bitung and Ambon) have operated at less than 60 percent of their installed capacity.[10] The focus on processing despite poor stock health is likely placing further stress on stock health.

Nonetheless, announcements made in late 2016 and in 2017 signal further investment in the cold storage and processing industries, including from Russia and Japan. This focus on cold storage and processing is likely to persist, largely at the government of Indonesia's request and direction; Indonesia aims to develop, with support from foreign investment, more than 30 SKPTs around the outer islands to help develop export channels, among other objectives. The MMAF DG of Capture Fisheries planned to develop 12 such centers in 2017 in Natuna, Saumlaki, Merauke, Nunukan, Mentawai, Talaud, Morotai, Biak Numfor, Mimika, Rote Ndao, Sumba Timur, and Sabang.[11] As of January 2018, only three SKPTs had been completed: Simeulue, Tahuna, and Natuna. Eleven others are expected to be completed in 2018. The Japan International Cooperation Agency has committed to funding six additional centers, including a second in Natuna.

Figure 2. Distribution of Fish Processing Industry[12]



PROCESSING IN TOTAL: 61,603 UNITS

Large-scale: 718 units*
Micro-, small-, medium-scale: 60,885 units **

WORKING CAPITAL TURNOVER PER YEAR

Micro-scale UPI: up to IDR 300 million
Small-scale UPI: between IDR 300 million and 3 billion
Medium-scale: between IDR 3 billion and 50 billion
Large-scale: > IDR 50 billion

Source: *Processing Eligibility Certificate (SKP) 2015
**BPS, 2015

A. Loans via domestic banks

Loans made by domestic banks are channeled via the KUR program or as commercial credit, including through the JARING program. The JARING program was launched by OJK in May 2015 with the explicit objective of "increasing financing to the maritime and fisheries sector." Eight banks joined the initiative at the outset (Bank Negara Indonesia, Bank Rakyat Indonesia, Bank Mandiri, BTPN, Bank Danamon, Bank Permata, Bukopin Bank, and BPD Sulselbar) and eight more have joined since then (BCA, Bank CIMB Niaga, Bank Maybank Indonesia, Sinarmas Bank, BPD East Java, BPD Riau Kepri, BPD Sulawesi Utara, and BPD Jawa Tengah).[13] The program aims to increase financing to the sector gradually by:

- Expanding financing for the whole maritime sector, including maritime services, marine transportation, maritime construction, maritime industry, tourism, and energy and mineral resources;
- Improving the human resources capability of financial consultants at the partnering banks, fishers, and the financial services sector though certified trainings held by OJK; and
- Implementing education programs to improve knowledge, especially of those operating in the maritime and fisheries sector, regarding products and services of the financial services sector.

Table 4. Comparison of Loans Channeled via the KUR Program Versus as Commercial Credit[14]

	KUR PROGRAM	COMMERCIAL CREDIT
Loan recipient (borrowers)	"Feasible but not bankable"	"Feasible and bankable creditor"
Loan amount	IDR 25-500 million (USD 1,852-37,037)	> IDR 500 million (> USD 37,037)
Interest rate	9% (2017), 7% (2018)	12-16%
Loan term	Maximum 3 years	Greater than 3 years

In 2016, approximately USD 164.9 million in new loans were made.[15]

Table 5. Investment by Subsector, 2016 (OJK)[16]

	USD	% OF TOTAL
Aquaculture	14,361,481.48	9%
Wild capture fishery	42,560,814.81	26%
Processing	19,990,000.00	12%
Trade	51,481,111.11	31%
Fishery services	36,537,481.48	22%
TOTAL	**164,930,888.89**	

As of June 30, 2017, outstanding loans from domestic banks to the fisheries sector amounted to USD 1.93 billion. This represented 0.58 percent of the USD 332.67 billion in total loans outstanding by all banks to all sectors. While the fisheries sector only represents a small fragment of the overall outstanding loans, it continues to exhibit higher growth rates than the overall loan growth. The fisheries sector has also managed to consistently maintain a non-performing loan (NPL) rate lower than the national rate.

Table 6. Outstanding KUR and Commercial Credit, 2014-2017, USD (billion)[17]

	2014	2015	2016	2017*
National total	272.171	300.59	324.24	324.24
Fisheries sector	1.33037	1.583	1.7933	1.7933
TOTAL	0.49%	0.53%	0.55%	0.55%

*2017 data covers January-June 2017

Table 7. Year-Over-Year Growth Rates[18]

	2014-2015	2015-2016	2016-2017
National growth rate	10.44%	7.87%	2.60%
Fisheries sector growth rate	18.99%	13.29%	7.68%

Table 8. Non-Performing Loans[19]

	DEC 2014	DEC 2015	DEC 2016	JAN 2017	FEB 2017	MAR 2017	APR 2017	MAY 2017	JUNE 2017
NPL National	2.16%	2.49%	2.93%	3.09%	3.16%	3.04%	3.07%	3.07%	2.96%
NPL Fisheries Sector	2.82%	1.80%	1.85%	2.74%	2.36%	2.26%	2.32%	2.43%	2.37%

In terms of the subsector breakdown of loans to the fisheries sector, processing and trading each represent about 30 percent. Capture fisheries represent approximately 20 percent. Geographically, more than half of the total outstanding loans are to entities based in Jakarta or East Java.

Table 9. Fisheries Sector KUR and Commercial Bank Credit by Subsector[20]

CATERGORY	NUMBER OF BORROWERS	LOANS OUTSTANDING (USD MILLION)	PERCENT OF TOTAL	NPL (%)
Processing	6,244	579.92	0.0%	0.91%
Trading	170,530	588.05	30.5%	2.56%
Fishery services	7,289	53.63	2.8%	5.25%
Wild capture fishery	71,188	391.91	20.3%	4.02%
Aquaculture	63,373	316.44	16.4%	2.18%
Salt	228	1.10	0.1%	1.77%
	318,852	**1,931.05**		

Table 10. Fisheries Sector KUR and Commercial Bank Credit by Province[21]

PROVINCE	NUMBER OF BORROWERS	LOANS OUTSTANDING (USD MILLION)	PERCENT OF TOTAL
Jakarta	7,208	537.78	27.9%
East Java	43,663	477.78	24.8%
North Sumatra	12,094	151.85	7.9%
Central Java	43,494	151.11	7.8%
South Sulawesi	31,480	117.78	6.1%
West Java	32,413	81.48	4.2%
Other	148,500	411.85	21.3%
	318,852	**1,929.63**	

B. Loans via domestic non-banking institutions

Non-banking institutions, including microfinance institutions, are not subject to regulation by the Indonesian Central Bank. As such, they generally charge higher interest rates than banks (e.g., 24-30 percent interest per year or 2-2.5 percent per month).[22] As of late May 2017, there were USD 47.19 million in outstanding loans from non-banking institutions to the fisheries sector. In the first five months of 2017, the non-banking institutions issued a total of USD 9.14 million in new loans.[23]

Table 11. Outstanding Non-Banking Credit[24]

CATEGORY	NUMBER OF BORROWERS	LOANS OUTSTANDING (USD MILLION)	PERCENT OF TOTAL	NPL (%)
Processing	935	6.27	13.3%	5.19%
Fishery services	2,880	8.31	17.6%	2.33%
Wild capture fishery	5,785	18.04	38.2%	2.93%
Aquaculture	6,174	14.60	30.9%	1.96%
TOTAL	**15,774.00**	**47.21**		

C. Equity via FDI and domestic investors

In 2016, new equity investments into the fisheries sector amounted to USD 241.5 million, with 44 percent from FDI and 56 percent from domestic sources.[25] The largest FDIs originated from Hong Kong and Japan, and the processing industry attracted nearly 80 percent of new equity investment.[26]

Table 12. Fisheries Sector Investment in Indonesia, by Originating Country[27]

	IDR MILLION	USD
Pakistan	0.20	14.81
Italy	12.70	940.74
Australia	62.90	4,659.26
Malaysia	3,173.70	235,088.89
U.S.	4,000.00	296,296.30
India	8,777.70	650,200.00
Taiwan	32,029.70	2,372,570.37
South Korea	39,210.90	2,904,511.11
Philippines	74,986.50	5,554,555.56
China	96,467.80	7,145,762.96
British Virgin Islands	113,737.10	8,424,970.37
Singapore	238,967.40	17,701,288.89
Japan	331,593.10	24,562,451.85
Hong Kong	488,372.00	36,175,703.70
Indonesia	1,827,991.70	135,406,792.59
Total	**3,259,383.40**	**241,435,807.41**
FDI	**1,431,391.70**	**106,029,014.81**
FDI (%)	**43.92%**	

Table 13. Fisheries Sector Investment in Indonesia, by Subsector[28]

SUBSECTOR	PROJECT	IDR MILLION	PERCENT OF TOTAL	USD
Aquaculture	17	601,218.30	18.45%	44,534,688.89
Wild capture fishery	3	7,400.30	0.23%	548,170.37
Processing	72	2,571,152.90	78.88%	190,455,770.37
Trade	19	79,611.90	2.44%	5,897,177.78
TOTAL	**111**	**3,259,383.40**		**241,435,807.41**

D. Investment funds

In 2016, new equity investments into the fisheries sector amounted to USD 241.5 million, with 44 percent from FDI and 56 percent from domestic sources. The largest FDIs originated from Hong Kong and Japan, and the processing industry attracted nearly 80 percent of new equity investment.

Althelia Sustainable Ocean Fund

- The first of its kind "blue economy" impact investment vehicle, aiming to drive economic development through marine investments
- Managed by Luxembourg-based Althelia Ecosphere, which also oversees the USD 120 million Climate Fund
- The fund is currently raising USD 50 million and eventually targeting USD 100 million
- Risk mitigation: The United States Agency for International Development (USAID), through its Development Credit Authority (DCA), is providing a USD 50 million, 50 percent credit guarantee[29]
- Partners: Environmental Defense Fund, Conservation International (on expert board)
- It aims to invest in 10-15 marine and coastal projects and enterprises in developing countries, focusing on:
  - sustainable seafood production (wild capture and aquaculture)
  - seafood supply chains
  - related coastal development projects (e.g., ecoservices, energy, and waste) that support a transition to environmental and social sustainability and underpin the "blue economy"

Meloy Fund

- The first impact fund focused entirely on community-level small-scale fisheries in developing countries
- The fund has raised USD 17.1 million, including a USD 6 million anchor investment from the Global Environment Facility and a USD 7 million investment from USAID DCA;[30] it is aiming to raise an additional USD 3 million for a total fund size of USD 20 million and is also expecting about USD 35.2 million in fisheries management and technical assistance co-financing through Rare's Fish Forever and other partners
- Risk mitigation: USAID DCA will provide a guarantee in the amount of USD 10 million, or up to 50 percent of the USD 20 million fund, over a twelve-year period
- Partners: Fish Forever (Rare, University of California Santa Barbara, Environmental Defense Fund), Conservation International
- It aims to invest in fishing-related enterprises in Indonesia and the Philippines that directly impact small-scale fishers in coral reef ecosystems, such as:
  - supply chain improvements, including cold storage and processing
  - enterprises that enhance the value of sustainably caught seafood
  - fishing pressure offset ventures, such as aquaculture
- The fund will lend to companies or buy stakes in them[31]

On the one hand, these funds could present new opportunities in financing the transition to sustainable fisheries in Indonesia. Assuming that the Meloy Fund invests half of its targeted fund size of USD 20 million in Indonesia and that the Althelia Sustainable Ocean Fund invests 10 percent of its targeted fund size of USD 100 million, USD 20 million will channel to sustainable fisheries in Indonesia in the years ahead. Successful outcomes from these investments will be important to demonstrate that sustainable fisheries can yield positive social, environmental, and financial outcomes. However, these funds are likely to encounter a number of challenges. For example:

- **Limited investment pipeline:** While the collective capital deployed by these funds is small relative to overall fisheries investment in Indonesia, these funds represent a strong uptick in capital for sustainable fisheries and the blue economy. Finding investments that are sufficiently large but that also provide strong community and small-scale fisher involvement, as well as environmental gains, will be hard. Bundling smaller projects together may help to achieve scale while reducing overall transaction costs.
- **Borrower risk aversion to foreign-currency denominated loans:** The funds may struggle to find entities willing to accept their investment terms, especially if these funds wish to make loans denominated in USD or EUR, effectively placing the exchange rate risk on the borrower.

- **Impact constraints due to treatment of the ocean as de facto open access:** The companies targeted by these funds will need to compete with small- and large-scale entities in a system that is de facto open access with no restrictions on fishing effort. Until policy measures are in place to manage these fisheries, it will be hard for individual companies, or even a handful of companies, to ensure the "sustainability" of fisheries in Indonesia.
- **May be dwarfed by investments into the sector that do not factor in sustainability considerations:** Assuming that future debt and equity investments into the fisheries sector are of a comparable scale to 2016 (i.e., USD 406.4 million) and that a significant portion of these investments are not made with sustainability factors in mind, the funds' overall ability to enable a transition to sustainable fisheries will be limited.

Ultimately, the sustainability of the fisheries sector will require that all debt and equity investments are made with similar objectives in mind.

D. Financial technology and other e-commerce solutions

Technological advancements are making it easier to bring financial solutions to fishers who do not have access to the banking system. In 2016, Bank Indonesia launched its own e-money system, the "Lantera Card," specifically designed for fishers. Indonesia's five largest banks— Bank Rakyat Indonesia, Bank Negara Indonesia, Bank Tabungan Negara, Bank Mandiri, and BCA—are supporting the program.[32] The fishing community can use the card to pay for fishing equipment at the cooperative level, and in the future the card will be used to distribute aid or other assistance to fishers.[33]

Several start-up companies are focused on other aspects of the fisheries sector. For example:

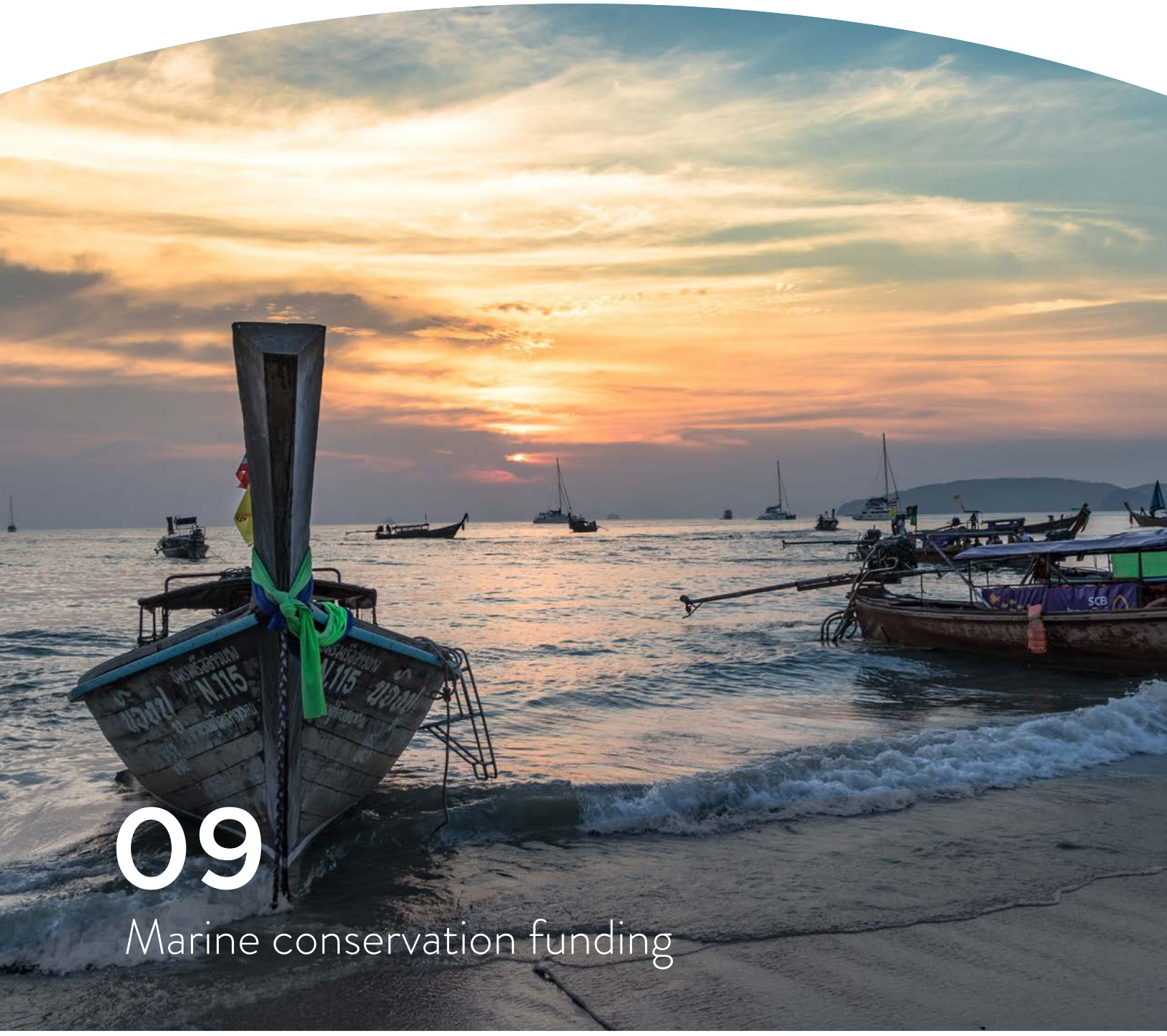
- **Aruna** (http://beta.aruna.id/), an integrated fisheries e-commerce company based in Jakarta, provides end-to-end e-commerce solutions for fishers through a "fair fish trading platform." Aruna hopes to improve the livelihoods of fishers and bring affordable and high-quality seafood to communities. The company currently operates in nine provinces with 1,701 fishers.
- **Growpal** (https://growpal.co.id/), a digital platform focused on financing aquaculture in Indonesia, brings together investors, landowners, and marine fish farmers. Growpal was recently awarded first place at the G-Startup Worldwide competition.[34]

E. Industry investments in the transition to sustainable fisheries

A number of industry investments were made in 2017 to support the transition to sustainable fisheries in Indonesia. Industry investments represent a large portion of the overall investment into the fisheries sector, and therefore play an important role in the transition to sustainable fisheries. While some of these investments are directly or indirectly captured in the OJK and BKPM data sets, further tracking systems are required to fully capture the details of industry investments, including whether or not investments are made with sustainability in mind.

Selected industry investments that support the transition to sustainable fisheries include:

- **The first Indonesian tuna fishery entered the MSC assessment process.** Sorong-based PT Citraraja Ampat Canning, which produced 2,600 MT of skipjack and 543 MT of yellowfin tuna in 2016, is pursuing MSC certification for pole-and-line-caught yellowfin and skipjack tuna. If this effort succeeds, the fishery could be supplying MSC-certified skipjack and yellowfin tuna to international markets by the end of 2018.[35]
- **Miami-based Blue Star Foods and its overseas supplier PT Blue Star Nusantara launched a cloud-based supply chain tracking system.** Blue Star Foods, in partnership with Wilderness Markets, created a mobile-based data collection system that integrates three components to provide traceability of its entire supply chain.[36]
- **Thai Union donated USD 50,000 to FIPs in Eastern Indonesia.** The donation supports pole-and-line fisheries, as well as overall sustainability for skipjack and yellowfin tuna stocks. Thai Union aims to ensure that 100 percent of its branded tuna is sustainably sourced, with a commitment of achieving a minimum of 75 percent by 2020.[37]
- **A new partnership was launched to tackle seafood traceability.** The Seafood Alliance for Legality and Traceability will promote legal and sustainable fisheries by improving supply chain transparency and traceability. Bringing together seafood industry representatives, NGOs, and governments, the partnership aims to collaborate on ways to combat illegal seafood and share best practices.[38]



09
Marine conservation funding

Marine conservation funding

Prepared by
CEA

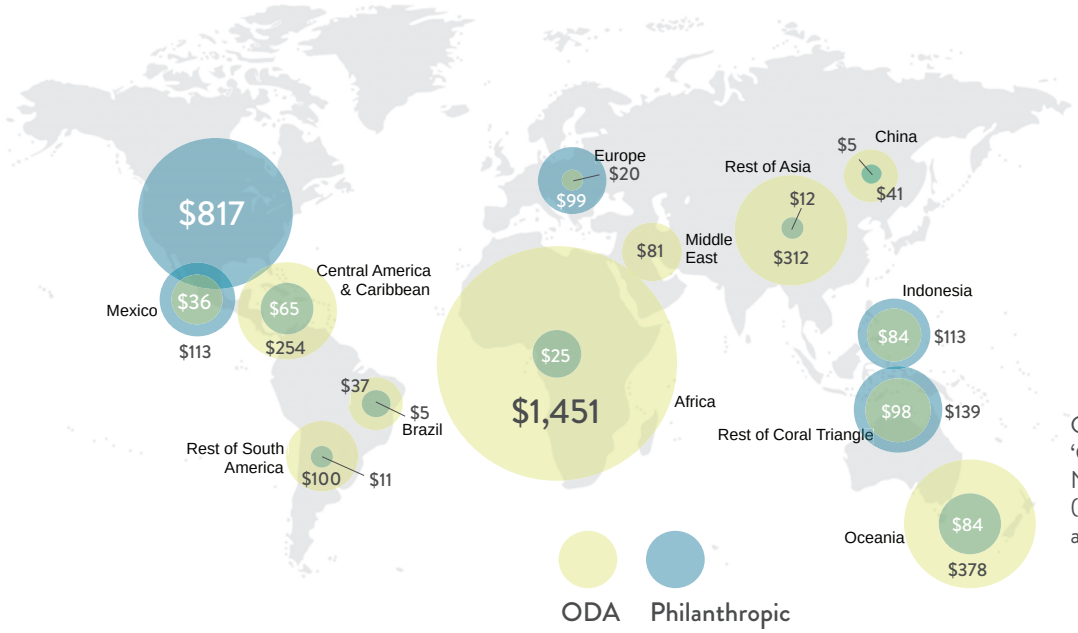
I. Overview of philanthropic and development aid grantmaking

Aside from public funding and private sector investments, private foundations and development aid organizations (which includes both bilateral and multilateral donors) also provide an important source of funding for marine and fisheries issues in Indonesia. This chapter provides a review of recent trends from the respective sectors, including level of grantmaking in recent years, key donors, and strategy updates which have influenced marine conservation-related grantmaking in Indonesia. The structure of this chapter is as follows: a) an overview of philanthropic and development aid grantmaking, b) a review of philanthropic funding trends, and c) a review of official development assistance (ODA) funding trends.

A. Overlay of grant funding by sector

Between 2007 and 2015, the philanthropic sector provided USD 113 million in funding and the development aid sector provided USD 84 million in ocean-related grants in Indonesia (Fig. 1). In recent decades, there has been a general geographic divide, with philanthropy investing heavily in North America (followed by Europe and the Coral Triangle), while ODA has placed a heavy focus on Africa and parts of Asia, given its emphasis on poverty alleviation and economic development in low- and middle-income countries.[i]

Figure 1. Total Oceans-Related Grants from Philanthropic Versus ODA Funding, 2007-2015



Countries included in 'Oceania': Fiji, Kiribati, Nauru, Oceania (regional), Tonga, and Vanuatu.

[i] According to the OECD, official development assistance is defined as: "Flows of official financing administered with the promotion of the economic development and welfare of developing countries as the main objective, and which are concessional in character with a grant element of at least 25 percent. By convention, ODA flows comprise contributions of donor government agencies, at all levels, to developing countries ('bilateral ODA') and to multilateral institutions. ODA receipts comprise disbursements by bilateral donors and multilateral institutions."

B. Data sources

Source data for analysis in this chapter were gathered from grant-level data provided directly by Foundations. ODA funding data was gathered from the Creditor Reporting System (CRS) database maintained by the Organization for Economic Cooperation and Development (OECD). All grants are reported based on commitment amounts for a given year, rather than disbursements.

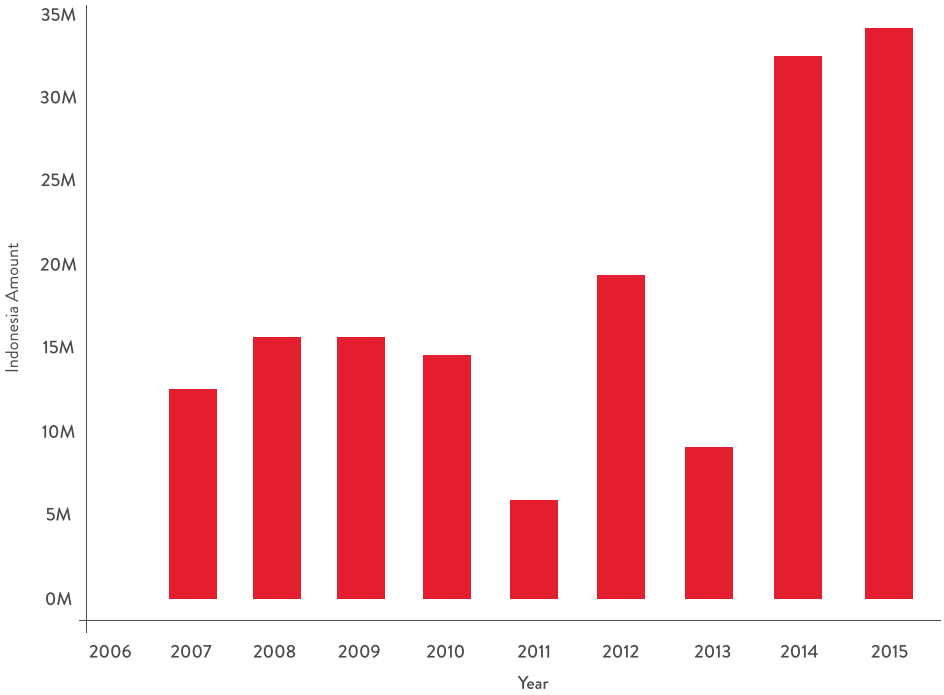
ODA is an indicator of international aid flow with the primary purpose of development. While ODA as a funding flow includes both grants and loans, the data shown below refer only to grants to enable an analogous comparison with philanthropic funding. For this reason, all loans and infrastructure-related grants are excluded from the amounts reported below, unless otherwise noted.

II. Review of philanthropic funding trends

A. Philanthropic funding over time

Foundation grantmaking for marine-related issues in Indonesia has risen substantially in recent years. Between 2007 and 2016, grantmaking has increased by more than 300 percent—from USD 12.5 million in 2007 to more than USD 34 million in 2015 (Fig. 2). These increases are driven primarily by large commitments from long-standing funders (e.g., USD 23 million from Walton Family Foundation in 2014; USD 14 million from Margaret A. Cargill Foundation in 2015), as well as the entrance of new funders to the field (e.g., Oceans 5, Vulcan Philanthropy, and Leonardo DiCaprio Foundation).

Figure 2. Marine-related philanthropic funding in Indonesia, 2007-2015



B. Indonesia Marine Funders Collaborative

Indonesia has been a geographic priority for several North America-based foundations, most notably those associated with the Indonesia Marine Funders Collaborative (IMFC)—an initiative of foundations that share a vision of restoring and protecting coastal and marine resources while enhancing fisheries management in Indonesia.

The four founding members of the IMFC include the John D. and Catherine T. MacArthur Foundation, the Walton Family Foundation, the Margaret A. Cargill Foundation, and the David and Lucile Packard Foundation. These four funders have gathered since 2012 to discuss their mutual interest in the long-term health of Indonesia's marine and coastal ecosystems. The IMFC has since expanded to include 13 members affiliated with the collaborative. While some members participate in the IMFC in a lighter-touch manner, a core group of close partners continues to actively collaborate on a consistent basis and provide strategic direction to the IMFC.

Key changes in recent years for the IMFC include:

- In 2018, the MacArthur Foundation announced the conclusion of its Conservation and Sustainable Development Program—a grantmaking program which was intended to be time-limited. With this announcement, the MacArthur Foundation is now focusing on four exit grants in Indonesia and will transition from serving as a core member of the IMFC.
- The United States Agency for International Development (USAID) joined the IMFC as a core member after launching its USD 40 million, five-year marine portfolio in Indonesia in 2016. For the purpose of this report, USAID funding is included in the subsequent ODA section to avoid double counting.
- Given these respective transitions, the core group of the IMFC currently includes the M.A. Cargill Philanthropies, Packard Foundation, Walton Family Foundation, and USAID.
- Recent strategy refreshes have brought close alignment between foundation strategies, particularly for the Packard Foundation and Walton Family Foundation. Both foundations focus on the same set of "pilot" or "archetypal" fisheries: snapper and grouper, tuna, and blue swimming crab to establish models of good fisheries management along three policy levels (local, national, and international). Likewise, both foundations seek to improve fisheries management through specific policy and management changes, and to build local and national-level capacity and leadership for improved management. Through the IMFC and other exchanges, these foundations are able to share collective learning and align closely in their grantmaking.
- The M.A. Cargill Philanthropies (MACP), which has been active in grantmaking in Indonesia for eight years, has included a focus on community-based work inside and outside of MPAs, with an overall focus on near-shore areas. The most recent round of funding, which occurs in a three-year grant cycle, ended in June 2018. MACP will increase funding slightly from the current level of USD 3 million per year to an anticipated USD 3.5 million per year between 2018 and 2021.

C. Breakdown of funding by foundation and category

The foundations which have provided the highest level of funding for marine-related issues in Indonesia are shown in Figure 3 below. The Walton Family Foundation has provided the largest share of funding (USD 89 million), followed by the Packard Foundation (USD 39 million), M.A. Cargill Philanthropies (USD 25 million), and the MacArthur Foundation (USD 6 million). While the Gordon and Betty Moore Foundation does not formally participate in the IMFC, several areas of its grantmaking—particularly related to aquaculture and seafood markets—contribute to grant recipients in Indonesia.

Figure 3. Grant funding by top 10 foundations, 2007-2016, USD (millions)

The top five funding areas by category are shown below in Table 1. MPAs received an outsized proportion of funding, particularly given the emphasis on large-scale projects such as the Bird's Head Seascape which has received substantial funding from the Walton Family Foundation. Fisheries management and seafood markets have been an important focus for several foundations, including the Walton Family Foundation, Packard Foundation, Moore Foundation, and Pew Charitable Trusts.

Table 1. Top Funding by Category for Marine-Related Grants, 2007-2016

ISSUE AREA	FUNDING (USD)
Protected areas	117 M
Fisheries management	17.6 M
Seafood markets	10.4 M
Capacity building	8.3 M
Marine birds	8.1 M

D. Conclusion

Overall trends indicate an increasing level of foundation funding for marine-related grantmaking in Indonesia. While Indonesia has historically been a strategic focus for foundations given the country's position as the largest seafood producer in the world and as an epicenter of marine biodiversity, anecdotal evidence suggests that foundation interest in the country is likely to remain stable or increase in the near future—particularly given the relevance of emerging issues, such as IUU fishing, distant water fishing, and expanding aquaculture production. Indonesia is also a global laboratory for implementing large-scale MPA projects (i.e., Bird's Head MPA Network) and marrying spatial protection efforts with fisheries management. Even as some funders look to transfer long-term management and financial sustainability of these MPA networks to local governments and communities, funder interest will likely remain strong in related aspects (i.e., human and financial capacity) to ensure that the success of these projects is enduring. Funder collaboratives such as the IMFC further solidify donor coordination and alignment in the country.

III. Review of development aid trends

A. Evolving characteristics of aid funding across all sectors in Indonesia

Across all sectors in Indonesia (beyond that of marine and fisheries), there has been an important transition in development finance in Indonesia in recent years. Over the past 15 years, 35 low-income countries in the world, including Indonesia, have shifted to middle-income status due to their country's respective economic growth. This change in income status has meant that characteristics of the development finance landscape—in terms of finance sources and mechanisms available, volume of aid, and conditions attached to that aid—has evolved for these countries. In the case of Indonesia, the overall volume of ODA decreased when Indonesia graduated from the International Development Association in 2009.[2] This gap was partly filled by an increase in other official flows (OOFs)—which includes flows that do not meet ODA criteria—and was buffered by low global market interest rates.[3]

Important developments in Indonesia's transition from concessional finance in recent years include:[4]

- Since 2007, Indonesia has lacked a formal structure for ensuring systematic coordination between the government and development partners. As a result, relationships and negotiations between the government and development partners occur on an individual and bilateral basis, usually managed at the presidential level.
- The Government of Indonesia has not been able to expand domestic finance as the proportion of external official finance has decreased. As a share of GDP, revenues from external assistance finance fell from 16.3 percent in 2005 to 15.5 percent in 2014.[5] This trend is known as the "missing middle" conundrum, referring to instances in which public revenues decrease while external assistance declines as a share of the overall economy.
- Given the change in income status to a middle-income country, Indonesia's development effectiveness and debt management strategies have transitioned to feature a stronger focus on capacity building and national ownership of development programs, effective use of a smaller amount of grant financing, and alignment of development programs with national priorities.

B. Marine-related development aid funding in Indonesia

Against the backdrop of changes in Indonesia's development finance landscape, ODA continues to play an important role in marine-related funding in the country. ODA funding is distributed in the form of grants, loans, and other flows (i.e., export credits).

Between 2007 and 2016, Indonesia received USD 459 million in marine-related ODA funding (Figures 4 and 5). By category, infrastructure received 36 percent of this funding, while fisheries received 34 percent. The remaining share was allocated to science and conservation categories. By flow type, roughly 60 percent of the total amount was in the form of grants and the remaining 40 percent came from an equal proportion of loans and non-export credits.

Figure 4. Total Indonesia Marine-related ODA Funding, 2007-2016

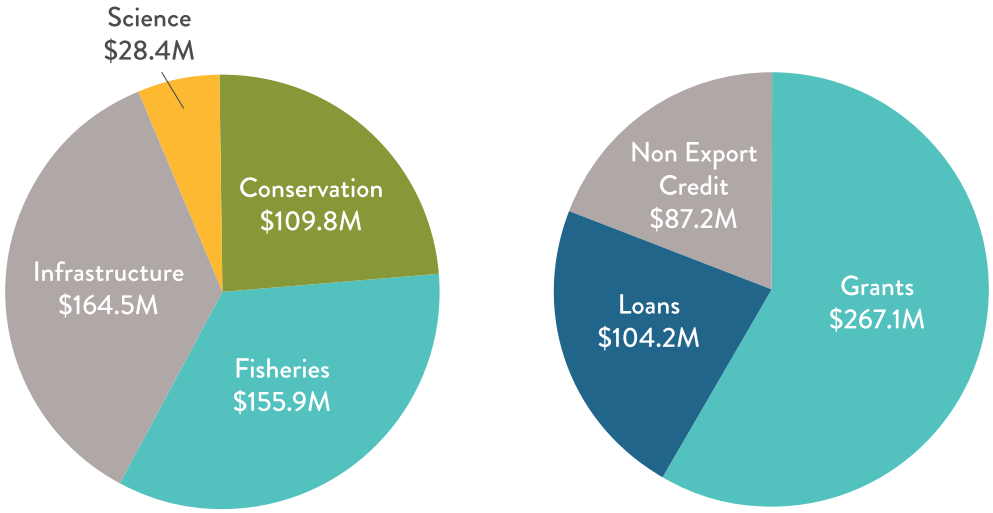
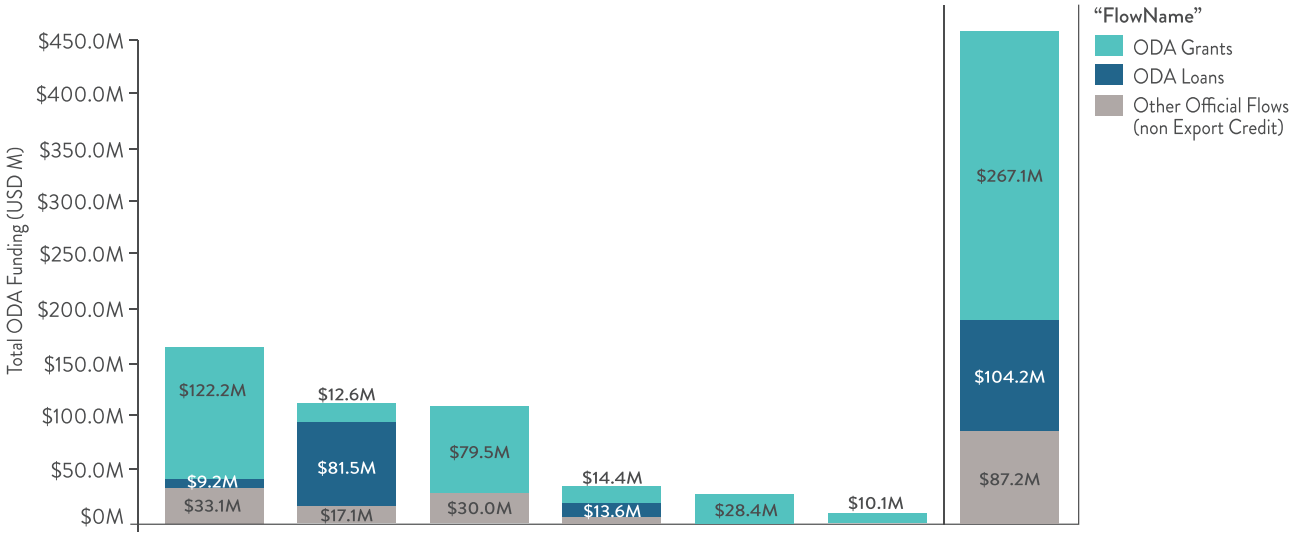


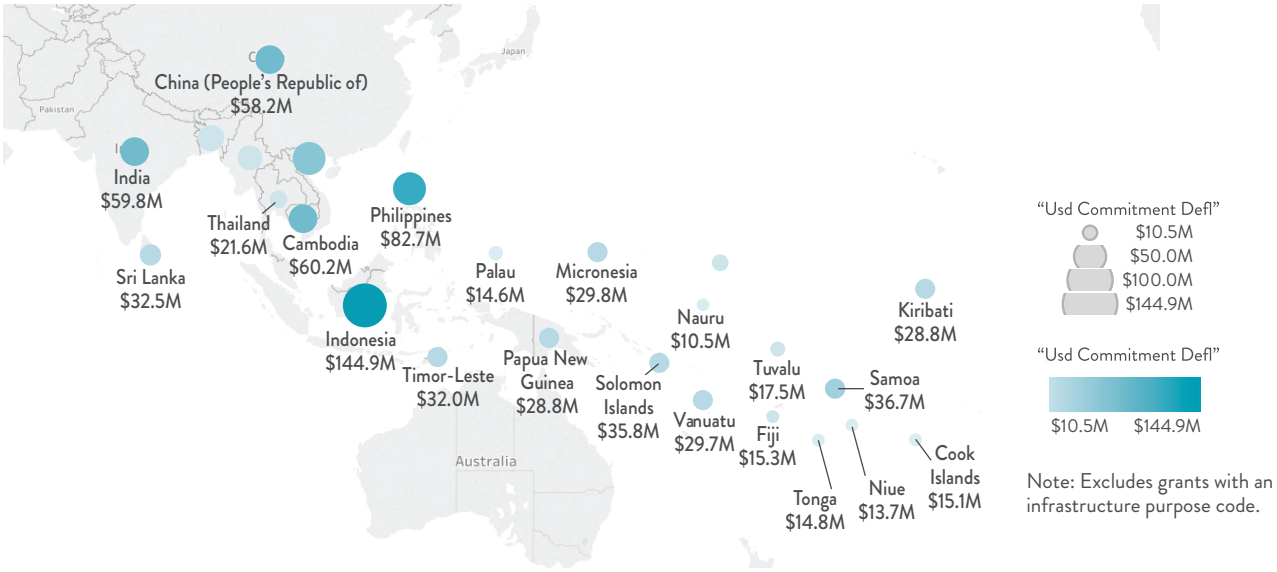
Figure 5. Total Marine ODA Funding by Category and Flow Type, 2007-2016



C. Marine-related ODA grant commitments, regional comparison

As compared to other countries in the region, Indonesia has received the highest level of marine-related ODA grants. This figure excludes loans, export credits, and grants made for infrastructure purposes. Between 2007 and 2016, Indonesia received approximately USD 150 million in grants related to fisheries development, conservation, fisheries policy and management, fisheries services, and science (Fig. 6). This amount was nearly double the respective level of funding of the two subsequent country recipients (i.e., USD 83 million for the Philippines and USD 80 million for Vietnam).

Figure 6. Heatmap of ODA Grants in the Region, 2007-2016

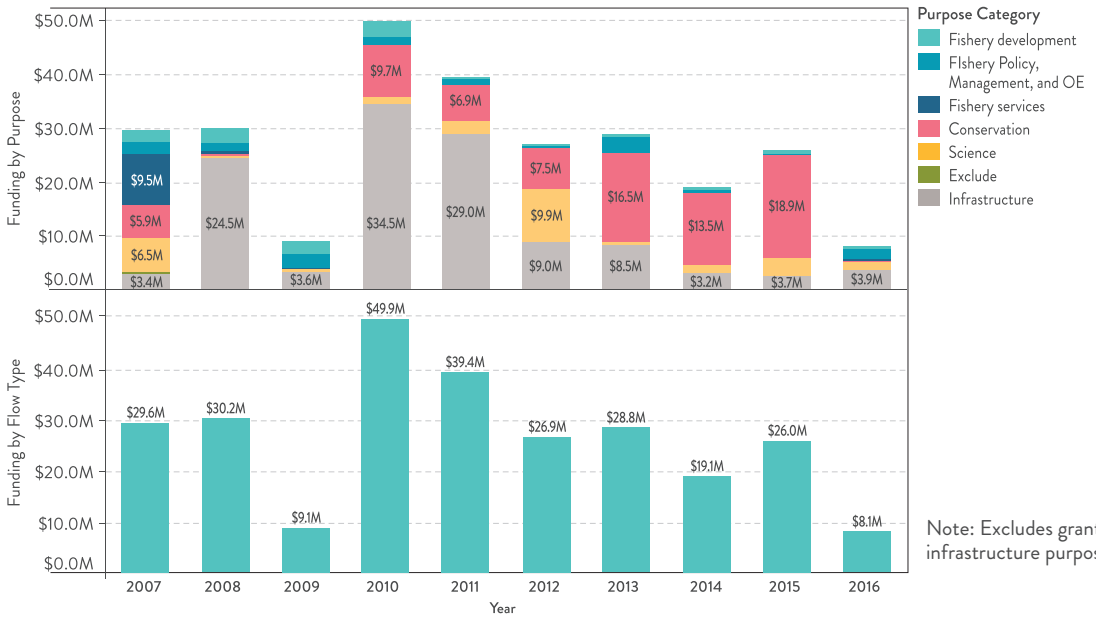


Note: Excludes grants with an infrastructure purpose code.

D. Marine-related ODA grant commitments over time

ODA grantmaking to Indonesia for marine-related purposes has not followed a consistent trendline over time, which may be attributed to the blended nature of ODA flows as opposed to being indicative of a specific trend in overall grantmaking. Marine-related ODA grants to Indonesia totaled USD 26 million in 2007 and USD 23 million in 2015, with fluctuations in interim years (Fig. 7). Of note, however, is that the Government of Indonesia cancelled numerous loans, including select projects from the World Bank and Asian Development Bank, as part of its recent approach to reduce the number of loans and shift to grants.

Figure 7. Annual Indonesia Marine ODA Grant Commitments, 2007-2015

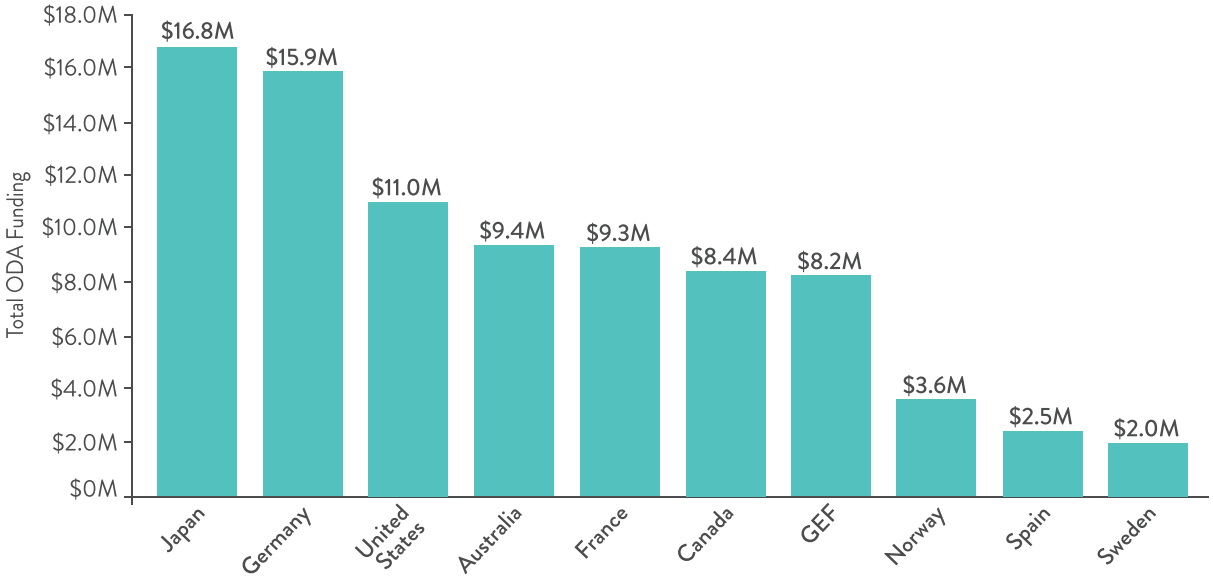


Note: Excludes grants with an infrastructure purpose code.

E. Top donors marine-related ODA grants to Indonesia

The leading three donors to Indonesia for marine-related ODA grants between 2007 and 2016 included Japan (USD 17 million), Germany (USD 16 million) and the United States (USD 11 million) (Figure 8).

Figure 8. Largest ODA Grantmakers to Indonesia, 2007-2016



Note: Excludes grants with an infrastructure purpose code.

Notable developments in recent years related to country-level commitments and partnerships include the following:

- Japan, the largest donor of marine-related grants in Japan in recent years, has been a key strategic partner to Indonesia—not only from a development perspective but also in terms of maritime security and market development. In 2017, the two countries launched the Japan-Indonesia Maritime Security Forum, with key goals of proactively partnering in maritime security and the development of Indonesia's outermost islands. Aside from traditional development funding, this partnership may be an approach by Japan to counter the influence of China, which has been expanding its presence in the South China Sea in recent years. Minister Pudjiastuti has also coordinated with Japan to negotiate the development of fishing ports and fish markets on six islands—Natuna, Sabang, Morotai, Saumlaki, Moa, and Biak islands—which are considered to have strong potential for capturing tuna and other fish for export to Japan, the largest importer of Indonesian tuna.
- USAID is implementing a five-year USD 40 million marine portfolio in Indonesia between 2016 and 2021. The largest portion of this portfolio is allocated to the Sustainable Ecosystems Advanced (SEA) Project, which seeks to use an ecosystem-based approach to reform fisheries management. The project is initially targeting provinces of West Papua, Maluku, and North Maluku (in WPP 715).

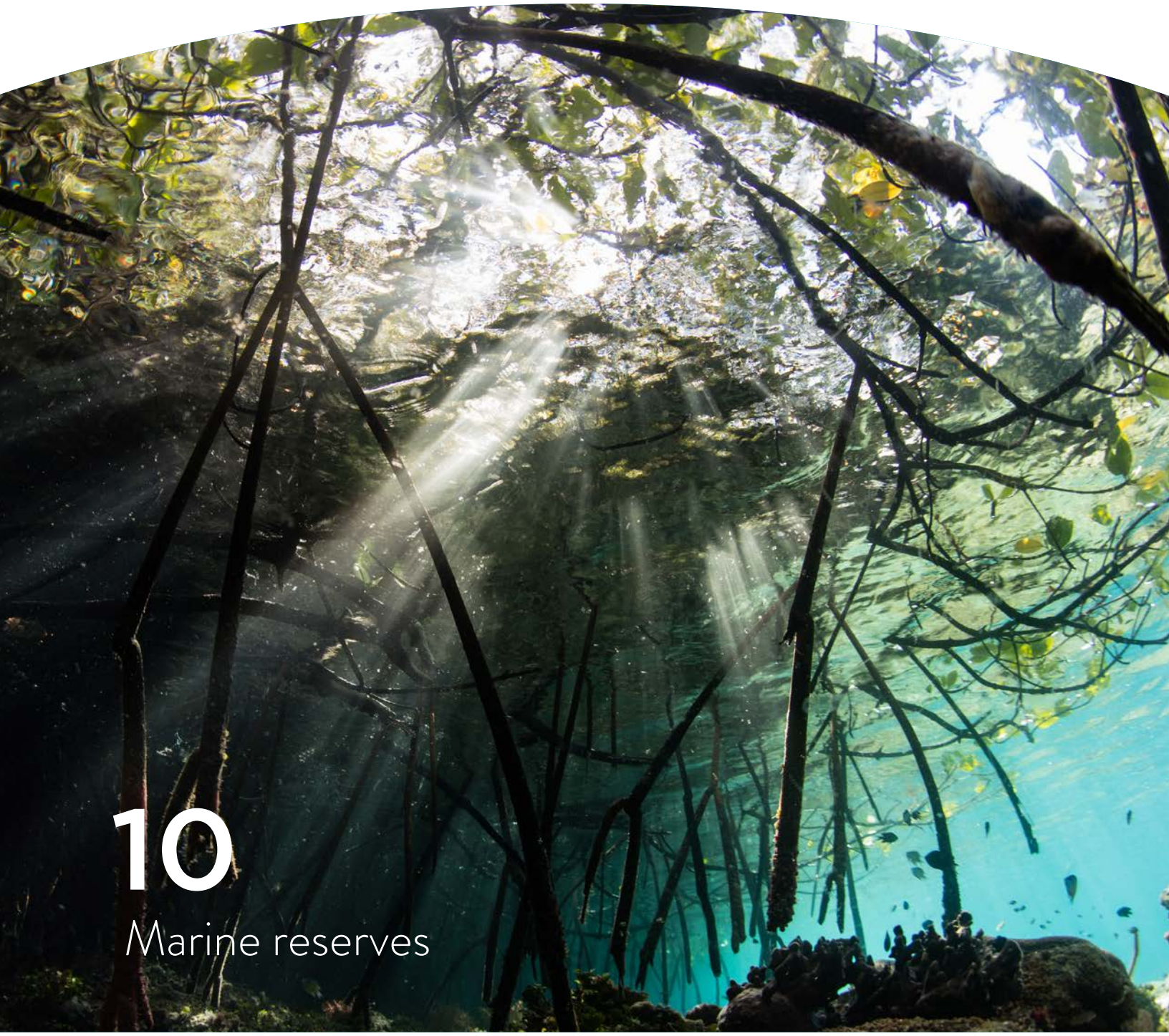
  In a unique collaboration between the development and philanthropic sectors, USAID formed a Global Development Alliance (GDA) with the Packard Foundation for the Supporting Nature and People – Partnership for Enduring Resources (SNAPPER) Project during 2016 to 2019. The objective of the SNAPPER Project, which is implemented by The Nature Conservancy, is to protect deep-slope marine ecosystems and to enhance the sustainability and profitability of deep-slope capture fisheries in WPP 573 and WPP 715. Additionally, USAID formed a GDA with the Walton Family Foundation to collaborate on marine biodiversity conservation and fisheries management initiatives in Indonesia for a combined commitment of USD 15 million.
- Norway made a commitment of USD 1.4 million to the Indonesia Ocean Trust Fund, managed by the World Bank, in January 2018.[6] The fund is intended to support national priorities on Indonesia's ocean agenda, with a focus on President Jokowi's goal to reduce marine plastic debris by 70 percent by 2025.

F. Top donors marine-related ODA grants to Indonesia

The largest marine-related ODA grants projects are provided in Table 2 below. These projects supported a wide range of purposes, from seafood product quality to MPA management, fisheries management, and livelihoods diversification.

Table 2. Largest ODA Grant Projects by Cumulative Commitment (Projects >$2M)

DONOR	GRANT COMMITMENT YEARS	GRANT COMMITMENT	PROJECT TITLE	DESCRIPTION
Japan (MOFA)	2007-2009	$9.5M	Promotion of Sustainable Coastal Fisheries	Minimize post-catch loss through construction of fishery facilities.
United States (USAID)	2012-2015	$8.3M	Coral Triangle Initiative: Indonesia Marine Protected Area Governance	Collaboration between USAID, WWF, TNC, and the Coral Triangle Center to support the Indonesian government in creating and managing Marine Protected Areas.
GEF	2013	$8.2M	Coral Triangle Initiative: Coral Reef Rehabilitation and Management	Increasing sustainable management of the coral reef ecosystem in Indonesia by enhancing management capacity in 10 target MPAs.
Germany (BMBF, Federal Ministry)	2007-2016	$5.7M	Science for the Protection of Indonesian Coastal Marine Ecosystems	Research projects on the impacts of marine pollution, carbon sequestration in the Indonesian Seas, resilience of coral reefs, mangrove ecology, and ocean potential for renewable energy.
Canada (CIDA)	2007	$4.8M	Tomini Bay Sustainable Coastal Livelihoods and Management	Protect and sustain sustainable livelihoods through equitable access and sustainable management of Tomini Bay resources.
Germany (BMF, BMU)	2012	$4.1M	Developing Resilient and Effective MPAs in the Lesser Sunda Ecoregion Restoring Coastal	Collaboration with TNC to develop a resilient and effectively managed MPA network in the Lesser Sunda Ecoregion
Canada (CIDA, GAC)	2010-2014	$3.6M	Livelihoods in South Sulawesi	Enhance the livelihood and well-being of vulnerable coastal communities on the west coast of South Sulawesi.
Norway (MFA)	2013-2015	$2.4M		Support MMAF in fish stock assessment, aquaculture, and fish meal production.



10
Marine reserves

Marine reserves

Prepared by
CEA

I. Overview of MPAs in Indonesia

The Indonesian Archipelago is at the heart of the Coral Triangle, a global hotspot for marine biodiversity and a priority for conservation. The Coral Triangle is home to 30 percent of the world's coral and has the highest diversity of coral and fishes in the world.

According to government data, Indonesia had declared 19.14 million hectares of Marine Protected Areas (MPAs) as of December 2017—or 96 percent of its total commitment to establish 20 million hectares by 2020.[1] While Indonesia has set aside notable expanses of marine and coastal areas for protection in recent decades, recent research has underscored the role of complementary factors—adequate staff and budget capacity, in particular—to make ocean protection work. A recent study found that globally, staff capacity and budget were the strongest predictors of fish population outcomes—even after accounting for factors such as MPA size, longevity, and presence or absence of fishing.[2]

MPA investments in Indonesia have delivered significant ecological, social, and economic benefits in many areas. Going forward, it will be important for the country to ensure that both old and new MPAs are adequately resourced to avoid underperformance. Additionally, it is essential to integrate MPA management with other coastal and marine management measures to design for adaptive capacity with emerging stressors (i.e., climate change and ocean acidification) and to mitigate against manageable threats (i.e., overfishing and IUU fishing).

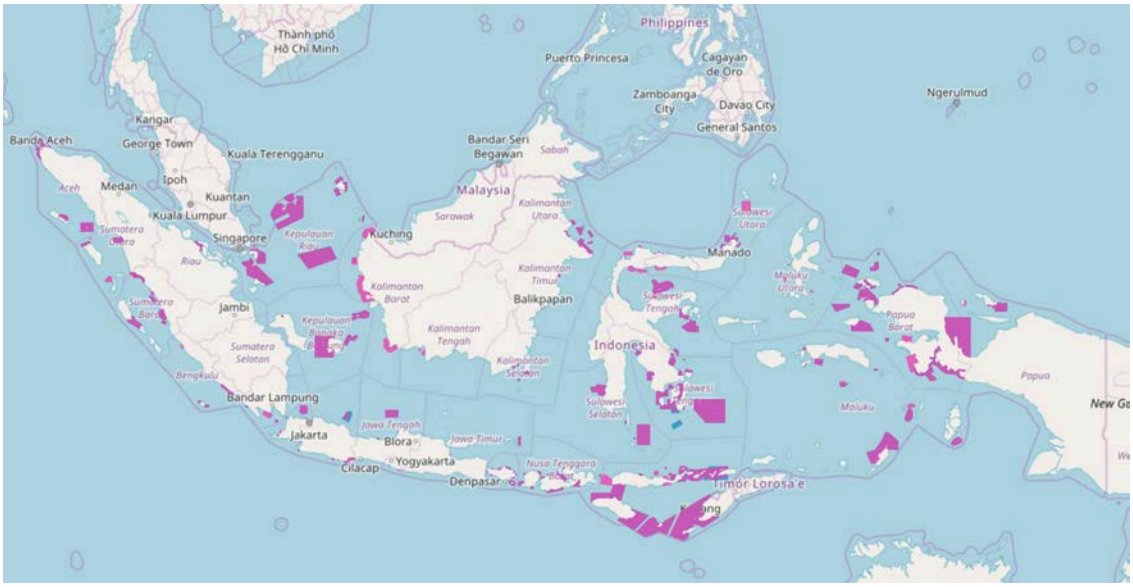
This chapter reviews the status of marine protection in Indonesia, trends and future directions for the sector, and provides a brief case study on monitoring results from the Bird's Head Seascape.

A. Status of marine protection in Indonesia

The first MPAs in Indonesia were established in the 1970s with the declaration of multiple national marine parks. As of December 2017, there were 172 MPAs (covering 19.14 million hectares) throughout Indonesia's marine and coastal areas.[3] There are various legal forms for marine area protection in Indonesia, including Marine Nature Tourism Park (*Taman Wisata Perairan*), Strict Marine Reserve (*Suaka Perairan*), Marine Sanctuary (*Daerah Perlindungan Laut*), Regional Marine Conservation Area (*Kawasan Konservasi Laut Daerah*), Coastal Reserve (*Suaka Pesisir*), Fisheries Reserve (*Suaka Perikanan*), and Marine National Parks (*Taman Nasional Perairan*).

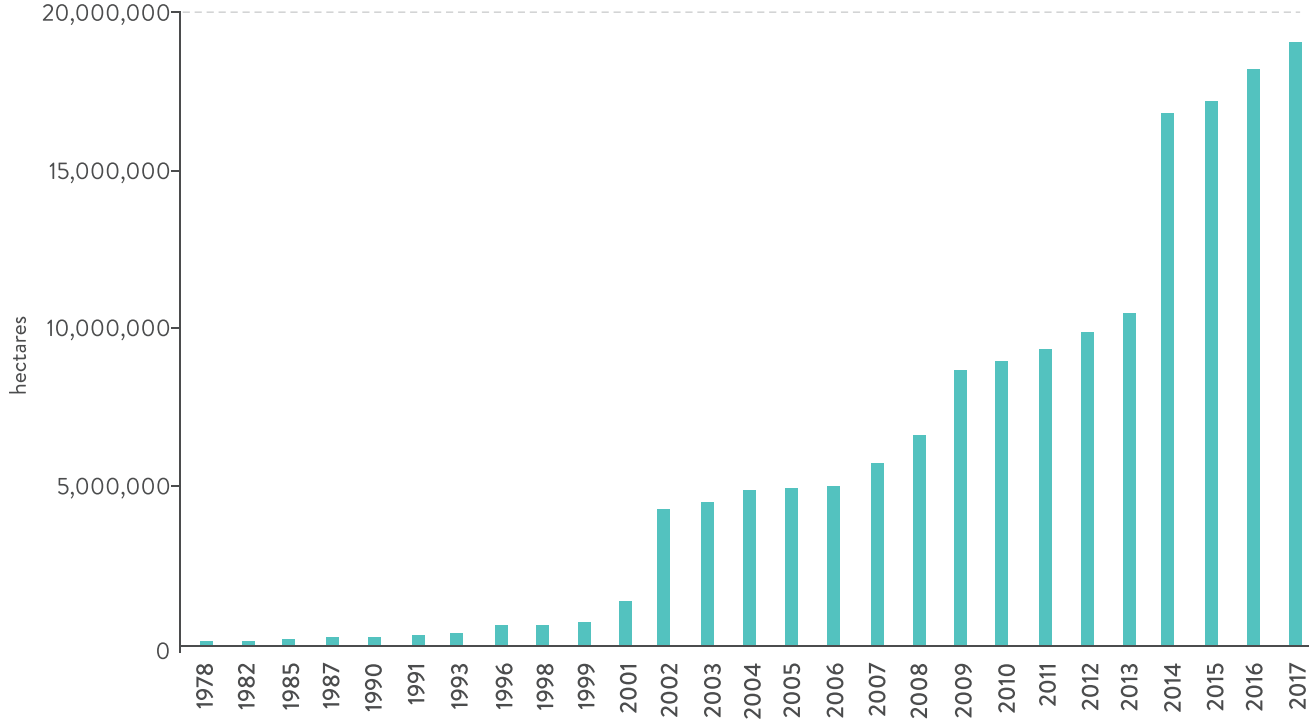
At the Coral Triangle Initiative Summit in 2009, then-President Susilo Bambang Yudhoyono declared a commitment to protect 20 million hectares of MPA in Indonesia by 2020. The MMAF, in coordination with the MEF and local governments, has been developing a nationwide system of MPAs which seeks to achieve this target (Fig. 1). Numerous international partners—such as those involved in a USAID-funded program called Marine Protected Areas Governance (including Conservation International, The Nature Conservancy, Wildlife Conservation Society, and World Wildlife Fund)—as well as dozens of local civil society and university partners have sought to support the Indonesian government in developing recommendations and spatial priorities for the country to achieve the 2020 target.[4]

Figure 1. Extent of MPAs in Indonesia, 2017



Based on a trendline of steadily increasing MPA designations in recent years, Indonesia appears to be on track to achieve its MPA target of 20 million hectares by 2020. According to MMAF data, the country had set aside 19.14 million hectares of MPAs as of 2017 (Fig. 2).[ii,5] Of particular note is the steady increase in MPA coverage following the announcement in 2009 to achieve 20 million hectares of coverage by 2020.

Figure 2. MPA Coverage in Indonesia, 1978-2017



Source: MMAF, 2018.

[ii] The MPA coverage measurements included in this report use the 2017 official MPA data from MMAF, which indicates the final size of MPAs as recorded in December 2017. This dataset includes measurements for MPAs that have been formally initiated.

II. Trends and future directions for the sector

There are several important trends in the sector, some of which are globally relevant and others which are unique to Indonesia, which carry implications for the current and future designation, management, and funding of MPAs. Those include:

1) The race to achieve country- and global-level targets may overshadow other key considerations, such as level of protection and implementation. Globally, countries are in a race against the clock to protect 10 percent of global ocean by 2020—a target set forth by the Convention on Biological Diversity's Aichi Target 11 and the UN's Sustainable Development Goal 14. Emerging efforts, such as the "MPA Truth Squad," which includes a coalition of practitioners and academics in the field, have lauded the interest in ocean protection but question whether the aspiration to show progress has led to incomplete accounting.

According to the MPA Truth Squad, there are two primary shortcomings in the way in which MPAs are currently perceived and accounted for. First, the level of protection provided by a MPA can vary widely, from light protection (i.e., an individual species is protected during only a specific time) to full protection (i.e., ban on all extractive activity). Marine reserves with full protection are utilized least often, though they can result in the most powerful benefits for ecosystem health. Secondly, the current accounting system does not differentiate between the levels of implementation for MPAs (i.e., under consideration, announced but not implementation, under implementation, or achieved). Furthermore, some countries may declare new MPAs but not follow through on actions necessary for officially designating and implementing protections on the water.

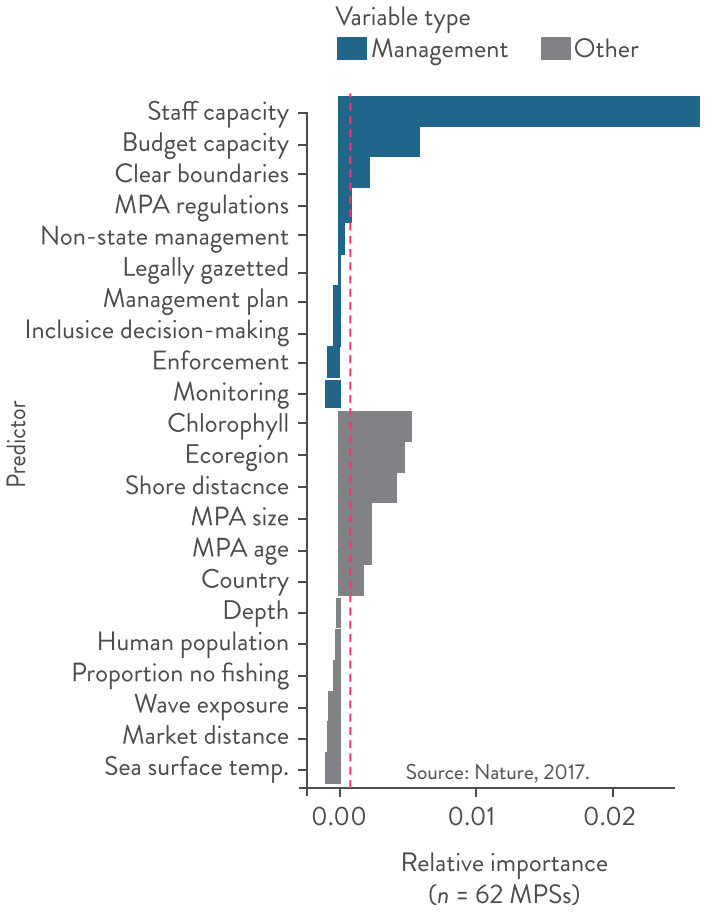
As it relates to MPAs in Indonesia, there are still numerous MPAs which lack an explicit zoning and management plan, which suggests that many MPAs exist only on paper. In order to ensure MPA effectiveness, it will be important for the Indonesian government to ensure thoughtful implementation and enforcement of existing MPAs, rather than declaring additional MPAs which may lack sufficient management capacity.

2) Bigger is not necessarily better. Nearshore protection is important, too. Globally, there has been a rise in designating large-scale marine reserves in remote areas, particularly as countries seek to meet their commitment targets.[6] In recent years, governments have declared numerous MPAs on the high seas, usually in areas with low levels of human commercial use, and industrial impact. While these declarations increase the overall coverage of the global MPA network, several of these areas are relatively untouched by direct impact of human activities.

In the case of Indonesia—which has an already crowded coastline with sensitive ecosystems and competing economic interests—spatial planning and marine protection in the coastal zone is critically important. Data from MPAtlas indicates that approximately 12.7 percent of Indonesia's nearshore waters (within 10 miles of coastline) are under some form of marine protection.[7] (As comparison, China has 2 percent of its nearshore waters under protection, while Chile has approximately 17 percent under protection.) In considering the extent of MPAs, it is important to differentiate between overall area protected and nearshore protection, given that coral reefs, mangroves, and other nearshore marine ecosystems typically have a greater diversity of species and face pressing threats such as overfishing, habitat degradation, tourism, development, and energy extraction.[8] While protecting vast expanses of open ocean is important, it should not replace the protection of coastal waters. Although the Indonesian government initially tended towards the creation of larger offshore MPAs, it appears that the number of nearshore MPAs has been increasing in recent years, which is a positive sign.[9]

3) Ensuring adequate staff and budget capacity is paramount to the successful performance of MPAs. Investments in MPA capacity development could led to positive ecological, social, and economic returns. A recent global study found that staff capacity and budget capacity were the strongest predictors in explaining fish responses to MPA protection (Fig. 3).[10] MPAs with adequate staff and budget capacity had fish recoveries which were three times as large as those without adequate capacity. This study found that only 35 percent of MPAs surveyed had a sufficient budget to manage the protected area, while only 9 percent had adequate staff capacity.

Figure 3. Relationship between MPA management processes and ecological impact



Random forest variable importance measures for management and other variables as they relate to ecological effects in 62 MPAs.

In both the global context and Indonesian context, there is a risk that as the number of MPAs increases, there may not be a simultaneous increase in capacity, which could result in the underperformance of both old and new MPAs. While several domestic and foreign-funded programs are aimed at supporting human capacity in the sector, the country is also experimenting with different approaches for ensuring financial sustainability, from tourism fees to allocations from government budgets and dedicated endowments, as in the case of the Blue Abadi Fund for the Bird's Head Seascape.

4) MPA planning and management is not a siloed issue; it is inextricably linked with fisheries management and environmental threats, such as the impacts of climate change, ocean acidification, habitat loss, and marine pollution. A universal theme for MPA management is that managers must consider the full suite of stressors, both visible (i.e., plastic debris) and invisible (i.e., ocean acidification), in terms of designing MPAs with adaptive capacity to deal with these threats. At the same time, MPA managers cannot address all stressors affecting the ocean, and thus it is important to pair MPA management with complementary management measures to mitigate against manageable threats, such as overfishing and IUU fishing.

Particularly in the case of Indonesia which has a high dependence on fisheries both for food security and livelihoods, MPAs can play a prominent role in supporting sustainable fisheries. Although important work remains, there are promising examples in Indonesia of embedding MPAs in larger spatial management processes, particularly as it relates to fisheries management. The government is implementing this approach in WPP 715 (North and Central Maluku), which it is considering for replication in other locations.[11] By accounting for human needs in terms of food security and livelihoods, MPAs have the potential to play a complementary role with sustainable fisheries management and biodiversity protection.

III. The case study of Bird's Head Seascape

The Bird's Head Seascape (BHS) is one of the most well-resourced MPA networks in the world, both financially and in terms of human resources devoted to the project. The BHS also has the most rigorous MPA impact monitoring program in the world through a unique global partnership among community members, NGOs, academics, and government officials. As such, the results from efforts to consistently and quantitatively report on ecological and social conditions across the BHS provide a unique vantage point for understanding common themes underpinning MPA management. It is worth emphasizing that the BHS is considered an outlier among MPAs, both globally and within Indonesia, given the massive scale of investment.[iii] For this reason, lessons learned may not be directly transferable to smaller-scale MPAs, but it is nonetheless worth examining whether the project is ultimately delivering on its conservation objectives.

CI, TNC, and WWF launched the Bird's Head Seascape Initiative in West Papua Province in 2004 given the extraordinary value of marine ecosystems in the region. (The BHS Seascape has more marine species than any other single place in the world.) The BHS MPA Network now includes 3.6 million hectares under protection as MPAs, representing approximately 20 percent of all MPAs in Indonesia (Fig. 4).[12] The goal of the MPA Network is to prioritize biodiversity conservation and sustainable local fisheries through an effective co-management system with local government, civil society, and community partners. The governments of Indonesia and the West Papua Province, in cooperation with local communities, have played pivotal roles in managing the BHS MPA Network and local fisheries.

Figure 4. Map of Bird's Head Seascape

Area: 22.5 million hectares
Key habitats: Coral reefs, mangroves, seagrass beds, marine lakes
Key species: Cetaceans, leatherback turtles, coral reef fishes
Population: ~350,000 individuals

Primary occupation: Agriculture, marine capture fisheries, wage labor
Threats: Destructive/illegal fisging, overharvesting, ecosystem impacts of fisheries, land-based development
Primary fishing gear: Hand-held gear, (e.g. gleaning, hand-held line, spear gun)

Source: BHS Coalition, 2015; WWF, 2018.

[iii] The Blue Abadi Fund, an endowment for the BHS MPA Network, will be the largest dedicated marine conservation fund in the world—at USD 38 million when fully capitalized. The intent of the fund is to provide long-term financial sustainability for the Seascape and to enable a complete transfer of management to local governments and communities.

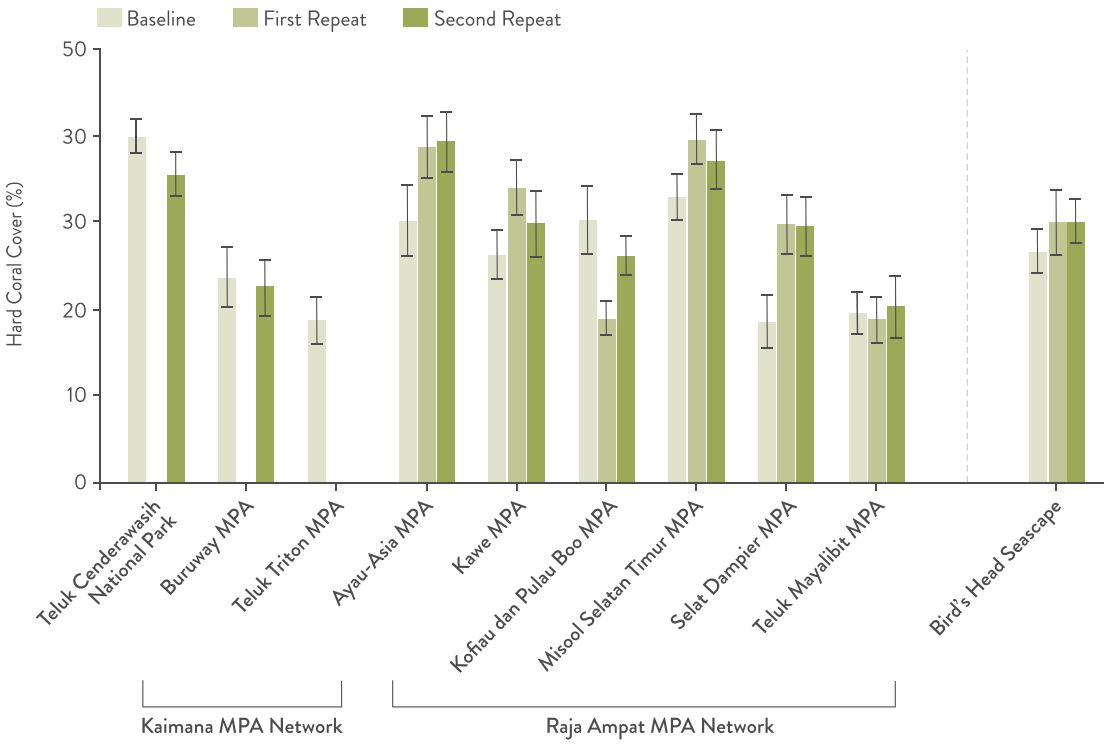
Several BHS monitoring partners—including Universitas Papua, CI, Rare, TNC, and WWF—conduct monitoring of ecological conditions, human well-being, and management in several MPAs across the BHS Seascape. Results from these scientific assessments are provided in editions of "The State of the Bird's Head Seascape Marine Protected Area Network" report, which provides a regular update on the status and trends in thirteen ecological, social, management, and governance indicators in the Seascape. The most recent report provided the following main findings:[13]

1) The overall picture is more nuanced than stating the conditions in the BHS are universally improving, remaining stable, or declining. A closer review of the detailed indicators of the assessment demonstrates that the status of ecosystem health, human well-being, MPA management, and marine resource governance is variable across the BHS MPA network.

2) All three ecosystem indicators (hard coral cover, key fisheries species, and fish functional group biomass) remain stable. In general, hard coral cover, biomass of key fisheries species, and biomass of fish functional groups are being maintained. Given the widespread declines in coral cover throughout the world, it is considered a positive sign of ecosystem health to maintain stable coral cover (rather than experience a net loss).[14] Furthermore, stability in coral cover may suggest that coral reefs of the BHS MPA Network may be more resilient to climate change.[15]

Even as trends in ecosystem health have remained stable at the Seascape level, it is worth noting that there was substantial variation among the Seascape's respective MPA Networks. For instance, coral cover increased in Kofiau dan Pulau Boo MPA, following a previous decline between 2010 and 2014. Coral cover has also increased in Selat Dampier MPA, while remaining stable over time in many other MPA sites (Fig. 5).

Figure 5. Percentage of Hard Coral Cover

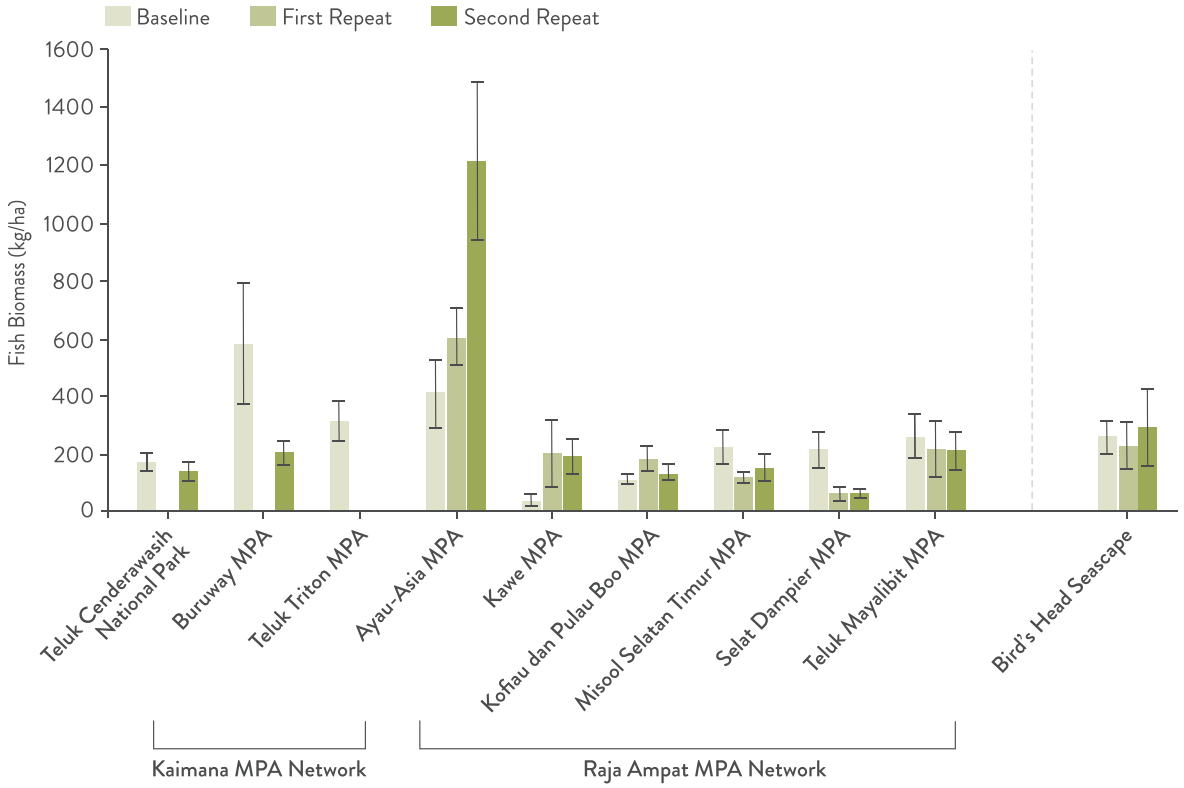


Note: Year of baseline and repeat monitoring at each MPA. Teluk Cenderawasih National Park: 2011, 2016; Buruway MPA: 2012, 2015; Teluk Triton Bay: 2013; Ayau-Asia MPA; 2010, 2014, 2016; Kawe MPA: 2010, 2014, 2016; Kofiau dan Pulau Boo MPA: 2010, 2014, 2016; Misool Selatan Timur MPA: 2011, 2013, 2015, Selat Dampier MPA: 2010, 2014, 2016; Teluk Mayalibit MPA: 2012, 2014, 2016.

3) In terms of whether fish biomass is increasing in the BHS MPA Network, the findings indicate that key fisheries species remain stable in most MPAs, though there are a few important caveats. First, the coalition began monitoring ecological conditions across the Seascape in 2007, which means that time-series data is limited given the longer timescale over which many ecological processes unfold. Secondly, there is inherent challenge in monitoring populations of highly mobile fish species.

As shown in Figure 6, key fisheries species biomass has remained stable across the full BHS MPA Network, though there is variation among the individual MPAs. In four of the seven BHS MPAs, key fisheries species biomass is increasing. The notable decrease in fish biomass in Buruway MPA is driving the Seascape-wide trend; when removed from the analysis, trends indicate that key fisheries biomass is increasing in the remaining BHS MPAs.

Figure 6. Biomass of Key Fisheries Species

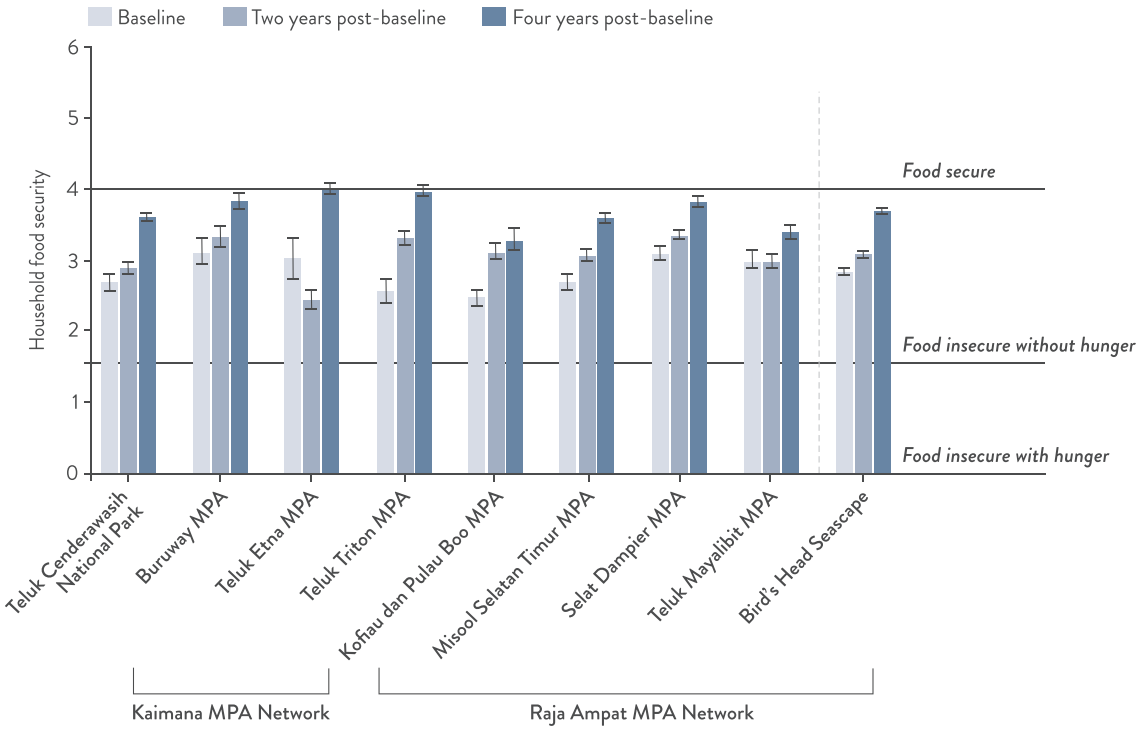


Note: Year of baseline and repeat monitoring at each MPA: Teluk Cenderawasih National Park: baseline 2010, repeat: 2012, 2014; Kaimana MPA Network: baseline 2012, repeat: 2014, 2016; Kofiau dan Pulau Boo MPA: baseline 2011, repeat: 2013, 2015; Misool Selatan Timur: baseline 2011, repeat: 2013, 2015; Selat Dampier MPA: baseline 2012, repeat: 2014, 2016; Teluk Mayalibit MPA: baseline 2010, repeat: 2012, 2014.

4) The trends in human well-being are highly variable across the Seascape: household food security and school enrollment rates have increased while household material assets and marine tenure have shown declines. An influx of government investment as well as improved market access may be driving household food security and school enrollment rates, whereas fuel price inflation and a transfer in management authority over marine resources may be key factors influencing household material assets and marine tenure. Given that trends in human well-being are generally consistent across the BHS MPAs, the project partners suggest that regional-scale political, economic, or social influences may be driving these trends as opposed to local-scale influences.

As shown in Figure 7, household food security has consistently increased in most BHS MPAs since the baseline collection. This increase may be connected to a combination of factors, such as the increased availability of fish, Provincial Government policies and investment programs, and improved market access.

Figure 7. Household Food Security Index

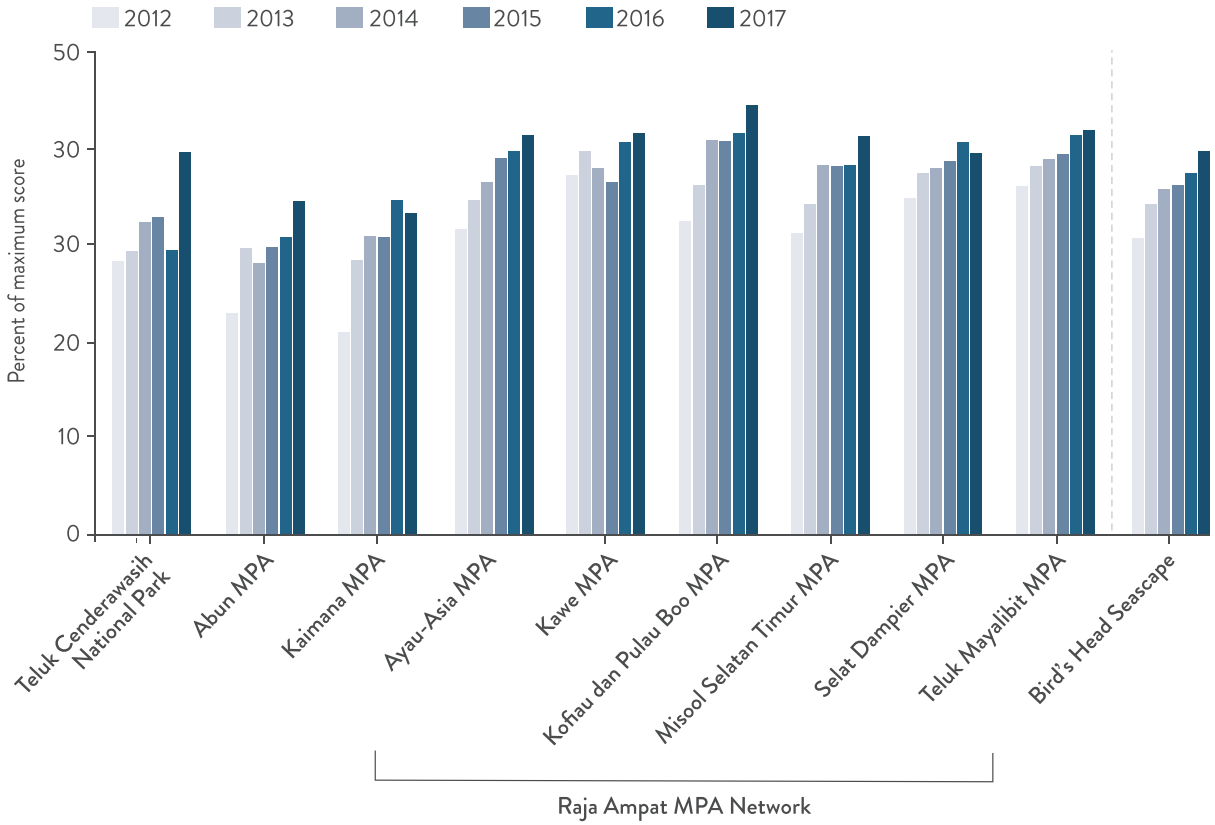


5) MPA management is continuing to improve over time in BHS MPA Network, according to the World Bank Scorecard management assessments.[16] All nine MPAs show increases in their respective management effectiveness scores during the time period 2012 to 2017 (Fig. 8). Variation between years in individual MPA performance may be related to differences in the interpretation of questions by assessors answering the score card. As a whole, this reported increase in management effectiveness is a promising trend given the role of management capacity in influencing MPA performance.[17]

While the BHS MPA Network has received substantial investment that is difficult to replicate at scale for other MPAs, the experience provides a valuable window into understanding whether conservation outcomes are being achieved, in spite of individual limitations in the methodology and time-series data. Additionally, the experience provides valuable learning for the broader field of conservation science and practice to understand how evidence-based approaches can inform the design and management of MPAs to improve conservation outcomes. While MPA monitoring in the Seascape is ongoing, the ideal scenario is for the coalition's regular assessments and reporting to inform adaptive management and decision-making for the BHS MPA Network. Anecdotal reports suggest that applying this knowledge to practice and decision-making is indeed occurring, at least in isolated cases if not yet at scale.

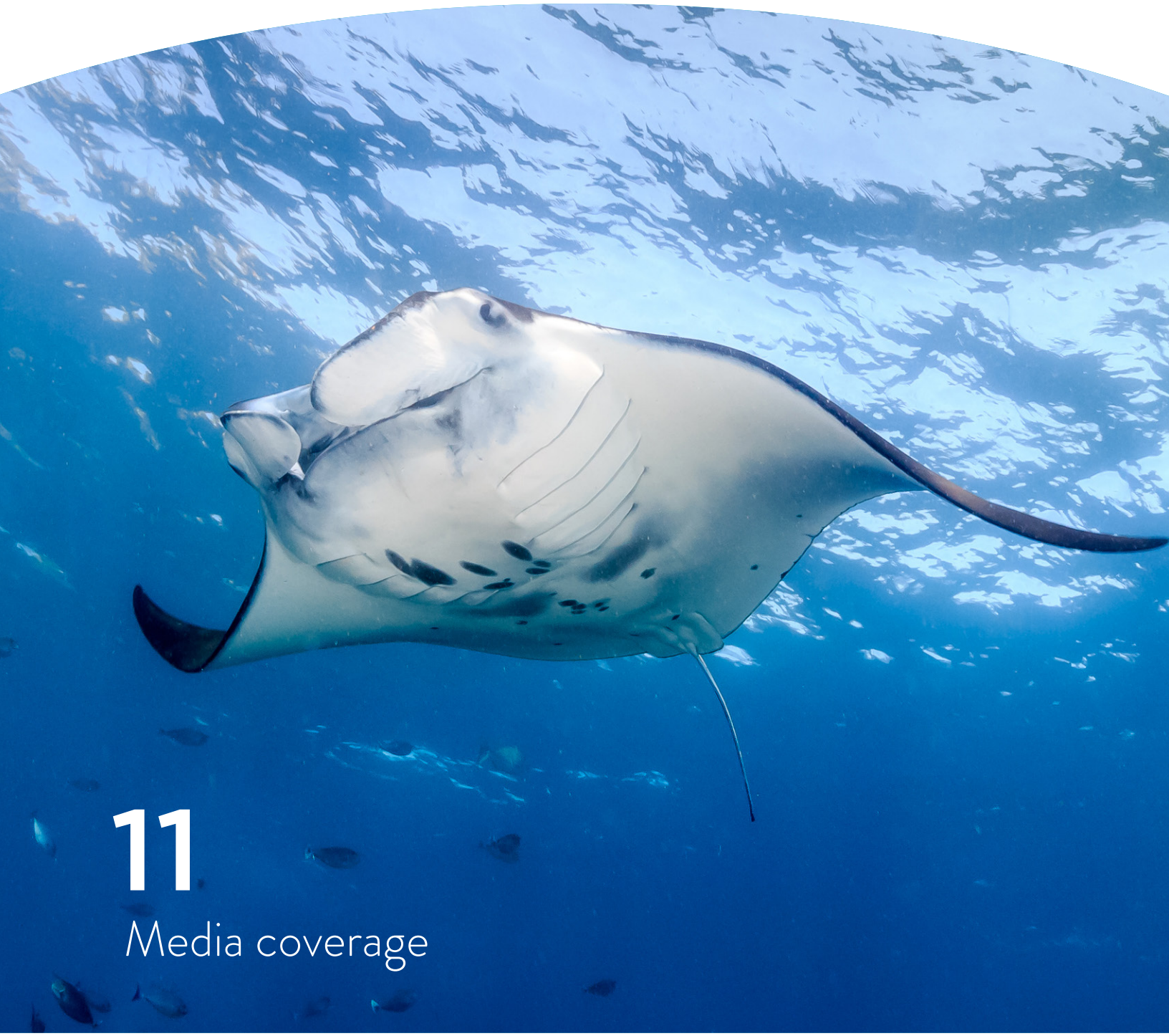
[iv] Household food security is defined as the ability of households to access safe, nutritious food in socially acceptable ways.

Figure 8. Changes in total management effectiveness score for nine BHS MPAs based on the World Bank MPA Scorecard



IV. Conclusion

MPA investments have produced noteworthy results—socially, ecologically, and economically—both globally and in Indonesia. However, the rapid expansion of MPAs without a parallel increase in investment (particularly for staff and budget capacity) has the potential to undermine MPA performance. Considering approaches for integrating MPA spatial management with fisheries resource management will be a key challenge and opportunity for stakeholders in Indonesia—including government, civil society, local community, and funders—going forward. Designing MPAs with adaptive capacity will also be critical to support these systems in confronting emerging stressors, such as climate change, ocean acidification, and pollution.



11
Media coverage

Media coverage

Prepared by
Mongabay

I. Overview

This chapter reviews trends in the level of media coverage on marine fisheries issues both over time and by public interest; coverage by Indonesian- and English-language media outlets and individual journalists; prominent social media influencers; and takeaways on the state of media coverage on fisheries issues in Indonesia.

In 2017, Indonesian media coverage of marine fisheries issues—both English-language and Indonesian-language—focused primarily on official government statements, trade and commerce (e.g., the fishing business), international relations (e.g., conflict with foreign fishers), and maritime security and law enforcement efforts, especially the sinking of illegal fishing vessels and enforcement of the trawl and seine net (cantrang) ban. Most of this coverage consisted of news articles rather than in-depth analysis or feature coverage. Fisheries management, MPAs, and the impacts of overfishing received substantially less coverage than the topics mentioned above. Stories highlighting sustainable fisheries management practices were few and far between. The select number of in-depth reporting stories with an investigative approach included articles on human trafficking, transshipment, declining supplies to canneries, and investments related to political interests and figures. Reporting that led to notable outcomes in raising awareness about the complexity of maritime and coastal resource management included stories on the rescue of hundreds of fishers from slavery in Benjina island (human trafficking), Natuna (assertion of sovereignty), the cantrang ban (fishing gear restriction), a moratorium on reclamation projects (economic development and protection of livelihoods), and lobster smuggling (illegal trade).

Catalysts for news coverage often were government announcements, events like conferences (e.g., the World Ocean Summit) and meetings between heads of state or other high-ranking officials, and dramatic breaking developments like ship sinkings. Rather than exploring new and complex issues related to fisheries, the media focused on events editorially deemed to have "news value" (such as government statements and actions) and stories that could be easily turned around (such as instances in which a press release or official statement could anchor an article). Fisheries issues were often given cursory mention in stories focused on the economy, maritime security, trade, and international relations.

WORLD OCEAN SUMMIT
February 22nd-24th 2017 • Bali, Indonesia

A. Year-over-year coverage

Media coverage of fisheries issues in Indonesia has risen year-over-year, according to multiple measures. The number of articles mentioning fisheries management or marine conservation in Indonesia's top media outlets increased each year from 2015 through 2017. For example, the ten focal Indonesian media outlets produced over 1,300 such stories in 2017, more than double the number in 2016 (598 stories) and 2015 (574 stories). The trend was similar across the broader set of Indonesian (Fig. 1) and English media outlets (Fig. 2).

Figure 1. News Articles in English Mentioning Indonesian Fisheries Management Issues, January 2014-December 2017

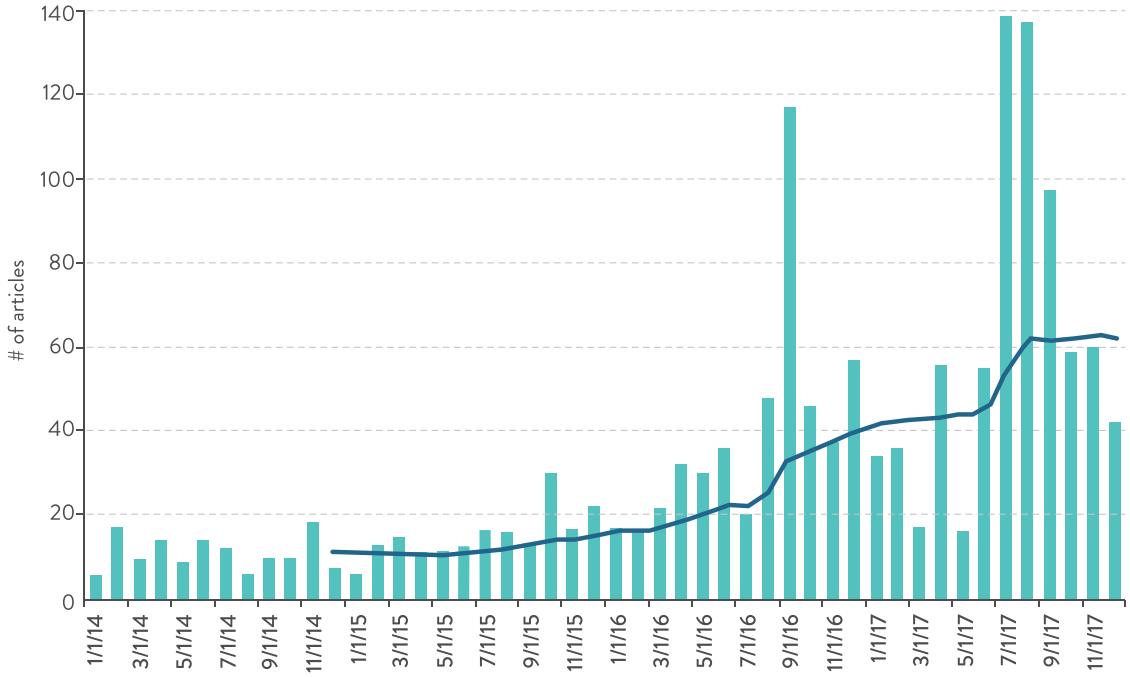
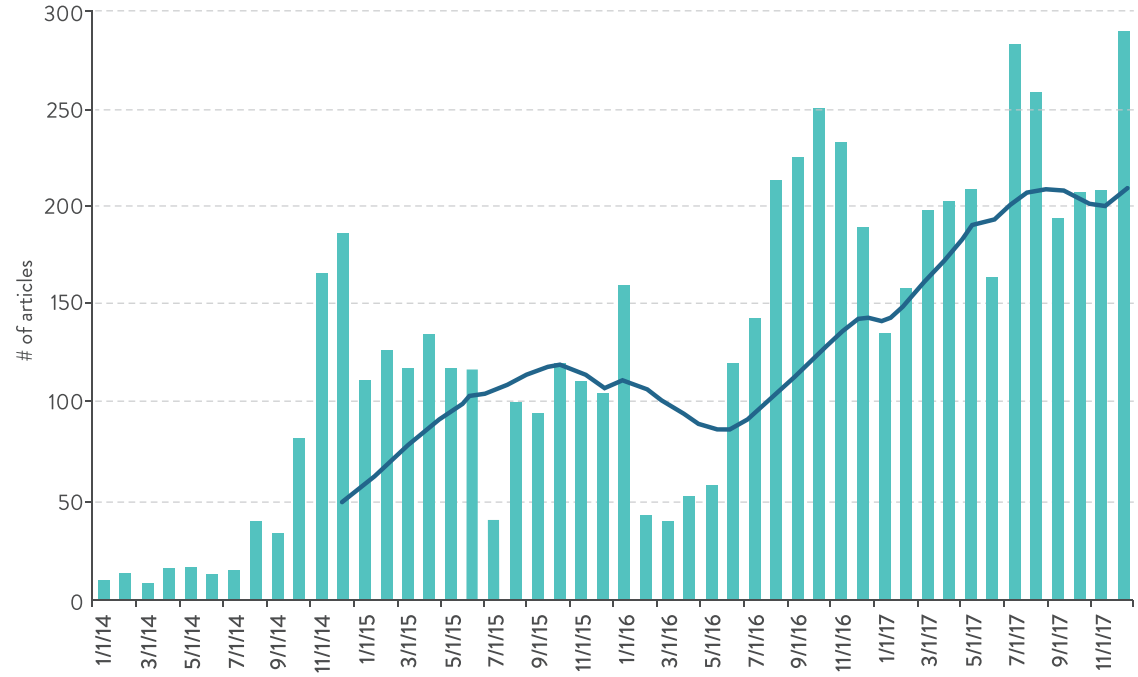


Figure 2. News Articles in Bahasa Indonesia Mentioning Indonesian Fisheries Management Issues, January 2014-December 2017



II. Trends in public interest

Public interest in fisheries management issues in Indonesia also appears to have increased. Google Trends data, when adjusted for the size of Indonesia's Internet audience, show a growing number of searches on various terms related to fisheries and marine conservation (Fig. 3). This trend is not mirrored for English-language searches on fisheries-related terms within Indonesia (Fig. 4). In other words, Indonesian-language queries from Indonesia on fisheries have risen more significantly than English-language queries from Indonesia on the same topic.

One hypothesis is that the strong personality of Minister Pudjiastuti and recent MMAF policies—which have been both lauded and criticized—have elevated the profile of marine and fisheries issues, which have not always garnered keen public interest. Historically, MMAF has not been positioned to receive substantial public attention. However, bold policies such as Minister Pudjiastuti's prominent position on IUU fishing and MMAF's role in a national campaign to increase national fish consumption rates have helped place fisheries issues into public dialogue.

Figure 3. Indonesian Public Interest in Fisheries-Related Issues, by Indonesian Keywords, 2010-2017

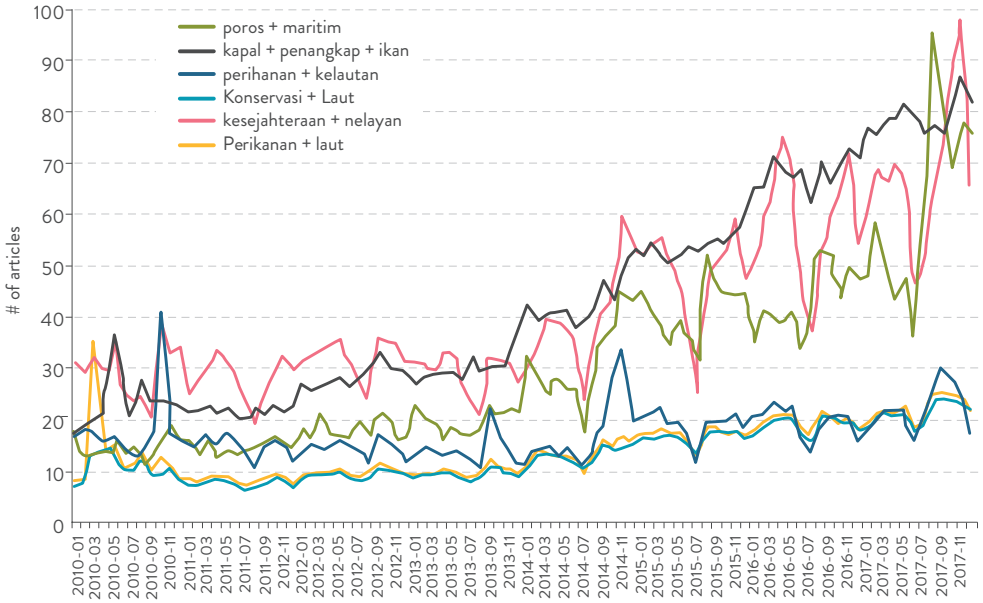
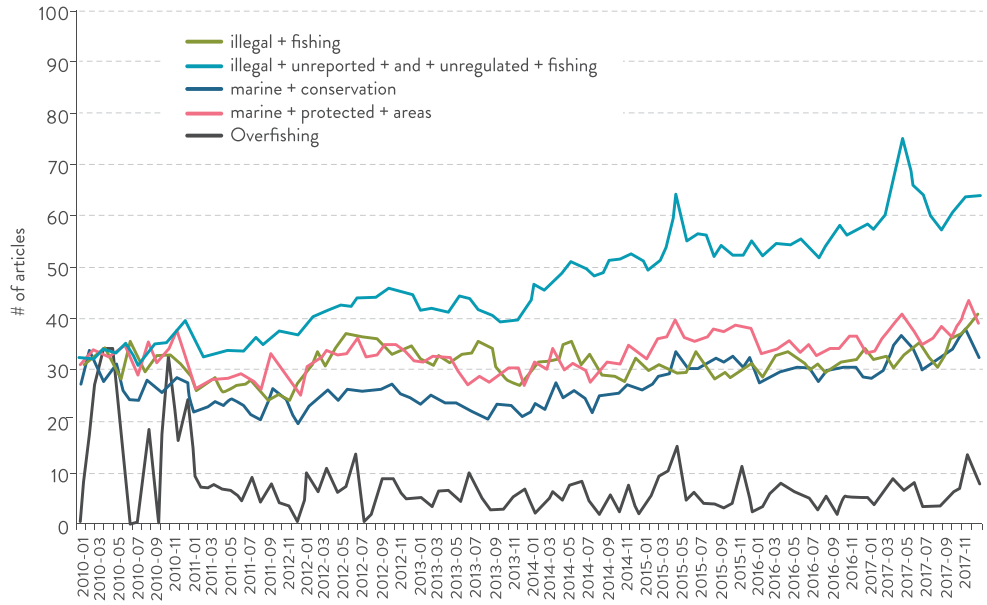


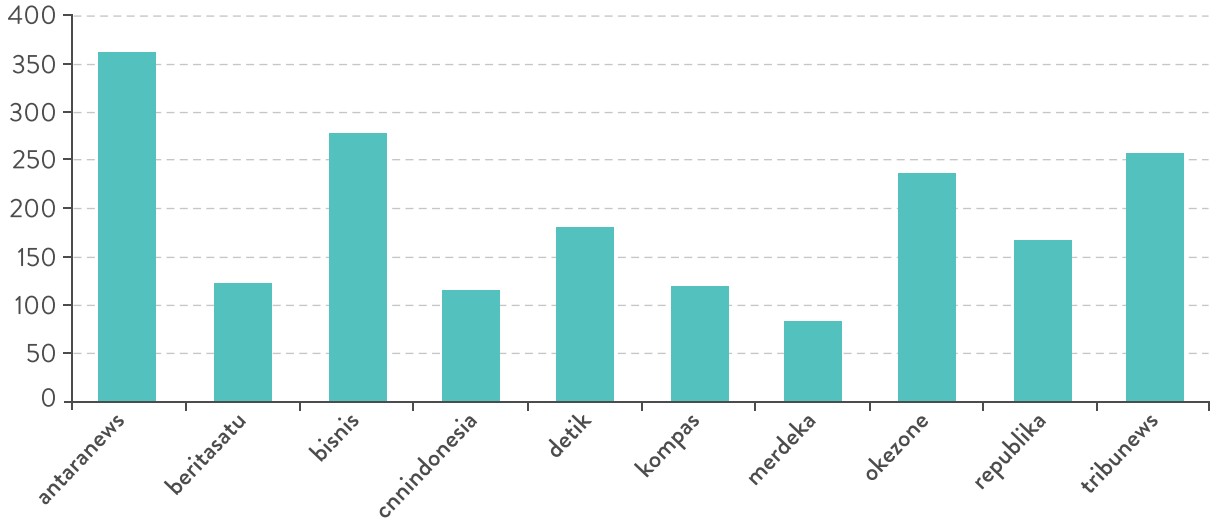
Figure 4. Indonesian Public Interest in Fisheries-Related Issues, by English Keywords, 2010-2017



III. Coverage by media outlets and journalists

The outlets that currently provide the most coverage of fisheries issues in Indonesian are Kompas (and Tribun News, part of Kompas group), ANTARA, Okezone, Detik, bisnis.com, and Republika, all of which are mostly producing straight news reporting, rather than features and analysis (Fig. 5). Gatra and Mongabay.co.id are generally producing more substantive, longer-form content than these outlets. As wire services, ANTARA and Kompas produce stories that are widely republished by other Indonesia media.

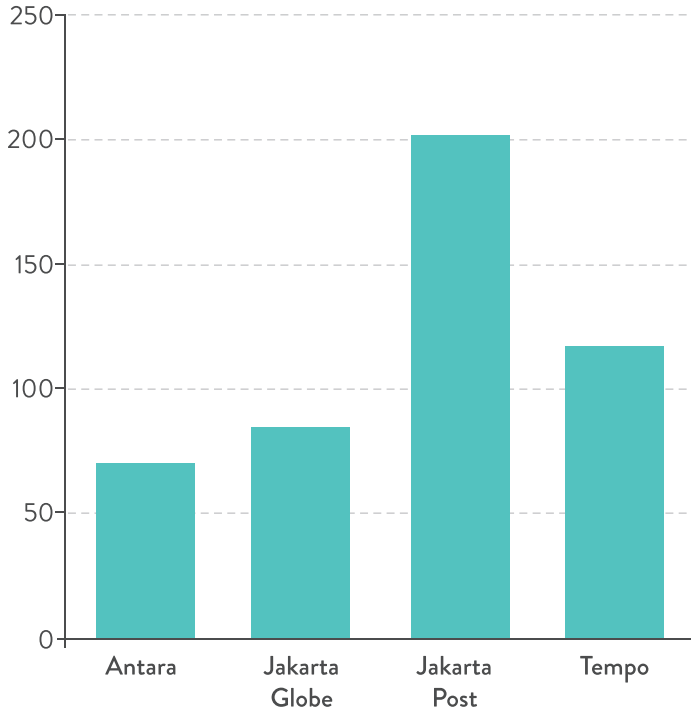
Figure 5. Marine Fisheries Stories in Major Indonesian Media Outlets, January 2015-December 2017



Indonesian-language news articles mentioning fisheries management issues, drawn from a set of ten popular publications.

Important English-language media outlets include The Jakarta Globe, The Jakarta Post, Tempo.co, and ANTARA. Influential foreign media outlets include NHK, Al Jazeera, BBC Indonesia, AFP (Agence France-Presse), VOA, and Xinhua (Fig. 6).

Figure 6. Marine Fisheries Stories in Major Indonesian Media Outlets, January 2015-December 2017



The journalists who have most frequently covered marine issues include M. Ambari from Mongabay.co.id and Ervan Bayu from Gatra magazine. Other authors who wrote several fisheries stories in 2017 were Sri Mas Sari for Bisnis.com, Eduardo Simorangkir for Detik.com, Siprianus Jewarut for JITUNEWS.COM, M. Razi Rahman for ANTARA, Tiara Sutari for CNN Indonesia, and Damiana aka Eme for Investor Daily. Arif Gunawan from *The Jakarta Post* and Basten Gokkon of Mongabay are among the most prolific English-language writers on these issues.

Indonesian-language news articles mentioning fisheries management issues, drawn from a set of ten popular publications.

A. Indonesian-language media coverage

MMAF Minister Pudjiastuti continued to attract substantial attention in Indonesian media coverage in 2017 due to her strong personality and bold approach to dealing with several policy issues, most notably illegal fishing. During 2017, critics increasingly questioned the effectiveness of the ship-sinking strategy, while MMAF claimed that it had already seen an increase in fish stocks as a result of the practice.

At the administration level, President Jokowi attracted significant press coverage related to fisheries. His administration has actively encouraged cooperation with other countries on the issue of IUU fishing, infrastructure, and fisheries industry investment. President Jokowi has called for more profitable investment, increased revenues from fisheries, and improvement of fishers' welfare. There was also extensive coverage on fisheries trade deals as well as on Indonesia's status as a global maritime power and the implications for sovereignty issues like fisheries management and access.

Other issues receiving significant media attention:

- **Fisheries busts:** Beyond ship sinking, law enforcement action garnered regular press coverage. Examples include attempts to smuggle contraband fisheries products like lobsters and arrests of fishers caught fishing illegally. These types of stories were typically based on a press release or press conference.
- **Fishing gear restrictions.** After banning the practice of trawling, President Jokowi received pushback from political supporters and fishing groups, raising questions about the government's enforcement of the ban. President Jokowi called for greater investment in aquaculture as a means to make up lost production from the trawling ban as well as a ban on harvesting juvenile lobsters.
- **Ocean infrastructure.** In late 2017, media outlets reported on the obstacles of marine infrastructure development related to President Jokowi's push to make Indonesia a global maritime power, including disparities between western and eastern Indonesia, bureaucratic challenges, and logistical issues like lack of electricity and transportation infrastructure.
- **Provincial marine zones.** The media covered challenges in coordinating fisheries management at the provincial level, including conflicts between business interests, local government, and small-scale fishers. An example is opposition from fishers to coastal reclamation and beach sand removal projects, which are often supported by property developers and politicians.
- **Encouraging tourism.** Indonesian media published a number of stories on Indonesia's push to promote new marine- and fishery-based tourism in an effort likened to creating "ten new Balis."[1] That effort includes highlighting the marine attractions of places like Lombok, Labuan Bajo (Komodo), Raja Ampat, Banda Neira, Morotai and Sabang.

B. English-language media coverage

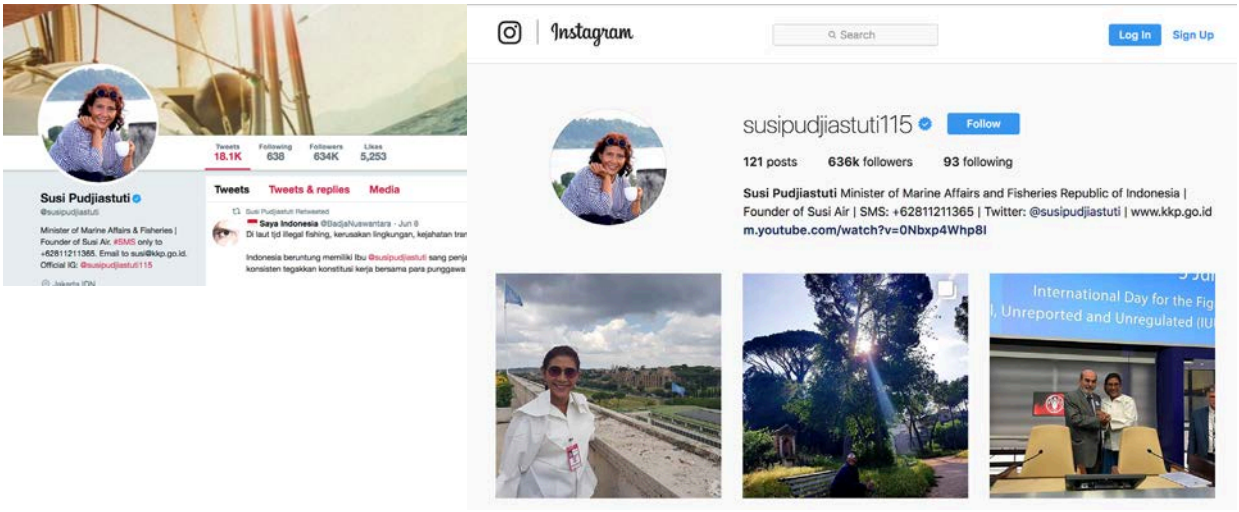
English-language coverage of fisheries issues was largely similar to that of Indonesian-language media coverage. Minister Pudjiastuti garnered substantial press, as did fisheries investment and trade, illegal fishing, and maritime conflicts over fishing rights. There was some coverage of philanthropy's efforts to reform the fisheries sector, marine conservation, human rights abuses in the fishing sector, and marine ecotourism. High-profile stories or exclusives in one outlet often yielded secondary coverage in other outlets.

Neither the Indonesian- nor the English-language press considered solutions to fisheries management challenges in any notable depth. The science of marine fisheries and the sustainability of current fishing practices received scant coverage. Illegality attracted more emphasis than sustainable fishing practices.

IV. Social media influencers

In Indonesia, social media (particularly Twitter, Facebook, and Instagram) play an important role in influencing public opinion. The most prominent social media influencer who regularly discusses marine conservation issues in Indonesia is Minister Pudjiastuti (Fig. 7), who is active on Twitter (social authority score[i] of 90, with 538,000 followers), Facebook (579,000 followers), and Instagram (520,000 followers).

Figure 7. Social Media Profile for Minister Pudjiastuti



No individual is close to Minister Pudjiastuti in terms of reach or social authority; the closest on Twitter are Suseno Sukoyono, Minister's Adviser at MMAF (58)[ii]; Rina Janwar, Chief of BKIPM at MMAF (52); Mohammad Zulficar Mochtar, MMAF (52); Daniel Johan, Deputy Chief of The People's Representative Council (48); and Jon Budi Prayogo, an activist (48).

Indonesian media outlets, companies, and NGOs focused exclusively on marine issues generally do not have a large-scale following on Facebook. WWF Indonesia (72), Greenpeace Indonesia (67), WALHI (63), TNC Indonesia (47), and SaveSharks Indonesia (41) have the largest following and most authority on Twitter among Indonesian NGOs involved in marine issues. International NGOs have a significantly larger following but lack an exclusive focus on Indonesia.

V. Key takeaways

Both year-over-year coverage and public interest in fisheries management issues in Indonesia have shown an increasing trend over the years. Press coverage in Indonesian media outlets in 2017 did not generally cover fisheries issues from an in-depth content perspective or propose solutions to fisheries management challenges. In contrast, the coverage was generally based on press releases, statements from officials, and press briefings. The articles generally fell under a broader beat, such as business and the economy, security, politics, or breaking news.

[i] Social authority score, which is set on a scale of 0 to 100, is calculated based on which accounts follow a user's Twitter handle and how that handle's tweets perform in terms of re-tweets and likes. The scores are provided by FollowerWonk, a social media analytics service that is operated by the marketing software company Moz.
[ii] Numbers listed in parentheses refer to the social authority score for social media influencers.

12 References

References

Executive Summary

[1] The World Factbook 2018. Washington, DC: Central Intelligence Agency, 2018.
[2] "Investing in Indonesia: Indonesia Business Update on Fisheries," BKPM, 2017.
[3] FAO Fisheries and Aquaculture Department. FishStat J-Software for Fisheries Statistical Time Series, updated July 21, 2016.
[4] Ibid.
[5] Ibid.
[6] National Fisheries Performance Slowed in Last Three Years", Tempo.co, January 15, 2018, https://bisnis.tempo.co/read/1050389/kinerja-perikanan-nasional-melambat-dalam-tiga-tahun-terakhir.
[7] Cabral R.B. et al., "Rapid and Lasting Gains from Solving Illegal Fishing," Nature Ecology and Evolution 2 (April 2018): 650-58.
[8] "Indonesia Buckles to Protests Against Seine Fishing Ban," Mongabay, January 25, 2018,https://news.mongabay.com/2018/01/indonesia-buckles-to-protests-against-seine-fishing-ban/; "Crackdown on Illegal Fishing Has Indonesian Fisheries Bouncing Back," Seafood Source, May 4, 2017, https://www.seafoodsource.com/news/environment-sustainability/crackdown-on-illegal-fishing-has-indonesian-fisheries-bouncing-back.
[9] "Harkell, Louis, "Nine million tons of farmed fish in Indonesia by 2019? Maybe not" Undercurrent News, August 18, 2017, https://www.undercurrentnews.com/2017/08/18/nine-million-tons-of-farmed-fish-in-indonesia-by-2019-maybe-not/
[10] Ibid.
[11] Seafood Intelligence Trading Portal, "Country Profile: Indonesia," 2018, https://seafood-tip.com/sourcing-intelligence/countries/indonesia/.
[12] FAO Fisheries and Aquaculture Department, "FishStat J."
[13] Bennett, Abigail, Pawan Patil, Kristin Kleisner, Doug Rader, John Virdin, and Xavier Basurto, "Contribution of Fisheries to Food and Nutrition Security: Current Knowledge, Policy, and Research," 2018, NI Report 18-02, Durham, NC: Duke University.
[14] FAO, "The State of World Fisheries and Aquaculture 2016," Rome, 2016.
[15] Tran, N. et al. "Indonesia Aquaculture Futures."
[16] Pudjiastuti, Susi, "Challenges in Public Policy: Lessons Learned from Indonesia's Fisheries Sector."
[17] Philips M., Henriksson PJG., Tran N., Chan CY., Mohan C.V., Rodriguez U-P., Suri S., Hall S., and Koeshendrajana S., "Exploring Indonesian Aquaculture Futures," 2015, Penang, Malaysia: WorldFish Program Report.
[18] Ibid.
[19] "Investing in Indonesia: Indonesia Business Update on Fisheries," BKPM, 2017.
[20] "National Fisheries Performance Slowed in Last Three Years," Tempo.co, January 15, 2018, https://bisnis.tempo.co/read/1050389/kinerja-perikanan-nasional-melambat-dalam-tiga-tahun-terakhir; "Indonesian Lawmakers at Odds"; "Potential Rise, Indonesia Fish Export."
[21] Pudjiastuti, Susi, "Challenges in Public Policy: Lessons Learned from Indonesia's Fisheries Sector."
[22] Gill, D.A. et al. "Capacity shortfalls hinder the performance of marine protected areas globally." 2017. Nature (543): 665-671.

Situational analysis

[1] Democracy Web, "Indonesia Country Study," 2016, http://democracyweb.org/human-rights-Indonesia.
[2] "Constitutional Court Rules Indigenous Faiths 'Acknowledged' by State," The Jakarta Post, November 7, 2017, http://www.thejakartapost.com/news/2017/11/07/constitutional-court-rules-indigenous-faiths-acknowledged-by-state.html.
[3] "Political Actors Take Advantage of Situation: Jokowi," The Jakarta Post, November 5, 2016, http://www.thejakartapost.com/news/2016/11/05/political-actors-take-advantage-of-situation-jokowi.html.
[4] "Bakamla Akui Kekurangan Kapal Patroli untuk Amankan Laut RI," Kompas.com, May 31, 2018, https://regional.kompas.com/read/2018/05/31/12092901/bakamla-akui-kekurangan-kapal-patroli-untuk-amankan-laut-ri
[5] "Bakamla trapped in overlapping agencies," The Jakarta Post, February 3rd 2015, http://www.thejakartapost.com/news/2015/02/03/bakamla-trapped-overlapping-agencies.html
[6] Dinanrto, Dedi, "Why Indonesia Needs to Reform Maritime Security Governance," ASEAN Studies Center, March 3, 2017, http://asc.fisipol.ugm.ac.id/indonesia-needs-reform-maritime-security-governance/.
[7] "The dilemma of Indonesia's coast guart," The Jakarta Post, February 11, 2015, http://www.thejakartapost.com/news/2015/02/11/the-dilemma-indonesia-s-coast-guard.html
[8] "Menteri Susi Temui Seniman yang Melukis Dirinya sebagai 'Wonder Woman' di Solo," Kompas.co, September 21, 2017, https://regional.kompas.com/read/2017/09/21/06182481/menteri-susi-temui-seniman-yang-melukis-dirinya-sebagai-wonder-woman-di-solo;"This Badass Mural of Indonesian Fisheries Minister Susi Pudjiastuti as Wonder Woman Is Pretty Much Perfect," Coconuts Jakarta, September 22, 2017, https://coconuts.co/jakarta/news/badass-mural-indonesian-fisheries-minister-susi-pudjiastuti-wonder-woman-pretty-much-perfect/.
[9] Indonesia: Fisheries minister goes from strength to strength, Asian Correspondent, May 18, 2017, https://asiancorrespondent.com/2017/05/indonesia-fisheries-minister-goes-strength-strength/#R19phwq5J7R5RoLU.97
[10] Cabral R.B. et al., "Rapid and Lasting Gains from Solving Illegal Fishing," Nature Ecology and Evolution 2 (April 2018): 650-58.
[11] "Collateral Damage in War Against Poachers," The Jakarta Post, http://www.thejakartapost.com/longform/2016/10/04/collateral-damage-in-war-against-poachers.html.
[12] International Labour Organization, "Indonesia ratifies the ILO Convention on Maritime Labour," 13 September 2016 http://www.ilo.org/jakarta/info/public/pr/WCMS_522323/lang--en/index.htm
[13] "Indonesia issues human rights decree for fisheries," The Jakarta Post, January 24, 2017, http://www.thejakartapost.com/news/2017/01/24/indonesia-issues-human-rights-decree-for-fisheries.html
[14] "Jokowi Vetoes Susi's Policy," The Jakarta Post, May 4, 2017, https://www.pressreader.com/indonesia/the-jakarta-post/20170504/281479276318508; "Muhammadiyah Reports Minister Susi to National Commission of Human Rights," Netral English, April 25, 2017, http://www.en.netralnews.com/news/currentnews/read/4754/muhammadiyah.reports.minister.susi.to.national.commission.of.human.rights; "DPR Krtitik Kinerja Kementrian Kalautan dan Perikanan," Sindonews.com, October 16, 2017, https://nasional.sindonews.com/read/1248677/12/dpr-kritik-kinerja-kementerian-kelautan-dan-perikanan-1508128863
[15] "PKB Show Off Hak Angket, Soal Cantrang Buktikan Cak Imin Tidak 'Paham Kepentingan Bangsa,""https://seword.com/politik/pkb-show-off-hak-angket-soal-cantrang-buktikan-cak-imin-tidak-paham-kepentingan-bangsa.

References

[16] Cabral R.B. et al., "Rapid and Lasting Gains from Solving Illegal Fishing," Nature Ecology and Evolution 2 (April 2018): 650-58.
[17] "Indonesia Buckles to Protests Against Seine Fishing Ban," Mongabay, January 25, 2018, https://news.mongabay.com/2018/01/indonesia-buckles-to-protests-against-seine-fishing-ban/; "Crackdown on Illegal Fishing Has Indonesian Fisheries Bouncing Back," Seafood Source, May 4, 2017, https://www.seafoodsource.com/news/environment-sustainability/crackdown-on-illegal-fishing-has-indonesian-fisheries-bouncing-back.
[18] Japan Helps Indonesia Develop Fishery Business Center, Tempo.co, August 8, 2017, https://en.tempo.co/read/news/2017/08/08/056898186/Japan-Helps-Indonesia-Develop-Fishery-Business-Center
[19] "Indonesia to Build Maritime, Fisheries Center in Nunukan: Minister," The Jakarta Post, March 24, 2017, http://www.thejakartapost.com/news/2017/03/24/indonesia-to-build-maritime-fisheries-center-in-nunukan-minister.html.
[20] "Harkell, Louis, "Nine million tons of farmed fish in Indonesia by 2019? Maybe not" Undercurrent News, August 18, 2017, https://www.undercurrentnews.com/2017/08/18/nine-million-tons-of-farmed-fish-in-indonesia-by-2019-maybe-not/
[21] "Indonesia's Bureaucratic Dead Wood: The Jakarta Post," The Straits Times, June 7, 2016, https://www.straitstimes.com/asia/se-asia/indonesias-bureaucratic-dead-wood-the-jakarta-post.
[22] Anggriani, Novi, "Indonesia's Village Law: A Step Toward Inclusive Governance," The Asia Foundation, February 17, 2016, https://asiafoundation.org/2016/02/17/indonesias-village-law-a-step-toward-inclusive-governance/.
[23] "Minister: Village Funds Increase to 120 Trillion in 2018," Tempo.co, March 28, 2017, https://en.tempo.co/read/news/2017/03/28/055860194/Minister-Village-Funds-Increase-to-120-Trillion-in-2018.
[24] "Government Cancels Plans to Double Village Fund in 2018," The Jakarta Post, December 13, 2017, http://www.thejakartapost.com/news/2017/12/13/government-cancels-plans-to-double-village-fund-in-2018.html.
[25] "Govt to Revamp Village Funds Scheme," The Jakarta Post, December 4, 2017, http://www.thejakartapost.com/news/2017/12/04/govt-revamp-village-funds-scheme.html.
[26] Ibid.
[27] "Outlook Dana Desa 2018 Potensi Penyalahgunaan Anggaran Desa di Tahun Politik," https://antikorupsi.org/sites/default/files/outlook_desa_2018_-_icw.pdf.
[28] Anggriani, Novi, "Indonesia's Village Law."
[29] Antlov, Hans, Leni Dharmawan & Anna Wetterberg, "The Promise and Pitfalls of Indonesia's Village Law," New Mandala, August 29, 2016, http://www.newmandala.org/promise-pitfalls-indonesias-village-law
[30] Zakaria, Yando & Jacqueline Vel, "New Law, Old Bureaucracy," Inside Indonesia, May 9, 2017, http://www.insideindonesia.org/new-law-old-bureaucracy.
[31] "Jokowi Says Progress on Maritime Infrastructure Insufficient," Jakarta Globe, March 30, 2016, http://jakartaglobe.id/news/jokowi-says-progress-maritime-infrastructure-insufficient/.
[32] Ekawati, Janet Dyah, "Indonesia's Global Maritime Axis Askew," Australian Institute of International Affairs, May 19, 2016, http://www.internationalaffairs.org.au/australianoutlook/indonesias-global-maritime-axis-askew/.
[33] "Jokowi Chasing $196b to Fund 5-Year Infrastructure Plan," The Straits Times, January 27, 2018, https://www.straitstimes.com/asia/se-asia/jokowi-chasing-196b-to-fund-5-year-infrastructure-plan.
[34] "3 Tahun Jokowi: Tol Laut Diklaim Tekan Disparitas Harga," CNN Indonesia, October 18, 2017, https://www.cnnindonesia.com/ekonomi/20171017201816-92-249094/3-tahun-jokowi-tol-laut-diklaim-tekan-disparitas-harga.
[35] "Jokowi Chasing $196b."
[36] "Indonesia's Tax Amnesty Passes its Deadline," The Economist, March 30, 2017, https://www.economist.com/news/finance-and-economics/21719822-it-brought-windfall-has-been-criticised-letting-evaders.
[37] Global Subsidies Initiative and International Institute for Sustainable Development, "Indonesia Energy Subsidy Review," March 2015, https://www.iisd.org/gsi/sites/default/files/ffs_indonesia_reviewi2v1_english.pdf.
[38] "Indonesian President Turns to Populist Policies Ahead of Tough 2019 Election," Reuters, April 25, 2018, https://www.reuters.com/article/us-indonesia-politics-policy-analysis/indonesian-president-turns-to-populist-policies-ahead-of-tough-2019-election-idUSKBN1HW0XQ.
[39] "Jokowi's War on Inflation Puts Populism 1st, Reform 2nd," The Malaysian Reserve, May 3, 2018, https://themalaysianreserve.com/2018/05/03/jokowis-war-on-inflation-puts-populism-1st-reform-2nd/.
[40] "A Child of the Slum Rises as President of Indonesia," The New York Times, July 22, 2014, https://www.nytimes.com/2014/07/23/world/asia/joko-widodo-populist-governor-is-named-winner-in-indonesian-election.html.
[41] "SBY Declares Support for Jokowi in 2019 Election," Tempo.co, March 10, 2018, https://en.tempo.co/read/news/2018/03/10/055916503/SBY-Declares-Support-for-Jokowi-in-2019-Election.

Political trends

[1] MMAF Strategic Plan 2015-2019.
[2] "Minister Luhut Launches Indonesian Ocean Policy in World Ocean Conference," Netral News, June 7, 2017, http://www.en.netralnews.com/news/business/read/6833/minister.luhut.launches.indonesian.ocean.policy.in.world.ocean.conference.
[3] "3 Years Later, Where is Indonesia's 'Global Maritime Fulcrum?'" The Diplomat, November 22, 2017, https://thediplomat.com/2017/11/3-years-later-where-is-indonesias-global-maritime-fulcrum/.
[4] "Indonesia Boosts its Air and Sea Denial Capabilities," Asia Times, November 20, 2017, http://www.atimes.com/indonesia-boosts-air-sea-denial-capabilities/.
[5] "3 Years Later."
[6] "How Can Indonesia Win Against Plastic Pollution?" The Conversation, September 5, 2017, https://theconversation.com/how-can-indonesia-win-against-plastic-pollution-80966.
[7] "Luhut Asks South Korea to Invest in Maritime Sector," Antara News, December 20, 2017, https://en.antaranews.com/news/113946/luhut-asks-south-korea-to-invest-in-maritime-sector.
[8] "Indonesia Pledges $1bn a Year to Curb Ocean Waste," The Guardian, March 2, 2017, https://www.theguardian.com/environment/the-coral-triangle/2017/mar/02/indonesia-pledges-us1-billion-a-year-to-curb-ocean-waste; "Indonesia to Reduce Plastic Waste 70% by 2025," Jakarta Globe, February 24, 2017, http://jakartaglobe.id/news/indonesia-to-reduce-plastic-waste-70-by-2025/.
[9] "Coordinating Minister for Maritime Affairs Inaugurates Two Ships for Sail Sabang," The Jakarta Post, November 21, 2017, http://www.thejakartapost.com/travel/2017/11/21/coordinating-minister-for-maritime-affairs-inaugurates-two-ships-for-sail-sabang.html.
[10] "Indonesia Targets Tourism Growth to Boost Revenue," The Straits Times, April 12, 2017, http://www.straitstimes.com/asia/se-asia/indonesia-targets-tourism-growth-to-boost-revenue.
[11] Ibid.
[12] "Indonesia Declares More Outermost Islands," The Jakarta Post, March 12, 2017, http://www.thejakartapost.com/news/2017/03/12/indonesia-declares-more-outermost-islands.html.

[13] "Why China Never Draws a Boundary Line Around its Claim to the South China Sea," Forbes, October 31, 2017, https://www.forbes.com/sites/ralphjennings/2017/10/31/china-claims-most-of-a-contested-asian-sea-without-a-demarcation-line/#6545e0822e07; "Indonesia New North Natuna Sea: A Response to an Old China Problem," The Diplomat, August 3, 2017, https://thediplomat.com/2017/08/indonesia-new-north-natuna-sea-a-response-to-an-old-china-problem/.

[14] Jennings, Ralph, "Why China Never Draws a Boundary Line Around its Claim to the South China Sea," Forbes, October 31, 2017, https://www.forbes.com/sites/ralphjennings/2017/10/31/china-claims-most-of-a-contested-asian-sea-without-a-demarcation-line/#6bb3105c2e07.

[15] "Indonesia New North Natuna Sea: A Response to an Old China Problem"; "Indonesia Sounds a Soft Warning in Renaming Part of Disputed Sea," VOA, July 19, 2017, https://www.voanews.com/a/indonesia-sounds-a-soft-warning-in-renaming-part-of-disputed-sea/3950098.html.

[16] "China is Waging a Global Fisheries War," The Japan Times, October 30, 2017, https://www.japantimes.co.jp/opinion/2017/10/30/commentary/world-commentary/china-waging-global-fisheries-war/#.WgxvNBOPJ0s.

[17] "Philippines Identifies Sites in South China Sea for Potential Joint Exploration with China," South China Morning Post, March 3, 2018, http://www.scmp.com/news/china/diplomacy-defence/article/2135545/philippines-identifies-sites-south-china-sea-potential.

[18] "Why Did Indonesia Just Rename its Part of the South China Sea?" The Diplomat, July 17, 2017, https://thediplomat.com/2017/07/why-did-indonesia-just-rename-its-part-of-the-south-china-sea/; "Indonesia's New North Natuna Sea: What's in a Name?" July 19, 2017, https://www.lowyinstitute.org/the-interpreter/indonesia-s-new-north-natuna-sea-what-s-name.

[19] "China Demands Indonesia Drop New Name for Natuna Waters," The Jakarta Post, September 3, 2017, http://www.thejakartapost.com/news/2017/09/03/china-demands-indonesia-drop-new-name-for-natuna-waters.html.

[20] "Government Extends Use of Trawls for Fishermen," Antara News, May 4, 2017, https://en.antaranews.com/news/110781/government-extends-use-of-trawls-for-fishermen.

[21] "New Fishing Rules Threaten Livelihood of Nearly 1 Million People: Kadin," The Jakarta Post, January 18, 2017, http://www.thejakartapost.com/news/2017/01/18/new-fishing-rules-threaten-livelihood-of-nearly-1-million-people-kadin.html.

[22] "Government Extends Use of Trawls for Fishermen."

[23] "Disallow Cantrang, Komnas HAM: Minister Susi Fails the Right of Fishermen," Tempo.co, October 2, 2017, https://bisnis.tempo.co/read/1021448/larang-cantrang-komnas-ham-menteri-susi-langgar-hak-nelayan.

[24] "Chaotic Rules on Trawling Nets," Tempo.co, May 17, 2017, https://en.tempo.co/read/news/2017/05/17/314876046/Chaotic-Rules-on-Trawling-Nets.

[25] "Disallow Cantrang, Komnas HAM: Minister Susi Fails the Right of Fishermen," Tempo.co, October 2, 2017, https://bisnis.tempo.co/read/1021448/larang-cantrang-komnas-ham-menteri-susi-langgar-hak-nelayan; "Jokowi Tells Minister to Extend Use of Fishing Trawlers," The Jakarta Post, May 3, 2017, http://www.thejakartapost.com/news/2017/05/03/jokowi-tells-minister-to-extend-use-of-fishing-trawlers.html; "Indonesia Buckles to Protests Against Seine Fishing Ban," Mongabay, January 25, 2018, https://news.mongabay.com/2018/01/indonesia-buckles-to-protests-against-seine-fishing-ban/.

[26] "Government to Distribute Fishing Equipment to Replace 'Cantrang,'" The Jakarta Post, July 13, 2017, http://www.thejakartapost.com/news/2017/05/03/jokowi-tells-minister-to-extend-use-of-fishing-trawlers.html.

[27] "Opinion: Overcoming Resistance to Save Our Fish and Oceans," The Jakarta Post, July 27, 2017, http://www.thejakartapost.com/academia/2017/07/27/overcoming-resistance-to-save-our-fish-and-oceans.html.

[28] NOAA, https://www.fisheries.noaa.gov/topic/international-affairs#iuu-fishing.

[29] "USAID, IPNLF Team Up on Indonesian Tuna Traceability," undercurrentnews, May 9, 2017, https://www.undercurrentnews.com/2017/05/09/usaid-ipnlf-team-up-on-indonesian-tuna-traceability/; "Indonesia Urges UN to Declare Fish Theft a Transnational Crime," VOA News, June 10, 2017, https://www.voanews.com/a/indonesia-urges-united-nations-declare-fish-theft-transnational-crime/3895243.html.

[30] "Protecting Our Waters from Fisheries Crimes," The Jakarta Post, June 14, 2016, http://www.thejakartapost.com/academia/2016/06/14/protecting-our-waters-from-fisheries-crime.html.

[31] Husein, Y., "Strategy on Combating IUU Fishing and Post-Moratorium Policies Plan," Presentation to Symposium on FishCRIME, October, 12-13, 2015, Cape Town, South Africa, http://www.fishcrime.info/assets/Uploads/Yunus-Husein-Indonesian-Approach-To-Tackling-Fisheries-Crime.pdf.

[32] Ibid.

[33] "Susi Insists on Continuing Her Ship-Sinking Policy," The Jakarta Post, January 10, 2018, http://www.thejakartapost.com/news/2018/01/10/susi-insists-on-continuing-her-ship-sinking-policy.html.

[34] "Minister Susi Rejects Idea to Auction Off Confiscated Fishing Boats," The Jakarta Post, July 24, 2017, http://www.thejakartapost.com/news/2017/07/24/minister-susi-rejects-idea-to-auction-off-confiscated-fishing-boats.html.

[35] "Why Boat Sinking is Controversial," The Jakarta Post, February 8, 2018, http://www.thejakartapost.com/academia/2018/02/08/why-boat-sinking-policy-is-controversial.html; "Indonesian Lawmakers at Odds Over Destroying Poaching Vessels," Arab News, January 13, 2018, http://www.arabnews.com/node/1224636/world.

[36] "Business Group Supports End to Ship-sinking Policy," The Jakarta Post, January 11, 2018, http://www.thejakartapost.com/news/2018/01/11/business-group-supports-end-to-ship-sinking-policy.html.

[37] "Susi Insists on Continuing Her Ship-Sinking Policy," The Jakarta Post, January 10, 2018, http://www.thejakartapost.com/news/2018/01/10/susi-insists-on-continuing-her-ship-sinking-policy.html.

[38] "Finally, A Game Changer Against Illegal Fishing," The Jakarta Post, August 11, 2016, http://www.thejakartapost.com/academia/2016/08/11/finally-a-game-changer-against-illegal-fishing.html.

[39] "Indonesia Urges UN to Declare Fish Theft a Transnational Crime"; "UN Supports Indonesia to Eradicate Illegal Fishing," Tempo.co, June 15, 2017, https://en.tempo.co/read/news/2017/06/15/055884874/UN-Supports-Indonesia-to-Eradicate-Illegal-Fishing.

[40] "Illegal Indonesian, Timorese Fisherman Return to Australian Waters Driven by Failings at Home," ABC News, May 25, 2017, http://www.abc.net.au/news/2017-05-26/illegal-indonesian-fisherman-returning-to-northern-australian/8561798.

[41] "5 Indonesian Fishermen Caught in Australian Waters Sent Home," The Jakarta Post, November 14, 2017, http://www.thejakartapost.com/news/2017/11/14/5-indonesian-fishermen-caught-in-australian-waters-sent-home.html.

References

[42] "Seafood Slavery: Human Trafficking in the International Fishing Industry," Center for American Progress, December 15, 2016, https://www.americanprogress.org/issues/green/reports/2016/12/15/295088/seafood-slavery/.
[43] International Organization for Migration, "Report on Human Trafficking, Forced Labour and Fisheries Crime in the Indonesian Fisheries Industry," 2016, https://www.iom.int/sites/default/files/country/docs/indonesia/Human-Trafficking-Forced-Labour-and-Fisheries-Crime-in-the-Indonesian-Fishing-Industry-IOM.pdf.
[44] Ibid.
[45] Dwinanda, Reiny, "Ministerial Decree on Human Rights Abuse in Fisheries Issued," Republika, January 24, 2017, http://en.republika.co.id/berita/en/national-politics/17/01/24/okades414-indonesia-committed-to-cracking-down-on-crimes-at-sea-minister.
[46] Tama Salim, "RI Brings Struggle Against Illegal Fishing in ASEAN," The Jakarta Post, August 8, 2017, http://www.thejakartapost.com/news/2017/08/08/ri-brings-struggle-against-illegal-fishing-asean.html.
[47] International Organization for Migration, "Report on Human Trafficking, Forced Labour and Fisheries Crime."
[48] "Concept Papers for Partnership Dialogues of The Ocean Conference," https://sustainabledevelopment.un.org/content/documents/13616ConservationInternational_Concept%20Paper_Partner%20Dialogue4.pdf; "A Sea Change for Seafood?" Conservation International, June 1, 2017, http://stories.conservation.org/a-sea-change-for-seafood.
[49] "Minister Susi Asks Fuel Subsidy Fisheries Abolished," CNN Indonesia, July 31, 2017, https://www.cnnindonesia.com/ekonomi/20170731183642-92-231540/menteri-susi-minta-subsidi-bbm-nelayan-dihapuskan/.
[50] "Indonesian Fisheries Czar Promises to End Subsidized Fuel Scam," Mongabay, August 4, 2016, https://news.mongabay.com/2016/08/indonesian-fisheries-czar-promises-to-end-subsidized-fuel-scam/.
[51] Ramadhani, N.F., "Minister Threatens to Stop Diesel Subsidy for Above 5 GT Boats," The Jakarta Post, August 2, 2016, http://www.thejakartapost.com/news/2016/08/02/minister-threatens-to-stop-diesel-subsidy-for-above-5-gt-boats.html.
[52] Ibid.
[53] "WTO Puts Off Agreement on Fisheries Subsidies," IISD, December 18, 2017, http://sdg.iisd.org/news/wto-puts-off-agreement-on-fisheries-subsidies/.
[54] "Susi Seeks Direct Line to Czech Businesses," The Jakarta Post, February 15, 2017, http://www.thejakartapost.com/news/2017/02/15/susi-seeks-direct-line-czech-businesses.html; "Minister Susi Signs Maritime, Fisheries Cooperation with Saudi," Netral English, March 3, 2017, http://www.en.netralnews.com/news/business/read/2167/minister.susi.signs.maritime..fishery.cooperation.with.saudi; "Susi Seeks to Deepen Cooperation in Fisheries with JICA," The Jakarta Post, April 12, 2017, http://www.thejakartapost.com/news/2017/04/12/susi-seeks-to-deepen-cooperation-in-fisheries-with-jica.html; "Japan Agrees to Help Develop Indonesia's Outer Islands, Promote Fisheries," The Japan Times, September 7, 2017, https://www.japantimes.co.jp/news/2017/09/07/national/japan-agrees-help-develop-indonesias-outer-islands-promote-fisheries/; "Japan, Russia to Develop Fish-Processing Centers in Indonesia," The Fish Site, December 15, 2016, https://thefishsite.com/articles/japan-russia-to-develop-fishprocessing-centers-in-indonesia; "Indonesia, Norway Commit to Assure Sea Healthiness," Antara News, October 6, 2017, https://en.antaranews.com/news/112947/indonesia-norway-commit-to-assure-sea-healthiness.
[55] "Government Seeks to Increase Fisheries Exports," Antara News, November 19, 2017, https://en.antaranews.com/news/113478/government-seeks-to-increase-fisheries-exports.
[56] "Japanese Firms to Relocate Fish Processing Operations to Indonesia from Thailand, With a Catch," Jakarta Globe, August 26, 2017, http://jakartaglobe.id/business/japanese-firms-relocate-fish-processing-operations-indonesia-thailand-catch/.
[57] "Japan Agrees to Help Develop Indonesia's Outer Islands, Promote Fisheries."
[58] "Indonesia Steps Up Cooperation with Japan to Develop Outer Islands," Antara News, September 7, 2017, http://www.antaranews.com/en/news/112546/indonesia-steps-up-cooperation-with-japan-to-develop-outlying-islands.

Political moments

[1] Ministerial Decree No. 68/2016; Ministerial Decree No. 69/2016; Ministerial Decree No. 70/2016.
[2] Dwinanda, Reiny, "Indonesia Committed to Cracking Down on Crimes at Sea," Republika, January 24, 2017, http://en.republika.co.id/berita/en/national-politics/17/01/24/okades414-indonesia-committed-to-cracking-down-on-crimes-at-sea-minister.
[3] "Indonesia Declares More Outermost Islands."
[4] "Ministry to Provide Insurance for All Indonesian Fishermen," Republika, March 21, 2017, http://en.republika.co.id/berita/en/national-politics/17/03/21/on60z8414-ministry-to-provide-insurance-to-all-indonesian-fishermen.
[5] "International Fish Force Academy Officially Opens," Tempo, March 16, 2017, https://en.tempo.co/read/news/2017/03/16/056856622/International-Fish-Force-Academy-Officially-Opens.
[6] "EEZ Treaty Ratification Will Support Eradication of Illegal Fishing: Ministry," The Jakarta Post, April 21, 2017, http://www.thejakartapost.com/news/2017/04/21/eez-treaty-ratification-will-support-eradication-of-illegal-fishing-ministry.html.
[7] Peter Benchley Ocean Awards, 2017, http://peterbenchleyoceanawards.org/press.
[8] World Wildlife Fund, "Indonesia's Susi Pudjiastuti Recognized as a Champion for the Oceans," 2017, https://www.worldwildlife.org/press-releases/indonesia-s-susi-pudjiastuti-recognized-as-a-champion-for-the-oceans.
[9] "Joint Team Police Foiled Smuggling of Lobster Seeds Rp 13 Billion," Kompas, May 29, 2017, http://regional.kompas.com/read/2017/05/29/21055331/tim.gabungan.polri.gagalkan.penyelundupan.benih.lobster.rp.13.miliar.
[10] "Indonesia Makes its Fishing Fleet Visible to the World Through Global Fishing Watch," Eureka Alert, June 7, 2017, https://www.eurekalert.org/pub_releases/2017-06/gfw-imi060717.php.
[11] SeaWeb, Seafood Champion Awards, 2017, http://www.seafoodchampions.org/2017-seafood-champions/2017-seafood-champion-award-finalists/susi-pudjiastuti/.
[12] "Indonesia Renames its Portion of the S. China Sea," The Maritime Executive, July 14, 2017, https://www.maritime-executive.com/article/indonesia-renames-its-portion-of-the-s-china-sea.
[13] "Why Indonesia's New Map Is Not (All) About the South China Sea," Australian Strategic Policy Institute, August 1, 2017, https://www.aspistrategist.org.au/indonesias-new-map-not-south-china-sea/.
[14] "Fishermen Offered Rp 50b to Stop Catching Lobster Seedlings," The Jakarta Post, July 6, 2017, http://www.thejakartapost.com/news/2017/07/06/fishermen-offered-rp-50b-stop-catching-lobster-seedlings.html; "Smuggling of Lobster Seeds Continues to Increase," Kompas, July 3, 2017, https://www.pressreader.com/indonesia/kompas/20170703/281900183230607.
[15] Tani, S. "Indonesia to Continue Blowing Up Illegal Fishing Vessels." Nikkei Asian Review, August 24, 2017.
[16] "Japanese Firms to Relocate Fish Processing Operations to Indonesia from Thailand, With a Catch."
[17] Ibid.; "Indonesia Expects Relocation of Japanese Fish Firms

from Thailand," The Jakarta Post, August 28, 2017, http://www.thejakartapost.com/news/2017/08/28/indonesia-expects-relocation-of-japanese-fish-firms-from-thailand.html.
[18] "Supreme Court Gives Reclamation Project Green Light," The Jakarta Post, August 15, 2017, http://www.thejakartapost.com/news/2017/08/15/supreme-court-gives-reclamation-project-green-light.html.
[19] "Japan Agrees to Help Develop Indonesia's Outer Islands, Promote Fisheries."
[20] "Indonesia Steps Up Cooperation with Japan to Develop Outlying Islands," Antara News, September 7, 2017, http://www.antaranews.com/en/news/112546/indonesia-steps-up-cooperation-with-japan-to-develop-outlying-islands.
[21] "100 Women: Meet Susi Pudjiastuti, the Indonesian Minister Blowing Up Boats," BBC News, October 5, 2017, http://www.bbc.com/news/world-asia-41438279.
[22] "Government Seeks to Increase Fisheries Exports," Antara News, November 19, 2017, https://en.antaranews.com/news/113478/government-seeks-to-increase-fisheries-exports.
[23] "Minister Susi Promises to Bring Indonesia to Dominate Global Ornamental Fish Market," Netral News, December 7, 2017, http://www.en.netralnews.com/news/business/read/15965/minister.susi.promises.to.bring.indonesia.to.dominate.global.ornamental.fish.market.
[24] "Government to Distribute Fishing Equipment to Replace 'Cantrang,'" The Jakarta Post, July 13, 2017, http://www.thejakartapost.com/news/2017/05/03/jokowi-tells-minister-to-extend-use-of-fishing-trawlers.html.
[25] "First Modern Fish Market Built in Jakarta," The Jakarta Post, February 8, 2018, http://www.thejakartapost.com/news/2018/02/08/first-modern-fish-market-developed-in-jakarta.html.
[26] McBeth, John, "Indonesia's 'Fish Lady' Fights to Stay the Course," Asia Times, March 8, 2018, http://www.atimes.com/article/indonesias-fish-lady-fights-stay-course/.
[27] OECD, "OECD Review of Fisheries," January 23, 2018, http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=TAD/FI(2017)14/FINAL&docLanguage=En.
[28] "Indonesia Seizes 26 Fishing Boats Since January," The Jakarta Post, April 13, 2018, http://www.thejakartapost.com/news/2018/04/13/indonesia-seizes-26-fishing-boats-since-january.html.
[29] "Google Satellite Tracking is Indonesia's Secret Weapon in War on Illegal Fishing," Straits Times, April 20, 2018, https://www.straitstimes.com/asia/se-asia/google-satellite-tracking-is-indonesias-secret-weapon-in-war-on-illegal-fishing.

Wild fisheries and aquaculture

[1] FAO Fisheries and Aquaculture Department, "FishStat J-Software for Fisheries Statistical Time Series," updated July 21, 2016.
[2] Ibid.
[3] Seafood Intelligence Trading Portal, "Country Profile: Indonesia," 2018, https://seafood-tip.com/sourcing-intelligence/countries/indonesia/.
[4] FAO Fisheries and Aquaculture Department, "FishStat J."
[5] Ibid.
[6] "National Fisheries Performance Slowed in Last Three Years," Tempo.co, January 15, 2018, https://bisnis.tempo.co/read/1050389/kinerja-perikanan-nasional-melambat-dalam-tiga-tahun-terakhir.
[7] Phillips, M., P.J.G. Henriksson, N. Tran, C.Y. Chan, C.V. Moahn, U-P Rodriguez, S. Suri, S. Hall, and S. Koeshendrajana, "Exploring Indonesian Aquaculture Futures," 2015, World Fish, Program Report: 2015-39.
[8] Bennett, Abigail, Pawan Patil, Kristin Kleisner, Doug Rader, John Virdin, and Xavier Basurto, "Contribution of Fisheries to Food and Nutrition Security: Current Knowledge, Policy, and Research," 2018, NI Report 18-02, Durham, NC: Duke University.
[9] Pudjiastuti, Susi, "Challenges in Public Policy: Lessons Learned from Indonesia's Fisheries Sector," Presentation for Harvard Kennedy School, Cambridge, MA, USA, March 12, 2018.
[10] Dhina, O., "'Eating Fish Campaign' in Kupang: Improving Indonesian Women's Health and Nutrition," MAMPU, May 15, 2017, http://www.mampu.or.id/en/news/eating-fish-campaign-kupang-improving-indonesian-women%E2%80%99s-health-and-nutrition.
[11] "Gov't Continues to Promote Fish Consumption Program," Tempo.co, April 9, 2017, https://en.tempo.co/read/news/2017/04/09/240864145/Govt-Continues-to-Promote-Fish-Consumption-Program.
[12] Pudjiastuti, Susi, "Challenges in Public Policy: Lessons Learned from Indonesia's Fisheries Sector."
[13] EIBN, "Sector Report: Fisheries and Aquaculture," German-Indonesian Chamber of Industry and Commerce, 2017, http://www.ekonid.or.id.
[14] Ibid.
[15] Golden, C. et al., "Nutrition: Fall in Fish Catch Threatens Human Health," Nature 2016 (534): 317-20.
[16] Black, R. E. et al., "Maternal and Child Undernutrition and Overweight in Low-Income and Middle-Income Countries," Lancet 2013 (382): 427-51.
[17] FAO, "The State of World Fisheries and Aquaculture 2016," Rome, 2016.
[18] Ibid.
[19] FAO Fisheries and Aquaculture Department. "FishStat J."
[20] EIBN, "Sector Report: Fisheries and Aquaculture."
[21] Tran, N. et al., "Indonesia Aquaculture Futures: An Analysis of Fish Supply and Demand in Indonesia to 2030 and Role of Aquaculture Using the AsiaFish Model," Marine Policy 2017(79): 25-32.
[22] Ibid.
[23] MMAF Statistics, "Analisis Data Pokok Kelautan dan Perikanan 2015," 2016.
[24] Tran, N. et al. "Indonesia Aquaculture Futures."
[25] Nomor 47/Kepmen-Kp/2017 Tentang, "Estimasi Potensi, Jumlah Tangkapan Yang Diperbolehkan, Dan Tingkat Pemanfaatan Sumber Daya Ikan Di Wilayah Pengelolaan Perikanan Negara Republik Indonesia," National Commission on Stock Assessments, 2018.
[26] Pudjiastuti, Susi, "Challenges in Public Policy: Lessons Learned from Indonesia's Fisheries Sector."
[27] Baruna Nusantara Foundation, "A Brief Review of Policy and Regulatory Reforms of Small-Scale Fisheries in Indonesia," April 2018.
[28] Pudjiastuti, Susi, "Challenges in Public Policy: Lessons Learned from Indonesia's Fisheries Sector."
[29] Baruna Nusantara Foundation, "A Brief Review of Policy and Regulatory Reforms."
[30] Kementrian Kelautan dan Perikanan Pusat Data, Statistik, dan Informasi, "Analisis Data Pokok Kelautan dan Perikanan 2016," 2018.
[31] Hermansyah, Anton, "Government Doubles Non-tax Revenue Target for Fishery Sector," The Jakarta Post, January 6, 2017, http://www.thejakartapost.com/news/2017/01/06/govt-doubles-non-tax-revenue-target-for-fishery-sector.html.
[32] Philips M., Henriksson PJG., Tran N., Chan CY., Mohan C.V., Rodriguez U-P., Suri S., Hall S., and Koeshendrajana S., "Exploring Indonesian Aquaculture Futures," 2015, Penang, Malaysia: WorldFish Program Report.
[33] Ibid.
[34] FAO Fisheries and Aquaculture Department. "FishStat J."
[35] Ibid.

References

[36] "Exploring Indonesian Aquaculture Futures."
[37] Ibid.
[38] Ibid.
[39] Ibid.
[40] Ibid.
[41] Ibid.
[42] Ibid.
[43] Ibid.
[44] Ibid.
[45] Hamilton, S., "Mangrove Forest to Shrimp Farm Conversion in Indonesia from 2000 to 2012," Report Prepared for the Moore Foundation, 2015.
[46] Conservation International, "Indonesia's Mangroves one of the World's Best Solutions to Climate Change," August 8, 2016, https://www.conservation.org/NewsRoom/pressreleases/Pages/Indonesias-mangroves-one-of-the-worlds-best-solutions-to-climate-change.aspx.
[47] Pahlow, M. et al., "Increasing Pressure on Freshwater Resources Due to Terrestrial Feed Ingredients for Aquaculture Production," 2015, Science of the Total Environment (536): 847-57.
[48] Ibid.
[49] "Exploring Indonesian Aquaculture Futures."
[50] Ibid.
[51] Golden, C.D., et al., "Does Aquaculture Support the Needs of Nutritionally Vulnerable Nations?" May 29, 2017, Frontiers in Marine Science. Perspective Article.
[52] Ibid.
[53] Ibid.
[54] "Exploring Indonesian Aquaculture Futures."
[55] EIBN, "Sector Report: Fisheries and Aquaculture," German-Indonesian Chamber of Industry and Commerce, 2017, http://www.ekonid.or.id.

Snapper and grouper fishery

[1] PUSDATIN, "Kelautan dan perikanan dalam angka tahun 2015/ Marine and Fisheries in Figures 2015," MMAF Center for Data and Information, 2016, http://statistik.kkp.go.id/sidatik-dev/Publikasi/src/kpda2015.pdf.
[2] Cawthorn, D.M. and S. Mariani, "Global Trade Statistics Lack Granularity to Inform Traceability and Management of Diverse and High-Value Fishes," Nature Scientifics Reports (2017) 7: 12852. doi:10.1038/s41598-017-12301-x.
[3] Banks, "MSC Pre-Assessment of the Indonesia Multi-Species Deepwater Fisheries Targeting Snappers, Groupers, Grunters, and Other Families," 2018, http://72.14.187.103:8080/ifish/pub/IndonesiaSnapperAndGrouperPre-assessmentReportDraft31October2017.pdf.

Blue swimming crab fishery

[1] FAO Fisheries and Aquaculture Department, FishStatJ – Software for Fishery Statistical Time Series, updated November 1, 2017.
[2] International Trade Center, "Trade Map: Indonesia," www.trademap.org.
[3] FishSource, 2017.
[4] Ibid.
[5] FishSource, "Blue Swimming Crab," December 1, 2017, https://www.fishsource.org/stock_page/742.
[6] Rubio, Angel, "Blue Swimming Crab Meat at Record Prices," UnderCurrent News, June 30, 2017, https://www.undercurrentnews.com/2017/06/30/blue-swimming-crab-meat-at-record-prices/.
[7] Muawanah et al., "Toward Sustainable Management of the Blue Swimming Crab Fishery in Indonesia," 2017, publication forthcoming.
[8] Johnston, D. et al., "Decline of a Blue Swimmer Crab (Portunus pelagicus) Fishery in Western Australia—History, Contributing Factors and Future Management Strategy," Fisheries Research 1 (2011): 119-30.
[9] FAO Fisheries and Aquaculture Department, FishStatJ.
[10] MMAF, "Estimasi Potensi, Jumlah Tangkapan Yang Diperbolehkan, Dan Tingkat Pemanfaatan Sumber Daya Ikan di Wilayah Pemgelolaan Perikanan Negara Republik Indonesia," 2018.
[11] Ibid.
[12] FAO Fisheries and Aquaculture Department, FishStatJ.
[13] Seafood Watch, "Crab Recommendations," http://www.seafoodwatch.org/seafood-recommendations/groups/crab?q=Crab&t=cra&type=blue-swimming&o=401092783,1338345570,413.
[14] Muawanah et al., 2017.
[15] FisheryProgress.org, "Indonesian Blue Swimming Crab – Gillnet/Trap," March 10, 2018, https://fisheryprogress.org/fip-profile/indonesian-blue-swimming-crab-gillnettrap-apri.
[16] APRI, "Coordination Meeting of Blue Swimming Crab Fishery in Indonesia," March 3, 2018, http://www.apri.or.id/coordination-meeting-of-blue-swimming-crab-fishery-in-indonesia/.
[17] Ibid.
[18] Ibid.
[19] FishSource, "Blue Swimming Crab."
[20] Ibid.
[21] FishSource, 2017.
[22] Whalen, Jack (SFP), personal communication, May 7, 2018.

Tuna fishery

[1] Seafood Trade Intelligence Portal, "Tuna and Bycatch in Indonesia," https://seafood-tip.com/sourcing-intelligence/countries/indonesia/tuna/.
[2] ISSF, "Status of the Stocks Report," 2017, https://iss-foundation.org/about-tuna/status-of-the-stocks/.
[3] ATUNA, "World Tuna Catches," 2017, http://atuna.com/index.php/en/fishing/world-tuna-catches.
[4] MMAF, "Capture Fisheries Statistics of Indonesia, 2016," 2018, Jakarta, Statistik Perikanan Tangkap Indonesia Menurut Provinsi.
[5] ATUNA, 2017.
[6] International Seafood Sustainability Foundation, "Status of the World Fisheries for Tuna. Nov. 2017. ISSF Technical Report 2017-02A," 2017, Washington, D.C.
[7] Western & Central Pacific Fisheries Commission, "Tuna Fishery Data," September 29, 2017, https://www.wcpfc.int/conservation-and-management-measures.
[8] "Vice President Watches the Impact of Fish Moratorium in Bitung," RadarBolmongOnline.com, March 21, 2016, https://radarbolmongonline.com/2016/03/wapres-saksikan-dampak-moratorium-perikanan-di-bitung/.
[9] RadarBolmongOnline.com, 2016.

Shark and ray fishery

[1] Dulvy, N.K., Fowler, S.L., Musick, J.A., Cavanagh, R.D., Kyne, P.M., Harrison, L.R., Carlson, J.K., et al., "Extinction Risk and Conservation of the World's Sharks and Rays," eLIFE (2014) 3: e00590. http://dx.doi.org/10.7554/eLife.00590.
[2] Bräutigam, A., Callow, M., Campbell, I.R., Camhi, M.D., Cornish, A.S., Dulvy, N.K., Fordham, S.V., et al., "Global Priorities for Conserving Sharks and Rays: A 2015–2025 Strategy," 2015.
[3] Ibid.
[4] Dulvy et al., 2014.
[5] Bräutigam et al., 2015.
[6] Ibid.

[7] Wildlife Conservation Society, "Sharks, Skates, and Rays," https://www.wcs.org/our-work/wildlife/sharks-skates-rays.
[8] Dulvy et al., 2014.
[9] Worm et al., "Global Catches, Exploitation Rates, and Rebuilding Options for Sharks," Marine Policy 40 (2013): 194-204.
[10] Ibid.
[11] Booth, H., Muttaqin, E., Simeon, B., Ichsan, M., Siregar, U., Yulianto, I. and Kassem, K., "Shark and Ray Conservation and Management in Indonesia: Status and Strategic Priorities 2018-2023," Wildlife Conservation Society, 2018, Bogor, Indonesia.
[12] Ibid.
[13] Ibid.
[14] Ibid.
[15] International Trade Center, "Trade Map: Indonesia," www.trademap.org.
[16] Booth et al., 2018.
[17] Hasibuan, Syarina, 2018.
[18] Denyer, Simon, "Even as China Turns Away from Shark Fin Soup, the Prestige Dish is Gaining Popularity Elsewhere in Asia," The Washington Post, February 15, 2018, https://www.washingtonpost.com/news/worldviews/wp/2018/02/14/even-as-china-turns-away-from-shark-fin-soup-the-prestige-dish-is-gaining-popularity-elsewhere-in-asia/?noredirect=on&utm_term=.9fb0a1a182b4.
[19] Kassem, Kenneth (WCS), personal communication, April 25, 2018.
[20] Booth et al., 2018.
[21] Nainggolan, Heru, "Fishermen in Indonesia Undaunted by Declining Shark Fin Demand in China," January 25, 2016, http://indonesiaexpat.biz/featured/fishermen-in-indonesia-undaunted-by-declining-shark-fin-demand-in-china/.
[22] Booth et al., 2018.
[23] Jaitehab, V., Loneragan, N., and Warren, C., "The End of Shark Finning? Impacts of Declining Catches and Fin Demand on Coastal Community Livelihoods," Marine Policy 82 (2017): 224-33.
[24] California Environmental Associates, "Our Shared Seas: A 2017 Overview of Ocean Threats and Conservation Funding," 2017.
[25] Ibid.

Public revenue and funding

[1] "Fisheries and Aquaculture," EU-Indonesia Business Network, 2017, http://indonesien.ahk.de/fileadmin/ahk_indonesien/Publications/EIBN/Fisheries_and_Aquaculture_Sector_Report_2017_FULL.pdf.
[2] "Investing in Indonesia: Indonesia Business Update on Fisheries," BKPM, 2017.
[3] "Value Chain Assessment: Bitung, Indonesia," The USAID Oceans and Fisheries Partnership, July 2017, https://www.seafdec-oceanspartnership.org/wp-content/uploads/USAID-Oceans_Value-Chain-Report_Indonesia.pdf.
[4] Pudjiastuti, Susi, "Challenges in Public Policy: Lessons Learned from Indonesia's Fisheries Sector," Presentation for Harvard Kennedy School, Cambridge, MA, USA, March 12, 2018.
[5] Directorate General of Taxation, "Optimization of Tax Revenue from Fisheries Sector: Challenges and Obstacles," Presentation to the National Coordination Meeting on Illegal, Unreported, and Unregulated Fishing, Jakarta, July 12, 2017.
[6] "Finance Minister Asks Fish Entrepreneurs Take Tax Amnesty Due to Insignificant Tax Ratio," Nusantara Maritime News, March 14, 2017, https://maritimenews.id/finance-minister-asks-fish-entrepreneurs-take-tax-amnesty-due-to-insignificant-tax-ratio/.
[7] "Govt Allocates Rp 175 Billion for Fishermen's Insurance Program: Minister Susi," Antara News, August 1, 2016, http://www.indonesia-ottawa.org/2016/08/govt-allocates-rp175-billion-for-fishermens-insurance-program-minister-susi/.
[8] Directorate General of Taxation, "Optimization of Tax Revenue from Fisheries Sector: Challenges and Obstacles."
[9] "Indonesia Fishery Exports Rise 8.12% to USD4.09 Billion in 2017," IRINDO, January 12, 2018, https://www.irindo.co.id/single-post/2018/01/12/Value-On-Indonesian-Fishery-Exports-Rise-812-to-USD409-Billion-in-2017.
[10] Directorate General of Taxation, "Optimization of Tax Revenue from Fisheries Sector: Challenges and Obstacles."
[11] "Ministry of Marine Affairs and Fisheries Financial Report 2015 (audited)."
[12] Ibid.
[13] "Indonesia's State Budget Realization Report 2017."
[14] "Indonesia State Budget Law No 15/2017," Explanation Chapter.
[15] "Indonesia's State Budget Realization 2017," Attachment 13, https://www.kemenkeu.go.id/media/5475/lapsem-2017.pdf.
[16] Dames Alexander Sinaga, "Poor Fishermen Made to Wait for Free Boats from Indonesian Government," Jakarta Globe, November 9, 2017, http://jakartaglobe.id/news/poor-fishermen-made-wait-free-boats-indonesian-government/; "Government to Hand Over 373 Fishing Boats this Month," The Jakarta Post, November 16, 2017, http://www.thejakartapost.com/news/2017/11/16/government-to-hand-over-373-fishing-boats-this-month.html.
[17] "Govt Allocates Rp 175 Billion."
[18] Ibid.
[19] Fika Fawzia, "Development Priorities in the Marine and Fisheries Sector," Presentation to Minister's Working Unit, Jakarta, Indonesia, November 21, 2017.
[20] "Government Launches Ultra-Micro Credit Program on Monday," The Jakarta Post, August 14, 2017, http://www.thejakartapost.com/news/2017/08/14/government-launches-ultra-micro-credit-program-on-monday.html.
[21] "Indonesia Economic Quarterly: Staying the Course," The World Bank, March 2017, http://pubdocs.worldbank.org/en/278631490090358078/IEQ-MAR-2017-ENG.pdf.
[22] Sihombing, M, unpublished research, 2016.
[23] "Indonesia Economic Quarterly: Staying the Course," The World Bank.
[24] Ibid.; Grace Amianti, "New KUR System Creates Higher Cost for Govt," The Jakarta Post, March 24, 2017, https://www.pressreader.com/indonesia/the-jakarta-post/20170324/281526520880837; Rachmadea Aisyah, "Mixed Response to Lower Rate on KUR Loans," The Jakarta Post, October 30, 2017, http://www.thejakartapost.com/news/2017/10/30/mixed-response-lower-rate-kur-loans.html.
[25] Amianti, "New KUR System."
[26] "Indonesia Economic Quarterly: Staying the Course," The World Bank; "Absorption of KUR for Fisheries Still Slow," Industri, October 30, 2017, http://industri.bisnis.com/read/20171030/99/704235/javascript.
[27] "Absorption of KUR for Fisheries Still Slow."
[28] Ibid.; "Indonesia Economic Quarterly: Staying the Course," The World Bank.
[29] Aisyah, "Mixed Response to Lower Rate on KUR Loans."
[30] "Absorption of KUR for Fisheries Still Slow."
[31] "Development Priorities in Marine and Fisheries Sector," KKP, November 21, 2017; Kompilasidari Kelautan dan Perikanan dalam Angka 2016, at 44; "Urgensi Revolving Dan Financing Usaha Sektor Kelautan Dan Perikanan," KKP, December 30, 2014; "MMAF Circular to Governors, Regents, and Mayors across Indonesia," November 7, 2014 (exempting boats less than 10 GT from paying fisheries levies).

[32] Priyankar Bhunia, "KOMINFO Indonesia Providing ICT Infrastructure and Support for Ultra-Micro Financing Programme to Enhance Financial Inclusion," OpenGovAsia, October 27, 2017, http://opengovasia.com/articles/7549-kominfo-indonesia-providing-ict-infrastructure-and-support-for-ultra-micro-financing-programme-to-enhance-financial-inclusion; "Government Launches Ultra-Micro Credit Program on Monday"; "Sri Mulyani Launches Today's Ultra Micro Credit Program," Tempo, August 14, 2017, https://bisnis.tempo.co/read/899601/sri-mulyani-luncurkan-program-kredit-ultra-mikro-hari-ini.
[33] "Distributing Fishery Business Financing, LPMUKP Waiting Tariff," Nusantara Maritime News, April 26, 2017, https://maritimenews.id/salurkan-pembiayaan-usaha-perikanan-lpmukp-menanti-besaran-tarif/; "KKP Facilitates Capital for Small Fishermen," Kompas, August 15, 2017, http://ekonomi.kompas.com/read/2017/08/15/151718226/kkp-fasilitasi-permodalan-untuk-nelayan-kecil.
[34] State Budget Law 2017, Explanation Chapter, https://www.kemenkeu.go.id/informasi-publik/uu-apbn-dan-nota-keuangan/.

Private sector investments

[1] International Monetary Fund, "Indonesia: Resilient Economy Can Benefit from Stronger Reforms," February 3, 2017, https://www.imf.org/en/News/Articles/2017/02/03/NA020317-Indonesia-Resilient-Economy-Can-Benefit-from-Stronger-Reforms.
[2] "Indonesia up 15 Places in Ease of Doing Business Index," The Jakarta Post, October 26, 2016, http://www.thejakartapost.com/news/2016/10/26/indonesia-up-15-places-in-ease-of-doing-business-index.html.
[3] Pudjiastuti, Susi, "Challenges in Public Policy: Lessons Learned from Indonesia's Fishery Sector," March 12, 2018; Presidential Regulation No. 44, 2016.
[4] "Weak Infrastructure Blocks Investment in Indonesia's Cold Storage Industry," Indonesia-Investments, May 19, 2016, https://www.indonesia-investments.com/id/news/todays-headlines/weak-infrastructure-blocks-investment-in-indonesia-s-cold-storage-industry/item6830.
[5] "National Fisheries Performance Slowed in Last Three Years," Tempo.co, January 15, 2018, https://bisnis.tempo.co/read/1050389/kinerja-perikanan-nasional-melambat-dalam-tiga-tahun-terakhir. "Indonesian Lawmakers at Odds over Destroying Poaching Vessels," Arab News, January 13, 2018, http://www.arabnews.com/node/1224636/world; "Potential Rise, Indonesia Fish Export Will Surge in 2017," Konton, February 19, 2017, http://nasional.kontan.co.id/news/potensi-naik-ekspor-ikan-ri-2017-bakal-melonjak.
[6] "National Fisheries Performance Slowed in Last Three Years," Tempo.co, January 15, 2018, https://bisnis.tempo.co/read/1050389/kinerja-perikanan-nasional-melambat-dalam-tiga-tahun-terakhir; "Indonesian Lawmakers at Odds"; "Potential Rise, Indonesia Fish Export."
[7] Fawzia, "Development Priorities in the Marine and Fisheries Sector."
[8] MMAF, "Indonesia Business and Investment Dialogue: Focus on the Fisheries Sector," March 9, 2017, http://www.asean.or.jp/ja/wp-content/uploads/2017/03/1.-MMAF.pdf; MMAF, "Focus Group Discussion: Preparation of a Potential Debtor Determination Method," Directorate of Business and Investment, 2017.
[9] NOMOR 47/KEPMEN-KP/2016 TENTANG, National Commission on Stock Assessments, 2016.
[10] "The Collateral Damage in the War Against Poachers," Jakarta Post, 2016.
[11] MMAF, "Indonesia Business and Investment Dialogue: Focus on the Fisheries Sector."
[12] Fawzia, "Development Priorities in the Marine and Fisheries Sector."
[13] "OJK Holds JARING Program Expo at Morodemak Fishing Port," OJK, http://www.ojk.go.id/en/berita-dan-kegiatan/siaran-pers/Documents/Pages/PRESS-RELEASE-JARING-PROGRAM-EXPO-AT-MORODEMAK-FISHING-PORT/JARING%20PROGRAM%20EXPO%20AT%20MORODEMAK%20FISHING%20PORT.pdf
[14] Santi Evelyna, Transformasi, email correspondence, November 17, 2017.
[15] MMAF, "Indonesia Business and Investment Dialogue: Focus on the Fisheries Sector."
[16] Ibid.
[17] MMAF, "Focus Group Discussion: Preparation of a Potential Debtor Determination Method."
[18] Ibid.
[19] Ibid.
[20] Ibid.
[21] Ibid.
[22] Evelyna, email correspondence.
[23] MMAF, "Focus Group Discussion: Preparation of a Potential Debtor Determination Method."
[24] Ibid.
[25] MMAF, "Indonesia Business and Investment Dialogue: Focus on the Fisheries Sector."
[26] Ibid.
[27] Ibid.
[28] Ibid.
[29] "Investing in Sustainable Fisheries: Partnering with the Althelia Sustainable Oceans Fund," December 2, 2016, USAID Development Credit Authority, https://usaid-credit.exposure.co/investing-in-sustainable-fisheries.
[30] "Impact Fund Surpasses $17 Million for Sustainable Coastal Fisheries in Indonesia and the Philippines," Cision, November 20, 2017, http://www.prweb.com/releases/2017/11/prweb14914739.htm.
[31] "$20m Impact Fund Launches with Indonesia, Philippines, Fishing Focus," Undercurrent News, August 18, 2017, https://www.undercurrentnews.com/2017/08/18/20m-impact-fund-launches-with-indonesia-philippines-fishing-focus/.
[32] Hermansyah, Anton, "BI Launches E-money program for Indonesian Fishermen," The Jakarta Post, August 15, 2016, http://www.thejakartapost.com/news/2016/08/15/bi-launches-e-money-program-for-indonesian-fishermen.html.
[33] "Riau Island Fishermen Encouraged to Use Lantera Card," The Jakarta Post, September 15, 2016, https://www.pressreader.com/indonesia/the-jakarta-post/20160915/281659664501642.
[34] "G-Startup Worldwide at GMIC Indonesia 2017 Winners Announced!" G-Startup, September 26, 2017, http://g-startup.com/gstartup-indonesia-2017-winners/.
[35] White, Cliff, "Indonesia Tuna Fishery Enters Marine Stewardship Council Assessment," SeafoodSource, July 6, 2017, https://www.seafoodsource.com/news/environment-sustainability/indonesian-tuna-fishery-enters-marine-stewardship-council-assessment.
[36] "Blue Star Foods Launches Traceability and Data Collection Tools for Blue Swimming Crab in Indonesia," Perishable News, March 17, 2017, http://www.perishablenews.com/index.php?article=0059059; "Crabmeat Importer Blue Star Implements Cloud-Based Supply Chain Tracking for Indonesian Blue Crab," SeafoodNews.com, March 16, 2017, http://www.seafoodnews.com/Login.aspx?ReturnUrl=/SearchStory/

Marine conservation funding

[1] California Environmental Associates. "Our Shared Seas: A 2017 Overview of Ocean Threats and Conservation Funding." 2017.
[2] Prizzon, A., R. Andrew, and M.A. Jalles d'Orey. "Moving away from aid? The case of Indonesia." 2017. Overseas Development Institute.
[3] Ibid.
[4] Ibid.
[5] Ibid.
[6] Royal Norwegian Embassy in Jakarta. "Norway and Indonesia are fighting marine debris together."
[7] https://www.norway.no/en/indonesia/norway-indonesia/news-events/news2/norway-and-indonesia-are-fighting-marine-debris-together/. February 1, 2018.

Marine reserves

[1] Pudjiastuti, Susi, "Challenges in Public Policy: Lessons Learned from Indonesia's Fisheries Sector," Presentation for Harvard Kennedy School, Cambridge, MA, USA, March 12, 2018.
[2] Gill, D.A. et al. "Capacity shortfalls hinder the performance of marine protected areas globally." 2017. Nature (543): 665-671.
[3] MMAF. "Lokasi Kawasan Konservasi Perairan Dan Kawasan Konservasi Pesisir & Pulau-Pulau Kecil Indonesia Tahun 2017." 2017. http://www.kkji.kp3k.kkp.go.id/index.php/peta-kkp-16.
[4] Yulianto I., Y. Herdiana, M.H. Halim, P. Ningtias, A. Hermansyah, S. Campbell. "Spatial analysis to achieve 20 Million Hectares of Marine Protected Areas for Indonesia by 2020." 2013. Wildlife Conservation Society and Marine Protected Areas Governance. Bogor. Indonesia.
[5] Pudjiastuti, Susi, "Challenges in Public Policy: Lessons Learned from Indonesia's Fisheries Sector."
[6] California Environmental Associates. "Our Shared Seas: A 2017 Overview of Ocean Threats and Conservation Funding." 2017.
[7] Marine Conservation Institute, MPAtlas (Seattle, 2017), www.mpatlas.org.
[8] Rocha, Luiz. "Bigger is Not Better for Ocean Conservation." The New York Times. March 20, 2018. https://www.nytimes.com/2018/03/20/opinion/environment-ocean-conservation.html.
[9] Personal communication, Rili Djohani, December 11, 2017.
[10] Gill, D.A. et al. "Capacity shortfalls hinder the performance of marine protected areas globally."
[11] Personal communication, Rili Djohani, December 11, 2017.
[12] Katz, L., R. Delfs, M. Erdmann, M. Fox, R. Garbaliauskas, R. Greenberg, G. Renosari,, A. Soles, C. Stone, K. Villeda. "Blue Abadi Business Plan." 2015. Bird's Head Seascape Coalition. Manokwari, West Papua, Indonesia.
[13] Ahmadia, G.N., Awaludinnoer, L. Glew, F. Pakiding, J. Harris, N. Hidayat, E. Ihsan, M. B. Mascia, D. Matualage, P. Mohebalian, D.Pada, Purwanto. "2017 State of the Bird's Head Seascape MPA Network Report." 2018. World Wildlife Fund, Conservation International, The Nature Conservancy, and Universitas Papua, Washington D.C., United States, Jakarta, Indonesia, and Manokwari, Indonesia.
[14] Jackson, J., M. Donovan, K. Cramer, and V. Lam. "Status and trends of Caribbean coral reefs: 1970-2012." 2014. Global Coral Reef Monitoring Network.
[15] Ibid.
[16] Andradi-Brown, D.A., G.N. Ahmadia, Purwanto, Awaludinnoer, J. Harris, A. Hasan, N. Hidayat, E. Ihsan, D. Matualage, R. Mambrasar, D. Pada. "Bird's Head Seascape: Changes in Marine Protected Area Management Effectiveness." 2017. World Wildlife Fund, Conservation International, The Nature Conservancy, and Universitas Papua, Washington D.C., United States, Jakarta, Indonesia, and Manokwari, Indonesia.
[17] Gill, D.A. et al. "Capacity shortfalls hinder the performance of marine protected areas globally."

CEA | California Environmental Associates

Since 1984, California Environmental Associates (CEA) has supported the work of environmental foundations and nonprofits as well as sustainability-oriented businesses with in-depth research and analysis, program design and evaluation, and strategic planning. Learn more at www.ceaconsulting.com.

the David & Lucile Packard FOUNDATION

The David and Lucile Packard Foundation is a family foundation that is guided by the enduring business philosophy and personal values of Lucile and David, who helped found one of the world's leading technology companies. Their approach to business and community participation has guided our philanthropy for over 50 years: we invest in effective organizations and leaders, collaborate with them to identify strategic solutions, and support them over time to reach our common goals. We work on the issues our founders cared about most, including improving the lives of children, enabling the creative pursuit of science, advancing reproductive health, and conserving and restoring the Earth's natural systems. Learn more at www.packard.org.