Reforms for a Blue Economy in Indonesia

Oceans for Prosperity

ISOP INDONESIA Indonesia Sustainable Oceans Program
OCEANS MDTF
THE WORLD BANK IBRD • IDA | WORLD BANK GROUP
COORDINATING MINISTRY FOR MARITIME AFFAIRS AND INVESTMENTS REPUBLIC OF INDONESIA

Disclaimer:
This report is a product of the staff of the International Bank for Reconstruction and Development/The World Bank. The findings, interpretations, and conclusions expressed in this paper do not necessarily reflect the views of the Executive Directors of the World Bank or the governments they represent. The World Bank does not guarantee the accuracy of the data included in this work. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of the World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

Copyright Statement:
The material in this publication is copyrighted. Copying and/or transmitting portions or all of this work without permission may be a violation of applicable law. The International Bank for Reconstruction and Development/The World Bank encourages dissemination of its work and will normally grant permission to reproduce portions of the work promptly.

For permission to photocopy or reprint any part of this work, please send a request with complete information to the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923, USA, telephone 978-750-8400, fax 978-750-4470, http://www.copyright.com/.

All other queries on rights and licenses, including subsidiary rights, should be addressed to the Office of the Publisher, The World Bank, 1818 H Street NW, Washington, DC 20433, USA, fax 202-522-2422, e-mail pubrights@worldbank.org.

Suggested Citation:
World Bank (2021). Oceans for Prosperity: Reforms for a Blue Economy in Indonesia. The World Bank, Washington, D.C.

Table of Contents

04_ **Foreword**

09_ **Acknowledgements**

10_ **Acronyms**

12_ **Executive Summary**

28_ **01. Introduction**

36_ **02. A Sustainable Fisheries Future**
Indonesia can get more from its fisheries sector through improved management

44_ **03. Realizing Indonesia's Tourism Potential**
To be a leading tourism destination, Indonesia must ensure that its marine and coastal assets are managed sustainably

50_ **04. Managing Coastal and Marine Assets**
Protecting Indonesia's marine and coastal assets is crucial to ensure continued benefits from ocean sectors

58_ **05. Combating Plastics from Source to Sea**
Marine plastic debris represents a significant risk to Indonesia's ocean sectors

64_ **06. Conclusion: Integrated Policy for a Blue Economy**
Close ecological and economic links between ocean sectors means that reforms can deliver broad benefits

72_ **References**

Foreword

Building a sustainable ocean economy is one of the most important tasks for Indonesia. As an archipelagic country with high marine biodiversity, Indonesia must ensure that its actions balance the needs of its people and its oceans. These needs align with current and upcoming challenges, including performance in seafood exports, threats from natural resources degradation, access to and volatility of markets, climate change, and marine debris.

A sustainable and prosperous oceans economy will contribute to higher revenues from marine-based activities, improved coastal communities' livelihoods, and healthier oceans and coastal ecosystems that can generate services and products and preserve unrivalled biodiversity. There are opportunities to implement this transformation through establishing an ecosystems approach within the Fisheries Management Area system (*Wilayah Penangkapan Perikanan*, WPP), and integrating WPP management with marine protected areas, spatial planning in marine and coastal areas, reduced marine debris, and improved livelihoods to ensure long-term sustainable fisheries and marine tourism industries.

I welcome this report, *Oceans for Prosperity*, and I am honored to provide this foreword. This concise report describes the opportunity for Indonesia to re-energize a sustainable oceans economy or "blue economy," to improve economic growth and to optimize the value of natural resources. The Government of Indonesia has and continues to make efforts along this pathway, as part of our commitment to economic growth, prosperity, and the sustainability of our oceans.

I look forward to partnerships that help build oceans-related opportunities. The closeness of the ocean grants us the possibility of improving lives through innovative and sustainable use of its resources. We will replace "doom and gloom" with a more optimistic vision. In collaboration with other nations that face similar challenges, we will further diversify our economy and secure the goods and services provided by our oceans.

Dr. Ir. Aryo Hanggono, DEA, *In Memory*
Former Director General for Marine Spatial Management, Ministry of Marine Affairs and Fisheries (MMAF)

Foreword

The ocean covers more than two-thirds of Indonesia's area and connects the many islands of our archipelagic country. The ocean provides livelihoods to the people of Indonesia, sustains social and economic activities, and ensures cultural richness. It is our duty to protect, restore, and sustain the diverse natural resources of our ocean for generations to come.

Indonesia has based its development planning for the next five years on the *Rencana Pembangunan Jangka Menengah Nasional* (RPJMN), which serves as the national guideline and roadmap towards one important goal: transforming Indonesia into a developed country. The first agenda item in the 2020–2024 RPJMN is to achieve economic resilience for high quality, equitable growth. As a maritime country, Indonesia's vast marine resources must be utilized to improve people's welfare. We see "blue" sectors in the future providing even greater support towards strengthening our national economy. However, Indonesia still faces challenges to fully achieve "blue" prosperity.

The RPJMN acknowledges that improved management of blue sectors is key to achieving Indonesia's development agenda. Additionally, it is one of our commitments as global citizens towards the Sustainable Development Goals (SDGs). Based on these responsibilities, marine and fisheries management strategies are designed to protect, conserve, and utilize marine resources in a sustainable manner.

One of those strategies is spatially-based management, such as the establishment of the Fisheries Management Area (*WPP*) system, and Marine Protected Areas (MPAs), which can help ensure long-term sustainability of ocean resources. We need to emphasize the importance of balancing conservation and economic growth to fully embody the concept of sustainability.

It is with great pleasure that I welcome this new publication by the World Bank, *Oceans for Prosperity: Reforms for a Blue Economy in Indonesia.* I hope that this publication will escalate efforts towards realizing blue prosperity in Indonesia. We would like to ensure that through these efforts we can strive consistently to support the government's strategic plan to achieve our collective goal, the welfare of the Indonesian people.

Dr. Ir. Arifin Rudiyanto, MSc.
Deputy of Maritime and Natural Resources, Ministry of National Development and Planning (Bappenas)

Foreword

Indonesia is an archipelagic country with enormous marine biodiversity and ocean resources, which are important sources of food security, livelihoods, carbon sequestration, and means of transportation. Ocean ecosystems and the economy they support must be preserved by overcoming current threats and challenges, including coastal degradation, climate change, unsustainable aquaculture practices, over-exploitation, and marine pollution such as plastic debris and solid waste in waterways and seas.

Gross Domestic Product (GDP) summarizes the size of an economy, representing the total value of certain goods and services produced. However, GDP leaves out important details of the ocean economy. How does the ocean affect local communities and individuals? How does economic activity damage or improve the health of ocean ecosystems? These knowledge gaps limit our ability to make effective, inclusive decisions about how we use the ocean and build a sustainable ocean economy, or "blue" economy, that can deliver on the National Ocean Agenda, as well as the 2030 Agenda for Sustainable Development.

An integrated and multi-sectoral blue economy strategy as described in this report, *Oceans for Prosperity*, is the key to improving marine and coastal activities, equal opportunities, and livelihoods. Fisheries and coastal tourism are the most significant sectors to develop and transform based on a foundation of healthy and productive marine and coastal ecosystems, including marine plastic pollution reduction and marine conservation. This is Indonesia's commitment. Fundamentally, a blue economy strategy enables governments to monitor and manage three critical trends with respect to the ocean economy:

1. Changes in ocean wealth, including mangroves, seagrass, and coral reefs
2. The distribution of oceans-related income among different groups of people (including income from fisheries or tourism for local communities)
3. The contribution from oceans-based economic activities to national economic output

The Coordinating Ministry for Maritime and Investment Affairs and other stakeholders look forward to increasing cooperation and collaboration to develop our blue economy with equal opportunities. We will continue the success of current initiatives, including the Oceans Multi-Donor Trust Fund[1], and look forward to positive global trends to position Indonesia's ocean economy for sustainable growth, especially after the COVID-19 pandemic.

Dr. Ir. Safri Burhanuddin, DEA.
Deputy Coordinating Minister for Maritime Resources, Coordinating Ministry for Maritime and Investment Affairs (CMMIA)

[1] The Indonesia Oceans Multi-Donor Trust Fund was established in 2017 at the request of the Government of Indonesia and with the support of the Governments of Denmark and Norway. It provides technical assistance to implement oceans policy, reduce marine debris, and strengthen coastal resilience.

A swirling tornado of Barracuda in blue water above a warm, tropical coral reef. Photo: © shutterstock.com

Mangrove trees. Photo: © shutterstock.com

Acknowledgements

This report was prepared by a World Bank team led by David Kaczan (economist) and André de Aquino (senior natural resources management specialist), and comprising Andrew Harvey (fisheries consultant), Jia Jun Lee (environmental consultant), Bertine Kamphuis (senior private sector specialist), Nikola Kojucharov (senior economist), Anjali Acharya (senior environmental specialist), Andhyta F. Utami (environmental economist), Celine Lim (natural resources management specialist), John Perrottet (senior private sector specialist), Frank van Woerden (lead environmental engineer), Xavier Vincent (lead fisheries specialist), Katelijn van den Berg (senior environmental specialist), Yadranka Farita (natural resources management specialist), Abdul Halim (oceans consultant), Juan-Pablo Castaneda (environmental economist), Dias Natasasmita (oceans consultant), Kian Siong (senior environmental engineer), Geertrui Paula Uyttendaele (geospatial consultant), Desta Pratama (oceans consultant), Ina Pranoto (senior oceans consultant), and Taruc Siham (oceans consultant). The report builds on an article in the World Bank's Indonesia Economic Quarterly (IEQ) entitled *Oceans of Opportunity*, published by the World Bank in June 2019.

The team thanks Satu Kristiina Kahkonen (country director for Indonesia), Rodrigo A. Chaves (former country director for Indonesia), Rolande Simone Pryce (former manager of operations for Indonesia), Karin Kemper (global director for environment, natural resources, and the blue economy), and Ann Jeannette Glauber (practice manager) for encouragement, guidance and support. Dinesh Aryal (senior natural resources management specialist) also provided support.

Constructive reviews of this report and the earlier IEQ article were received from Andrew Mason (lead economist), Ergys Islamaj (senior economist), Francesca de Nicola (senior economist), Frederico Gil Sander (lead economist), Derek Chen (senior economist), Jaffar Al-Rikabi (economist), Urvashi Narain (lead economist), Delphine Arri (senior environmental engineer), Miguel Angel Jorge (senior fisheries specialist), and Charlotte de Fontaubert (senior fisheries specialist).

The team thanks Bapak Arifin Rudiyanto (Deputy of Maritime and Natural Resources, Ministry of National Development and Planning, Bappenas), Bapak Safri Burhanuddin (Deputy for Maritime Resources, Coordinating Ministry of Maritime Affairs and Investment, CMMAI), Ibu Nani Hendiarti (Deputy for Environment and Forestry Management, Coordinating Ministry for Maritime Affairs and Investment, CMMAI) and their teams, for valued input and reviews. The team also thanks Bapak Andreas A. Hutahaean (coordinator of the Oceans Multi-Donor Trust Fund, CMMAI) for his input and coordination support. Input and reviews from staff at the Marine Spatial Management and Capture Fisheries Directorates, Ministry of Marine Affairs and Fisheries, were also received with appreciation.

The team thanks the World Bank's communications staff in Jakarta, including Puni Anjungsari, Annemarie Sieraphin Minaesta, Reidinar Juliane Wardoyo, Irfan Tonnei Herlambang, and David Irianto, for production and dissemination. The manuscript was edited by Zubair Qamar.

The report was funded by the Indonesia Oceans Multi-Donor Trust Fund, established in 2017 at the request of the Government of Indonesia with the support of the Governments of Norway and Denmark. The Oceans Multi-Donor Trust Fund provides technical assistance to implement oceans policy, reduce marine debris, and strengthen coastal resilience. The earlier IEQ article was funded by the Australian government under the Support for Enhanced Macroeconomic and Fiscal Policy Analysis (SEMEFPA) program.

Any errors or omissions are the responsibility of the authors.

Finally, the team would like to acknowledge the support and inspiration of Bapak Aryo Hanggono (former Director General for Marine Spatial Management, MMAF), who provided advice, technical input, and the report's foreword, and passed away before publication. He is remembered as a champion of the oceans and a tireless public servant for Indonesia.

Acronyms

APBD	*Anggaran Pendapatan dan Belanja Daerah* (Regional Revenues and Expenditures Budget)
APEC	Asia-Pacific Economic Cooperation
Bappenas	*Badan Perencanaan Pembangunan Nasional* (Ministry of National Development Planning)
CMMAI	Coordinating Ministry of Maritime Affairs and Investment
COREMAP	Coral Reef Rehabilitation and Management Program
COVID-19	Coronavirus Disease 2019
CTMPA	Coral Triangle Marine Protected Area
E-KKP3K	*Evaluasi Efektivitas Pengelolaan Kawasan Konservasi Perairan, Pesisir dan Pulau-pulau Kecil* (Evaluation of the Effectiveness of Management of Marine, Coastal and Small Islands Conservation Areas)
EPR	Extended Producer Responsibility
GDP	Gross Domestic Product
GoI	Government of Indonesia
GPS	Global Program on Sustainability
IDR	Indonesian Rupiah
ITMPs	Integrated Tourism Master Plans
IEQ	Indonesia Economic Quarterly
IUCN	International Union for Conservation of Nature
LCDI	Low Carbon Development Initiative for Indonesia
LIPI	*Lembaga Ilmu Pengetahuan Indonesia* (Indonesian Institute of Sciences)
LPP	*Lembaga Pengelola Perikanan* (Fishery Management Council)
MAC	Marine and Coastal
MCS	Monitoring, Control, and Surveillance
MOEF	Ministry of Environment and Forestry
MOF	Ministry of Finance
MMAF	Ministry of Marine Affairs and Fisheries
MPA	Marine Protected Area
NCA	Natural Capital Accounting
OECD	Organisation for Economic Co-operation and Development
PNBP	*Penerimaan Negara Bukan Pajak* (Non-tax State Revenue)
PTSP	*Pelayanan Terpadu Satu Pintu* (One-Stop Integrated Services system)
PUSDATIN	*Pusat Data Statistik dan Informasi* (Center for Data, Statistics, and Information)
REDD	Reduced Emissions for Deforestation and Forest Degradation
RPJMN	*Rencana Pembangunan Jangka Menengah Nasional* (National Medium-Term Development Plan)
P3TB	*Program Pembangunan Pariwisata Terintegrasi dan Berkelanjutan* (Integrated and Sustainable Tourism Development Program)
RPP	*Rencana Pengelolaan Perikanan* (Fishery Management Plan)
RTRW	*Rencana Tata Ruang Wilayah* (Spatial Plan)
RZ-KAW	*Rencana Zonasi Kawasan Antar Wilayah* (Inter-regional Zoning Plan)
RZ-KSN	*Rencana Zonasi Kawasan Strategis Nasional* (National Strategic Area Zoning Plan)
RZ-KSNT	*Rencana Zonasi Kawasan Nasional Tertentu* (Zoning Plan for Specific National Strategic Areas)
RZ-WP3K	*Rencana Zonasi Wilayah Perairan dan Pulau Pulau Kecil* (Coastal and Small Islands Zoning Plan)
SISNERLING	Sistem Terintegrasi Neraca Lingkungan dan Ekonomi (Indonesian System of Environmental-Economic Accounts)
STO	Sustainable Tourism Observatory
SDGs	Sustainable Development Goals
WPP	*Wilayah Pengelolaan Perikanan* (Fishery Management Area)
YoY	Year-on-Year

Executive Summary

A False clownfish (Amphiprion ocellaris) swims among the tentacles of its colorful host anemone on a coral reef in Raja Ampat, Indonesia. Photo: © shutterstock.com

Oceans for Prosperity

Executive Summary

Oceans are vital for Indonesia's economy and social welfare.

Oceans are central to Indonesia's prosperity

With more than 17,500 islands, 108,000 kilometers of coastline, and three-quarters of its territory at sea[2], oceans are central to Indonesia's prosperity through economic activities, including capture fisheries and aquaculture, coastal tourism, marine construction, and transportation. Indonesia has the world's second largest fishery sector worth around US$27 billion to GDP and providing 7 million jobs and over 50 percent of the country's animal-based protein needs. Oceans are a key asset for the country's tourism industry worth around US$21 billion to GDP in 2019 (marine and non-marine) (WTTC 2020). In 2016, 44 percent of foreign visitors undertook marine and coastal (MAC) tourism activities as part of their visit (Ministry of Tourism 2016).

There are opportunities to increase this value

Yet there is substantial opportunity to grow the long-term value of these sectors further. Research suggests that improvements to fisheries management could increase the long-term value of production by over US$3 billion per year, relative to returns under a scenario in which current practices continue and fish stocks decline (Costello et al. 2016). Sustainable aquaculture could be expanded, prioritizing low-trophic level species, including seaweed. While the global tourism outlook is currently bleak amidst the COVID-19 pandemic, tourism has rebounded following past crises (although recovery times and profiles vary) (World Bank 2020a). There are future opportunities for carbon payments in coastal ecosystems, particularly mangroves and seagrasses.

Realizing these opportunities will require healthy marine and coastal ecosystems

These economic opportunities are built upon a foundation of natural assets: mangroves, coral reefs, and seagrasses, among other valuable ecosystems. A 2017 study estimated that Indonesia's coral reefs underpinned tourism revenues of around US$3.1 billion per year through the recreation activities they supported (e.g., diving and snorkeling) (Spalding et al. 2017). Reefs further support fishery revenues of some US$2.9 billion per year by providing critical fish habitat (UN Environment 2018). Coastal infrastructure also relies on these ecosystems: coral reefs help Indonesia avoid an estimated US$0.6 billion in flood damages annually (Beck et al. 2018), a value that will grow as coastal areas become more developed and climate change impacts become more severe.

However, there are challenges to the extent and integrity of Indonesia's marine and coastal ecosystems that, if not managed well, could undermine the potential of Indonesia's ocean economy.

Fisheries management is not yet optimized

In 2017, 38 percent of the nation's marine capture fisheries were estimated to be overfished (with a further 44 percent fully fished),[3] reducing returns, export earnings, government revenues, and the wellbeing of coastal communities. While foreign incursion into Indonesian waters has been effectively controlled by the Government of Indonesia (GoI), management of the domestic fleet remains in need of strengthening. Indonesia's fleet comprises over 600,000 vessels, more than 90 percent of which are small vessels (under 10 gross tonnes) collectively responsible for over half the total catch (CEA 2018). Many are unregistered and unmonitored. Implementation of the Fisheries Management Area (*Wilayah Pengelolaan Perikanan*, WPP) system, a critical institution to strengthen the governance of Indonesia's fisheries, remains unfinished, and coordination across level of government requires clarification of responsibilities.

[2] Statistics from reference data by the Coordinating Ministry of Maritime Affairs and Investment (CMMAI).
[3] Marine and Fisheries Ministerial Decree 50/Kepmen-Kp/2017.

Human impacts are damaging coral reefs; this is exacerbated by climate change

Meanwhile, around one-third of Indonesia's coral reefs are in poor condition according to recent surveys by the Indonesian Institute of Sciences (*Lembaga Ilmu Pengetahuan Indonesia*, LIPI) (LIPI 2020). The contributing factors include destructive fishing and pollution, including agricultural and urban runoff and waste plastics. The damage is further exacerbated by climate change. Studies show that more than 80 percent of Indonesia's reefs are expected to experience coral bleaching in five out of ten years throughout the 2030s (Burke et al. 2012).

Coastal development threatens critical habitats such as mangroves

Mangroves are similarly showing substantial losses. Indonesia is home to the largest extent of mangroves in the world (totaling 3.31 million hectares, around 20 percent of the world's total), yet has some of the fastest rates of loss in the world (between 6,200 and 52,000 hectares per year, varying by year and classification technique used) (Goldberg et al. 2020; Murdiyarso et al. 2015). Clearing for aquaculture accounts for nearly half of mangrove removal, while clearing for oil palm contributes a further 16 percent (Richardson et al. 2018). Over 50 percent of mangroves are in a degraded condition (MMAF 2019; MoEF 2019).

Marine and coastal tourism sites are threatened by inadequate infrastructure and increased visitor numbers

Important MAC tourism sites are impacted by basic infrastructure and services deficiencies for residents. For example, in 2015, prior to its prioritization for tourism development, Lombok's tourism areas were characterized by low average household access to piped water supply (45 percent of households had access), sanitation (48 percent), and solid waste collection services (26 percent). The resulting environmental pressure is compounded by growing visitors' and businesses' needs. The impact of these deficiencies on tourists' perceptions can be seen in online reviews: topics of dissatisfaction expressed on TripAdvisor by tourists along Lombok's southern coast included the poor state of local sanitation and noticeable pollution (Horwath 2017). Early signs of environmental degradation can be seen at Komodo National Park, where the proportion of tourists encountering marine plastic debris increased from around 10 percent in 2009 to over 50 percent in 2017 (Harvey et al. 2018).

Plastics litter oceans and impose costs on fisheries, tourism, and ecosystems

More broadly, marine plastic debris impacts ecosystems, human health, and ocean economy sectors, particularly fisheries, coastal tourism, and commercial shipping. Recent estimates of the economic damage of plastic pollution exceed US$10.8 billion annually in the Asia Pacific Region alone, including over US$450 million per year for Indonesia (APEC 2020). These estimates are direct costs only. Costs of remediation and indirect damage to ecosystems, if known, would increase this estimate substantially. In 2020, World Bank modelling using local data estimated that Indonesia contributes between 0.20 and 0.55 million tonnes of plastic to the oceans each year.[4]

Compounding these long-term challenges are more immediate pressures from the COVID-19 pandemic.

The economy entered the first recession in two decades due to COVID-19

The World Bank estimates that Indonesia's real GDP shrank by 2.2 percent in 2020, the first recession in two decades, and a stark contrast to pre-COVID-19 predictions of 5.0 percent growth (World Bank 2020c). Without social assistance measures to mitigate the shock, the pandemic could have led to an estimated poverty rate increase of 3.0 percentage points, equal to an additional 8.5 million Indonesians falling below the poverty line (World Bank 2020c). Poverty is likely to rise even with the GoI's substantial assistance measures, as unemployment hit its highest rate (7.1 percent) since 2011.

Oceans sectors are affected in a variety of adverse ways

The impact will be felt in all sectors of the economy. The global Fish Price Index showed an 8.3 percent decline year-on-year (YoY) between January and May 2020, with prices for select species in Indonesia falling by as much as 60 percent.[5] Between January and October of 2020, foreign visitor arrivals to Indonesia were down 72 percent YoY.[6] Beach

[4] Forthcoming publication.
[5] Based on early survey data by Rare Indonesia.
[6] World Bank staff calculations based on BPS data.

clean-up events are collecting increased quantities of pandemic-related medical waste. Such waste was reported to amount to 16 per cent of the total garbage floating in Cilincing and Marunda river estuaries in Jakarta Bay in March and April 2020 (Yang 2020).

Both long and short-term challenges can be addressed through a blue economy strategy; such a strategy is being pursued by the GoI through a range of initiatives.

A blue economy is a sustainable ocean economy

A blue economy generates economic and social benefits while ensuring oceans' long-term environmental sustainability (World Bank 2017a). In other words, a blue economy is a sustainable ocean economy. It requires policymaking based on science and data, inter-sectoral coordination, and participation of diverse stakeholders in decision-making. Investments in skills, institutions, infrastructure, and services are needed. These investments, in turn, require new mechanisms for financing, along with better use of existing funding streams.

Indonesia's blue economy initiatives include: (1) improved fisheries management

Oceans-led development and a transition towards a blue economy is a priority for the GoI. Specific goals aligned with blue economy principles are seen in the National Medium-Term Development Plan (*Rencana Pembangunan Jangka Menengah Nasional*, RPJMN), the 2017 Oceans Policy, and a wide range of initiatives underway. One example is seen in the strong stance taken by the GoI against foreign illegal, unregulated, and unreported (IUU) fishing. While controversial in some respects, these efforts have reduced pressure on fish stocks from foreign sources, creating a near-term opportunity to rebuild key fisheries (Cabral et al. 2018).

(2) development and integration of spatial plans

Both central and provincial governments are working to enhance integrated and sustainable use of coastal and marine ecosystems through marine spatial planning, a tool for resolving oceans and coastal land use conflicts by delineating zones for specific uses through a participatory process. Most provinces have developed marine spatial plans for their waters (*Rencana Zonasi Wilayah Perairan dan Pulau Pulau Kecil*, RZ-WP3K), and will integrate these plans with Indonesia's broader (terrestrial and marine) spatial planning framework (*Rencana Tata Ruang Wilayah*, RTRW) in the coming years.

(3) expansion of marine protected areas

The GoI has similarly made substantial progress in expanding marine protected areas (MPAs) to over 23 million hectares (meeting the Aichi target[7] of 20 million hectares), with a further goal of reaching 30 million hectares by 2030. Improving management of these areas is now a priority. To monitor progress, MMAF has been implementing a scorecard system (*Evaluasi Efektivitas Pengelolaan Kawasan Konservasi Perairan, Pesisir dan Pulau-pulau Kecil*, E-KKP3K) across MPAs to provide a rigorous and consistent means of tracking management effectiveness, and has recently developed an upgraded version with increased focus on socio-economic and environmental outcomes.

(4) a national action plan for marine debris

The GoI launched the National Action Plan on Marine Debris in June 2017, with the goal of reducing marine debris by 70 percent by 2025. Efforts to meet the goal include moving waste management infrastructure away from waterways, as seen in the Government's *Citarum Harum Program* along the Citarum River. Other actions include recent Extended Producer Responsibility (EPR) legislation on consumer goods manufacturers, which obliges firms to reduce their total waste by 30 percent by 2029.[8] Taxes and bans on single-use plastics are being enacted by provincial and city governments to discourage plastics consumption, including in Jakarta and Bali.

[7] Aichi Target 11, of the Convention on Biological Diversity, is a call for countries to effectively conserve at least 10 percent of coastal and marine areas by 2020.
[8] Ministry of Environment and Forestry Regulation No.75 of 2019 regarding Roadmap for Reduction of Waste from Producers.

(5) an integrated and sustainable tourism development program

In 2018, the GoI launched the Integrated and Sustainable Tourism Development Program (*Program Pembangunan Pariwisata Terintegrasi dan Berkelanjutan*, P3TB) to bring a more holistic and inclusive approach to tourism development. The program incorporates planning functions, support to businesses, community empowerment, and environmental and cultural asset management, along with investment in tourism-relevant basic infrastructure and skills. The program focuses on a selection of ten priority tourism destinations, starting with Lombok, Borobudur-Yogyakarta-Prambanan and Lake Toba, and will in 2021 include Komodo National Park and Labuan Bajo, Bromo-Tengger-Semeru, and Wakatobi. Key to the program are integrated tourism master plans (ITMPs), which aim to develop destinations while avoiding degradation of the natural and cultural assets that attract visitors (MPWH 2020).[9]

Developing a blue economy will require substantial investments and policy reform that build on these initiatives. The recommendations outlined in this report include:

Policies for improved management of oceans and coastal areas:

Operationalize Indonesia's Fisheries Management Area (WPP) system

Indonesia's WPP system and its supporting institutions are the basis for fishery management. While development of the system is recognized as a national priority, key elements are yet to be finalized. WPP councils (*Lembaga Pengelola Perikanan*, LPP) require budgets, human resources, and a strengthened legal mandate. LPPs' primary management tool—fishery management plans (*Rencana Pengelolaan Perikanan*, RPP)—are awaiting inclusion of evidence-based harvest strategies. Roles and responsibilities for fisheries management across levels of government (national, provincial, district) and stakeholders (government, private sector, civil society, academia) require further clarification, with management measures linked to LPP advice and decisions.

Ensure compliance with spatial plans

Indonesia has an opportunity to be a world-leader in marine and coastal spatial planning, building on recent spatial plan development and implementation efforts. Compliance with spatial plans will need to be ensured through integration of plans with business permitting systems, notably issuance of business licenses. Longer-term, a marine and coastal cadastre (a spatial title registry, identifying property rights over specific areas, including aquaculture sites and tourism facilities) will be needed to complement these systems and help manage conflicts in the face of increasing demand for marine and coastal areas.

Expand use of rights-based approach in management

Rights-based fisheries management—which has found considerable success internationally— has potential for expansion in Indonesia. Under such systems, governments grant fishing privileges to firms or communities to a quantity of catch (within an overall harvest limit), to a defined area, or to apply a defined level of fishing effort. These privileges can be linked to the existing license system and be based on inputs (e.g., fishing days), outputs (fish caught), as well as spatial zones. Adat communities[10] can currently receive such privileges for use of defined spatial areas. However, refined legal mechanisms are now required to extend this system more widely, for example to include traditional and local communities.[11] While such mechanisms have faced legal challenges previously, legally robust mechanisms for rights-based approaches are feasible for Indonesia (Waddell 2012).

[9] MPWH (2020). Integrated and Sustainable Tourism Development Program (http://p3tb.pu.go.id/in/main/home).
[10] Adat communities are primarily indigenous, outlying island communities that follow customary rules regarding the utilization of land and resources. Adat has some formal recognition in the law.
[11] Communities in coastal and small island areas are designated as adat law communities, traditional communities, or local communities (Law No.27/2007, as amended by Law No.1/2014, on Coastal and Small Islands Management).

Extend the primary forest conversion moratorium to mangroves and include mangroves in the national REDD+ framework

The GoI has set a commendable target for mangrove restoration — 600,000 hectares to be restored by 2025. If reached, this would represent a dramatic acceleration of restoration efforts, with MoEF reporting that around 50,000 hectares of mangroves were restored or replanted between 2010 and 2016, an average of 7,000 hectares per year. Yet rehabilitation costs are high relative to conservation measures that could reduce mangrove loss in the first place. Indonesia has a moratorium on land conversion for Indonesia's primary forests. This could be extended to mangroves that have similarly high ecological, carbon-sequestration, and economic values (Murdiyarso et al. 2015). When reviewing its Nationally Determined Contribution (NDC), Indonesia could consider including mangroves in its land use emissions baseline to allow mangroves to generate emissions reductions payments in carbon-based schemes such as REDD+. Greater clarity around institutional responsibility for conserving and restoring mangroves would help facilitate these actions.

Systems for improved data and monitoring:

Improve quality, integration and use of fisheries data

Fisheries management plans and operationalization of harvest strategies rely on area- and species-specific data. Multiple sources of such data are already available. However, they are not yet fully integrated within key databases or fully informing management. Improvement of landing surveys, including expanded geographic and species coverage and refined analysis (e.g., use of indicator species instead of aggregated species groups) would be beneficial, along with accelerated rollout of e-monitoring and reporting systems. Continued integration within MMAF's *Pusat Data Statistik dan Informasi* (PUSDATIN) system will contribute to these needs.

Improve monitoring of tourism impacts in hotspots

Improved data will also benefit tourism. Environmental impact monitoring systems could be expanded at MAC destinations to detect problems and inform mitigation measures. The GoI has encouraged the establishment of Sustainable Tourism Observatories (STOs) in priority destinations to monitor risks to natural and cultural assets and identify growing pressure points, which could be expanded across popular MAC destinations. In the short term, STOs already established can take advantage of the COVID-19 period to monitor ecosystems in the absence of large tourist numbers, setting useful baselines to later benchmark tourism impacts.

Improve monitoring of ecosystems and spatial plan implementation

Remaining gaps in ecosystems monitoring continue to hinder management decisions. Information on the basic status and trends in seagrasses, for example, is extremely limited. Agreement on consistent methods and data formats for measurement and harmonizing coastal ecosystem datasets would help alleviate such challenges. Such efforts are being promoted by LIPI's mangrove and coral reef health indices and would benefit from further support. Transparency over the implementation of spatial plans would benefit from a scorecard system with progress indicators, akin to the MPA scorecard system. Scorecard systems are most valuable if they go beyond measuring inputs and processes (such as regulations, management plans, and budgets) to also include ecological and social-economic impacts such as the extent of mangroves or quality of corals.

Financing, incentives, and investments:

Invest in waste management infrastructure and cost-effective coastal clean-ups

Improved basic services and infrastructure are needed to manage pollution and waste generation across Indonesia. The required investment for urban areas alone is estimated to exceed US$5 billion. Investment could be targeted at high priority areas for marine debris reduction, such as coastal and riverside cities, and MAC tourism sites. More immediately, coastal clean-ups can be used to address plastics build-up, particularly in those coastal areas with sensitive ecosystem and tourism values, and to raise awareness of the issue. These clean-ups can draw on community support by working in partnership with schools and community groups, which can also help reduce costs.

Improve management of visitor flow

For MAC destinations at risk of overcrowding, measures to manage the flow of visitors would be beneficial. These include: (1) use of tiered pricing with higher access fees for more fragile areas; (2) "congestion pricing," whereby above-average entrance fees are charged for certain tourist sites during peak demand periods; (3) minimum expenditure thresholds for tourists; (4) technologies to control crowd flows such as scheduling apps that allocate visitors to specific time slots at key attractions; and (5) the development of alternative tourism attractions to divert and re-distribute visitors away from popular but environmentally-fragile attractions. Measures affecting pricing could be tiered by income or origin to ensure fair access for local tourists.

Incentivize waste-minimizing behaviors

Taxes and bans on plastics could be expanded to increase the transition to alternative or reusable products. The 2020 approval by parliament of a Ministry of Finance (MOF) proposal to include certain plastics as excisable goods[12] was an important step forward. Financial incentives could also be introduced to reduce plastic waste from marine activities, such as fishing gear losses or discards. Programs can build on the experience of pilots in Papua and Java that paid fishers to collect discarded nets.

Extend producer responsibility and circular economy policies

EPR regulation would benefit from institutional strengthening for monitoring and enforcement and could be expanded over time to support a transition to a circular economy. The regulation, passed in late 2019 and under implementation, could be complemented by other measures such as deposit-refund systems, standards and technical guidelines for recyclable materials, and minimum recycled content requirements in select products where technically and economically feasible. International coordination around these measures would help to create a sufficiently large market for the private sector to invest. Options for public procurement that prioritizes recycled materials could also be explored.

"Build back better" from the COVID-19 pandemic

While recovery from the impacts of the COVID-19 pandemic will be the priority of all governments over the short- and medium-term, there are opportunities to align recovery efforts with the long-term needs of oceans sectors. Key management systems—such as ITMPs, spatial plans, and harvest strategies for fisheries—could be further developed, tested, and implemented in a context of low demand and low development pressure. As the recovery progresses, these systems would gradually become binding. Recovery packages could be structured to promote livelihoods and jobs while strengthening long-term coastal ecosystem resilience. These could include labor-intensive coastal and marine conservation and restoration activities in hard-hit tourism-dependent communities, and livelihood diversification programs in fishing communities to reduce pressure on overexploited stocks and support transitions to more productive sectors.

[12] Draft Presidential Decree on Plastic Bag Excise. The Parliament has requested an expansion of this excise to other plastic products.

"The oceans, the seas, the bays, and the straits are the future of our civilization"

– President Joko Widodo's speech at his inauguration, October 20, 2014

The beautiful islands and colors around Fam Island, Raja Ampats, West Papua, Indonesia. Photo: © shutterstock.com

Summary of Policy Recommendations

	Recommendation	Priority Level Key Government Agencies	Themes: Resilient ecosystems	Growth and Productivity	Sustainable tourism	Sustainable fisheries	Fiscal revenues	Plastics reduction	COVID-19 Recovery
	Coordination and Planning								
1.	**Cross-sectoral coordination for oceans**: Ensure Medium-Term National Development Plan (RPJMN) goals across oceans sectors are aligned with Indonesia's Oceans Policy, and strengthen processes for stakeholder engagement and input.	**Short-term priority** *CMMAI, MMAF, Bappenas, Provinces*	✓	✓	✓	✓	✓	✓	✓
2.	**Integrated Tourism Master Plans**: Complete and implement integrated development plans for priority tourism areas.	**Short-term priority** *Bappenas, MPWH, MoTCE, MoT, ATR/BPN, MoEF, MoHA, MoEMR, MoSOE, MoF, MoH, MoCSME, MoMAF, MoM, MoVDDRT, BKPM, Provinces, Districts/Cities**	✓	✓	✓				
3.	**Spatial plans**: Complete integration of marine and terrestrial spatial plans, ensuring the participation of agencies with responsibility over coastal and marine management (particularly MMAF) to ensure detailed technical knowledge is incorporated, and ensure that spatial plan information is readily accessible by stakeholders.	**Short- and medium-term priority** *CMMAI, MMAF, MoEF, ATR/BPN, Provinces*	✓	✓	✓	✓			
	Sustainable and Productive Fisheries								
4.	**Public spending efficiency**: Undertake a public expenditure review of the fisheries sector to strengthen MMAF annual funding requests and work plans, and to identify opportunities to improve the alignment of expenditures with sustainability and/or productivity objectives.	**Short-term priority** *MMAF, Provinces, MoF, Bappenas*		✓		✓	✓		
5.	**Fisheries management institutions:** Identify and define the full suite of roles and responsibilities across levels of governments needed to operationalize WPP management; update regulations and fully resource public institutions (with human resources and operational budgets), including implementing agencies and decision-making and advisory bodies (such as *Lembaga Pengolaan Perikanan*, LPP) that can foster consultation in management.	**Short-term priority** *CMMAI, MMAF, Bappenas, Provinces*	✓	✓		✓			
6.	**Fisheries management plans and harvest strategies:** Accelerate development and implementation of harvest control rules (including clearly defined limit and target reference points and input/output control mechanisms) based on best available data and define specific management objectives in consultation with stakeholders.	**Short- and medium-term priority** *MMAF, Provinces*	✓	✓		✓	✓		
7.	**Fishing license allocations:** Create incentives for allocation of fishing access within agreed limits. Condition any additional responsibility for allocating fishing access to provinces on achievement of specific management objectives. Disclose licenses and registrations publicly.	**Medium- and long-term priority** *MMAF, Provinces*	✓	✓		✓	✓		

8.	**Fisheries data:** Assess and enhance statistical systems for cost-efficiency and accuracy, expanding their geographical and fleet coverage and refining species information (notably indicator species instead of species aggregates), and optimize use of technology (e-monitoring; e-reporting). Consolidate the existing multiple information systems within MMAF, including within *Pusat Data Statistik dan Informasi*.	**Medium- and long-term priority** *MMAF, BPS, Provinces*	✓			✓			
9.	**Fishery value-chain development:** Concentrate public investment in essential services and infrastructure that supports and facilitates private-sector operations and investment. Where appropriate, pursue opportunities for blended public-private sector investment in essential services and infrastructure such as ports, cold storages, and logistics hubs. Investment should be based on a value chain strategy that determines market demand and access, stock status, and human resources and support services availability before construction.	**Medium- and long-term priority** *MMAF, Provinces*		✓		✓	✓		
10.	**Linkages between licenses and performance**: Establish criteria to link the allocation of fishing licenses to socio-economic and environmental performance. For example, award preferential access to vessels or firms with performance track records that best contribute to the fishery's socio-economic and environmental objectives.	**Long-term priority** *MMAF, Provinces*	✓	✓		✓	✓		
11.	**Rights-based fishery management:** Develop a legal framework that can define marine resources privileges and responsibilities, rules for allocating privileges, and define institutions to grant privileges and enforce responsibilities. Under the framework, cooperatives, communities, or companies would be provided fishing privileges for specific stocks and/or areas, in the form of fishing effort (e.g., days-at-sea), catch quotas, or area rights. Privileges would be durable and would be revoked if social or environmental responsibilities are not met.	**Long-term priority** *CMMAI, MMAF, Bappenas, Provinces*	✓	✓		✓	✓		
	*Sustainable Tourism***								
12.	**Tourism impact monitoring**: Establish Sustainable Tourism Observatories in priority tourism development sites with environmental impact data made publicly available at frequent intervals. Use data collection during the current downturn in foreign tourist numbers to set baselines against which ecological impacts of tourism can be determined subsequently.	**Short-term priority** *MTCE*	✓		✓				
13.	**Visitor flow management**: Implement measures to limit or manage the flow of visitors in MAC destinations that are either at risk of overcrowding or already showing signs of environmental degradation, such as electronic ticketing and pricing systems to manage visitor flow at priority sites, including tiered pricing, congestion pricing, and scheduling apps, or minimum expenditure thresholds at high value sites.	**Medium-term priority** *Bappenas, MPWH, Provinces, Districts/Cities*	✓		✓		✓		

14.	**Services for residents near tourist sites**: Increase investment in basic infrastructure and public services such as water, sanitation, and solid waste collection to manage environmental degradation and provide for residents' basic needs around tourist sites.	**Medium- and long-term priority** *MPWH, MTCE, CMMAI, Provinces*	✓		✓			✓	
15.	**Systems approach to conservation financing**: Develop a provincial (pilot) or national-level system for collection of visitor fees in high-visitation areas, with transfer of a proportion of revenues to support conservation areas that are unable to generate their own revenues, while allowing the site management to keep a proportion of revenues to incentivize performance. Additional public funding will be needed to underpin conservation and management efforts at both revenue and non-revenue sites more broadly.	**Long-term priority** *MTCE, MMAF, MoEF, Provinces*	✓		✓		✓		
Coastal Management									
16.	**Adaptive and monitored spatial plan implementation**: Develop a scorecard to monitor and evaluate spatial plan implementation (akin to the MPA management effectiveness scorecard, E-KKP3K) that moves beyond output and process indicators to also consider social, economic, and environmental outcomes. Establish a regular process for benchmarking plan implementation, adapting plans where needed, and incentivising accelerated implementation by sub-national governments.	**Short-term priority** *MMAF, Provinces*	✓	✓	✓	✓			
17.	**Marine protected area (MPA) management**: Invest in MPA management effectiveness, including human resource capacity; monitoring, control, and surveillance capacity; small infrastructure; and community engagement to accelerate progress against the E-KKP3K scorecard and, where appropriate, obtain certification and accreditation against international standards (e.g., IUCN Green List).	**Short-term priority** *MMAF, MoEF, Provinces*	✓		✓	✓			
18.	**Labor-intensive coastal works programs**: Expand labor-intensive coastal and marine restoration activities, including mangrove restoration and coastal cleanups, to provide short-term employment during the recession and long-term resilience benefits.	**Short-term priority** *MPWH, MMAF, MoEF, MOF, Provinces*	✓						✓
19.	**National endowment fund for MPAs**: Building on experience at local and regional levels (such as that in the Bird's Head Seascape, West Papua), facilitate the establishment of a national conservation endowment fund to provide a sustainable flow of financing for MPA management funded through philanthropy, development assistance, private sector contributions (domestic and international), and public budget allocation.	**Medium-term priority** *MMAF, MoEF, Bappenas, MOF, Provinces*	✓		✓	✓	✓		

20.	**Ecosystems data collection:** Establish and systematize long-term monitoring with defined sampling protocols for coral reefs, mangroves, and seagrasses that continues beyond any one individual monitoring project. Complement physical measures with economic valuation of key coastal ecosystems and include valuation data within the Indonesian System of Environmental-Economic Accounts (SISNERLING).	**Medium-term priority** *MMAF, MoEF, LIPI, Provinces*	✓						
21.	**Mangrove deforestation moratorium**: Expand the scope of license issuance moratorium in primary forest and peatlands to include mangroves and include mangroves in the national REDD+ framework to attract carbon financing.	**Medium- and long-term priority** *MoEF, MMAF, Bappenas, Provinces*	✓				✓		
22.	**Coastal livelihoods and business support**: Promote diversified livelihoods and business growth in coastal communities through business skills-building, access to finance programs, and investment in infrastructure and services. Training and business promotion in activities outside of fishing could support efforts to reduce pressure on marine or coastal resources. Use existing social programs' delivery systems where possible for efficient rollout.	**Medium- and long-term priority** *MPWH, MMAF, MOF, Provinces*	✓	✓		✓			✓
23.	**Marine and coastal cadastre**: Develop a cadastre, a spatial title registry identifying property rights over specific areas, including aquaculture sites and tourism facilities, over marine and coastal areas, to support spatial planning.	**Long-term priority** *MMAF, ATR/BPN, Provinces*	✓	✓	✓	✓			
Marine plastics									
24.	**Waste management services for priority areas**: Invest in basic waste management systems and services with an initial focus on those areas identified as waste hotspots and tourism areas, including locations close to major rivers and critical coastlines. Investments should be complemented through increased waste management funding schemes (retribution) for waste collection and disposal. This will require strengthened technical guidance to city and district levels of government for design and implementation of funding mechanisms. Retribution should support recycling and waste collection and disposal aimed at ensuring sufficient collected clean plastics for recycling and developing markets and supply-chains that use recycled materials.	**Short- and medium-term priority** *MPWH, CMMAI, Provinces*	✓		✓			✓	
25.	**Beach and shallow sea plastic clean-ups**: Pilot and invest in cost-effective clean-ups of polluted and priority beaches and shallow sea areas, with appropriate disposal of collected waste. Support on-going community-organized clean-up events. Citizen science and monitoring, or data from STOs, can be used to help target clean-up activities and identify plastic products that are most polluting waterways and coasts.	**Short- and medium-term priority** *CMMAI, MMAF, MoT, Provinces, Districts/Cities*	✓		✓			✓	

26.	**Sea-sourced waste reduction**: Invest in harbor and port reception facilities that receive solid waste from ships, with a focus on fishing gear, complemented by a reporting, monitoring, and incentive system to encourage collection, reuse, and recycling.	**Short- and medium-term priority** *MPWH, CMMAI, MMAF, MoT, MoEF, Provinces*	✓			✓		✓	
27.	**Single-use plastics**: Introduce and scale cost-effective bans, excises, and other policies on single-use plastics (such as bags, food packaging, straws) on items for which alternatives are readily available and affordable in the short-term, and for other products in the medium term, supported by a transition plan for impacted sectors.	**Short- and medium-term priority** *MoEF, CMMAI, MOF, Provinces, Cities*	✓				✓	✓	
28.	**Extended Producer Responsibility (EPR)**: Support the implementation through institutional strengthening for monitoring and enforcement of the 2019 EPR regulation, which requires manufacturers to reduce waste produced and to manage post-consumer waste through reuse or recycling. Assess the suitability of additional incentive instruments under EPR, notably deposit-refund schemes and packaging fees.	**Short- and medium-term priority** *MoEF, CMMAI, MoI, Provinces*	✓					✓	
29.	**Behavioral change campaigns**: Use community activities to build support for policies and programs that reduce plastics use, increase individual behavior and awareness (e.g., recycling), and reduce waste build-up in prominent locations.	**Short- and medium-term priority** *MoEF, CMMAI, MPWH, Provinces, Districts/Cities*	✓					✓	
30.	**Design for circularity**: Develop technical standards to improve the quality of recycled plastic, specifically food-grade plastics, and reduce dependence on virgin material, with accompanying incentives. Assess the suitability of measures to support long-term shifts towards a circular economy, such as recycled material standards, minimum recycled content requirements, and prioritizing recycled material in public procurement.	**Medium- and long-term priority** *MPWH, CMMAI, MoI, Provinces*	✓					✓	

Notes: MoEF = Ministry of Environment and Forestry, CMMAI = Coordinating Ministry of Maritime Affairs and Investment, MoI = Ministry of Industry, MPWH = Ministry of Public Works and Public Housing, MoT = Ministry of Tranport, MTCE = Ministry of Tourism and Creative Economy, Bappenas = Ministry of National Development and Planning, LIPI = Indonesian Institute of Sciences, ATR/BPN = Ministry of Agrarian Affairs and Spatial Planning/National Land Agency, BPS = National Statistics Agency, MoF = Ministry of Finance, MMAF = Ministry of Marine Affairs and Fisheries, MoHA = Ministry of Home Affairs, MoEMR = Ministry of Energy and Mineral Resources, MoSOE = Ministry of State-Owned Enterprises, MoVDDRT = Ministry of Villages, Development of Disadvantaged Regions, and Transmigration, MoH = Ministry of Health, MoCSME = Ministry of Cooperatives and Small and Medium-sized Enterprises, MoM = Ministry of Manpower, BKPM = Investment Coordinating Board.

* This is based on the Bappenas decree on the National Coordination Team for Integrated and Sustainable Tourism (Surat Keputusan No. Kep.183/M.PPN/HK/09/2019), dated September 25, 2019. This may change depending on the specific needs of the selected destinations.

** Sustainable tourism also requires skill development, firm support programs, community engagement, and cultural heritage management and protection, among other governance elements. However, this summary is limited to recommendations specific to MAC tourism sites. For more details, see P3TB (p3tb.pu.go.id/in/main/home).

01. Introduction

Home and boats on the water. Photo: © Curt Carnemark/ World Bank

Oceans for Prosperity

01. Introduction

Local fishermen Indonesia. Photo: © André Rodrigues Aquino

Oceans are a critical part of Indonesia's immediate and long-term response to the COVID-19 crisis.

Oceans are vital for Indonesia's economy and welfare

With more than 17,500 islands, 108,000 kilometers of coastline, and three-quarters of its territory at sea,[13] oceans are central to Indonesia's prosperity. Indonesia's oceans confer an unparalleled source of economic advantage that are estimated to support more than US$180 billion of economic activity annually (PENSEA 2018).[14] Yet, the evidence presented in this report shows that Indonesia's oceans have more to offer when managed sustainably. Realizing this potential will deliver increased growth, jobs, food security, and reductions in the current account deficit; protect ecosystems for present and future generations; and further Indonesia's ambition of becoming a global "maritime nexus."

Indonesia has committed to a 'blue economy,' requiring policy reform and investment

A 'blue economy' strategy is a pathway towards these outcomes. A blue economy is a sustainable oceans economy that generates economic and social benefits while ensuring long-term environmental sustainability (the very source of these benefits) (World Bank 2017a).[15] A blue economy requires policymaking based on science and data, coordination across ocean sectors such as fisheries, tourism, and transportation, and participation of diverse stakeholders in decision-making. Investments in skills and infrastructure are needed to add value to ocean resources. These investments and policies, in turn, require more efficient use of existing funding streams, and in some cases, new financing mechanisms. Indonesia has shown commitment to a blue economy strategy through its Oceans Policy of 2017, the Medium-Term National Development Plan (RPJMN), and other high-level commitments.

[13] Statistics from reference data by the Coordinating Ministry of Maritime Affairs and Investment (CMMAI).
[14] Based on 2015 data. Sectors comprising this total include fisheries, marine and coastal tourism, sea-based transport, energy and minerals, marine manufacturing (e.g., shipbuilding, salt production), marine and nearshore construction, and government oceans-related expenditure.
[15] The Blue Economy concept refers to the sustainable use of oceans resources for economic growth and improved livelihoods. It encompasses sectors such as fisheries and aquaculture, coastal and marine tourism, and maritime transportation. The concept emphasizes the interconnection across sectoral activities given their impact on oceans resources and calls for integrated management approaches, including marine spatial planning to manage trade-offs across sectors, multi-stakeholder consultations and improved data, natural capital accounting to determine and communicate the value of natural resources, and 'blue financing,' public and private financing aimed to promote sustainable use of the oceans.

This report details the status of, and rationale for, a blue economy transition in Indonesia…

This report begins with a discussion of the potential economic opportunities within two key ocean sectors—fisheries and marine and coastal tourism. The report then turns to the foundation of these sectors—healthy and productive marine and coastal ecosystems—and describes measures that can ensure their long-term vitality. An in-depth look at marine plastics pollution, a growing and severe threat to the development of both sectors, is presented next with a description of key elements of an integrated blue economy strategy to conclude. Throughout, this report presents some of the latest data on Indonesia's ocean sectors, opportunities for their development, and a synthesis of threats to their sustainability and productivity.

…along with policy recommendations that would support such a transition within select sectors

In doing so, the report aims to provide a policy pathway forward for a blue economy transition in Indonesia. It does so within the context of the COVID-19 pandemic in which economic pressures on marine and coastal stakeholders have increased substantially. The report deliberately focuses on fisheries and marine and coastal tourism from among the larger suite of oceans related activities. While other sectors make important contributions to the blue economy (such as maritime transport and coastal construction), fisheries and marine and coastal tourism are among those most closely linked to the vitality of Indonesia's ocean ecosystems and their sustainable management.

Blue economy sectors are threatened in the short term by the COVID-19 crisis…

The pandemic crisis has impacted almost every aspect of the economy. The World Bank estimated that Indonesia's real GDP shrank by 2.2 percent in 2020, the first recession in two decades, and a stark turnaround compared to pre-COVID-19 estimates of five percent growth (World Bank 2020c). May and June rounds of the World Bank HiFy survey[16] showed that 24 percent of respondents had stopped working. Of those still working, income losses were widespread, with 84 percent of those in the trade, hotel, and restaurant sectors reporting lower incomes since the start of the crisis. While conditions improved later in the year, 5.1 million people became unemployed or exited the labor market in 2020. Without social assistance measures, the pandemic would have led to an estimated poverty rate increase of 3.0 percentage points, equal to an additional 8.5 million Indonesians falling below the poverty line (World Bank 2020c). Poverty is likely to rise even with substantial assistance measures. Even with social assistance measures, substantial poverty impacts are being felt, with unemployment hitting its highest rate (7.1 percent) since 2011. These impacts compound already elevated levels of poverty in coastal, oceans-dependent communities.[17]

A reduction in demand for seafood

Lockdowns and recession have reduced demand for seafood and disrupted global supply chains (FAO 2020). Landing port facilities were closed in the initial months, leading to stockpiling of fish in cold storage. Exports to key markets (including China, USA, Europe) declined by as much as 70 percent, and high-value segments of the fresh market (such as tuna) were affected by reductions in available air transportation. The global Fish Price Index declined by 8.3 percent year-on-year (YoY) between January and May 2020, while prices for select species in Indonesia fell by as much as 60 percent.[18] While this improved affordability for consumers, large job losses and income losses were reported on the supply side. The number of active fishers and fish traders in South Sulawesi, for example, declined by more than 60 percent in the initial months of the pandemic (Campbell et al. 2020). The fragmented nature of the small-scale fisheries sector means that the full scale of impacts is not yet known.

[16] The World Bank is administering high-frequency (HiFy) monitoring of the socio-economic impacts of COVID-19 on households. The HiFy is a telephone interview survey of about 4,000 panel households 27 provinces every 3-8 weeks.
[17] The poverty rate in coastal villages is 1.3 times higher than in non-coastal villages, with average fisher income below the minimum wage. See Cahagi and Gurning (2018).
[18] Based on early survey data by Rare Indonesia (unpublished).
[19] Findings from the World Bank COVID-19 Business Pulse Survey in Indonesia. Round 1 (May-June 2020) and Round 2 (October 2020).

A dramatic decline in coastal tourism

Tourism has been one of the most heavily impacted sectors. Indonesia reported a 72 percent YoY decrease in foreign arrivals for the between January and October 2020 (BPS 2020). A business pulse survey conducted by the World Bank in June 2020 found that 82 percent of Indonesian tourism firms faced a sales drop, with an average drop in YoY monthly sales of 57 percent. Compared to June 2020, tourism firms' financial situation in October 2020 was slightly better, but 71 percent of firms were still experiencing a drop in sales.[19] Considerably more tourism firms were receiving assistance from government programs in October (46 percent) than in June (6 percent). The COVID-19 crisis has had a significant impact on all tourism destinations, including coastal locations such as Bali, Lombok, Labuan Bajo and Komodo National Park, Raja Ampat National Park, and Wakatobi National Park, where residents and local business rely heavily on tourism.

Uptake in plastics use, and...

Evidence from around the world and Indonesia point to a significant increase in the use of plastics during the pandemic, notably of personal protective equipment (Peszko 2020). Beach clean-up events have collected increased quantities of masks, gloves, and plastic gowns, with medical waste reported to amount to 16 percent of the total garbage in the Cilincing and Marunda river estuaries of the Jakarta Bay in March and April of 2020 (Yang 2020). The surge of online purchases during the pandemic has further contributed to increased waste, with large amounts of plastic packaging used in shipped products, along with consumption of take-out food. These add to an already significant flow of plastics into Indonesia's oceans, explored in detail in Chapter 5.

Oceans management curtailed by budget constraints

There is also a risk that oceans management and investment outcomes could be compromised by pandemic-related cuts in government budgets. The MMAF budget for 2020 was reduced by almost 20 percent in 2020. While the Ministry has worked to maintain core functions, including monitoring and enforcement to deter illegal fishing (Gokkon 2020), broader oceans activities such as data collection and investment in management systems could face constraints. There have been some reports of increased illegal fishing in response to expectations of reduced enforcement, as well as economic pressures. Bomb fishing, for example, has been reported in Raja Ampat regency, West Papua, during the crisis, risking damage to one of the world's most valued reef ecosystems (Suryana 2020). The extent of the problem remains uncertain. Local government expenditure on tourism-related services fell in line with budget shortfalls, although GoI infrastructure development budgets for priority destinations were maintained.

The Government acted quickly to address immediate COVID-19 impacts, and can enhance recovery through three priorities

The GoI has responded with measures to protect fishers' health (including promoting protective health measures in ports, processing plants, and on vessels), increased cash transfers to fishers and to aquaculture and salt producers, intervened directly in the market by buying, stocking, and distributing seafood to maintain prices, promoted e-trade platforms to stimulate market demand, and worked with the private sector to increase cold storage capacity. More broadly, the GoI provided a IDR 695 trillion (US$49 billion) relief package concentrated on strengthening health care, expanding social protection, and supporting businesses. Building on these short-term responses, long-term measures for recovery could consider prioritizing three areas: (1) strengthening marine and coastal planning and management; (2) incentivizing "blue" businesses and jobs for growth and to reduce pressure on natural resources; and (3) supporting labor-intensive coastal and marine resources conservation and restoration activities.

BOX 1

High-return Options for Blue Economic Stimulus

The global High-Level Panel for Sustainable Oceans (Northrop et al. 2020) proposed five high-priority areas for blue stimulus spending in response to the COVID-19 crisis based on quantified costs and benefits of each option. While the recommendations are based on global data, and thus need to be confirmed and substantially calibrated with data on Indonesia's circumstances, they provide indications of investment areas where high social, environmental, and economic returns are being found globally:

Stimulus Priority	Expected Impacts	Supporting Government Actions
Restoration and preservation of coastal and marine ecosystems	Short- and medium-term job stimulus; ongoing flood and storm protection, water quality, carbon sequestration, fisheries sustainability, productivity.	Public funding for restoration projects, policy, and regulatory reform to ensure protection of existing ecosystems.
Wastewater and sewerage infrastructure for coastal communities	Short- and medium-term job stimulus; ongoing water-borne disease prevention, water security, coastal water pollution control, amenity for tourism.	Public funding for infrastructure development and repairs, investments in systems and institutions for ongoing maintenance and management.
Sustainable marine aquaculture (mariculture) focused on low trophic-level species e.g., shellfish and seaweed farming with minimal external feed needs	Medium-term jobs; diversified economic production (including seafood, poultry grit, industrial feedstocks, and biofuels), food security, carbon sequestration, water quality improvements.	Funding for feasibility studies, financing (grants and micro-loans), extension services.
Zero and low-emission marine transport	Medium- and long-term jobs; ongoing health benefits for people living near ports and on vessels, carbon emission reductions.	Upgrading or replacing of vessels, public investment in facilitating ports infrastructure.
Ocean-based renewable energy	Medium- and long-term jobs; energy security, carbon emission reductions.	Mapping potential, simplifying permitting, aligning with spatial plans, setting of national targets, financing to stimulate private sector investment.

Regardless of the investment areas chosen, stimulus and longer-term measures will require substantial public financing, which comes in the context of a challenging fiscal environment. In 2020, the GoI undertook revenue, expenditure, and financing measures in response to the COVID-19 crisis amounting to IDR 695 trillion (US$49 billion) (World Bank 2020c). Government estimates show the deficit increasing by more than three-fold to 6.3 percent of GDP in 2020 before narrowing over subsequent years as revenues recover and stimulus spending is withdrawn.

In the medium to long term, widening the revenue base in a sustainable and inclusive manner will be an important part of fiscal recovery, and necessary for making sustained public investment in critical sectors. Even prior to the crisis, government revenue collection in Indonesia as a proportion of GDP was among the lowest of East Asian economies. More progressive taxation of income, a broader tax base, and improved tax compliance, along with further reform of the remaining regressive energy subsidies, will be needed. These measures could be supported by green taxes such as an adjustable fuel excise, a single-use plastic excise, and potential taxes on virgin plastics, with simultaneous benefits for the environment (see Chapter 5).

Source: World Bank.

(1) Improve development planning and management of coastal and marine resources

The economic slowdown induced by the pandemic provides "breathing space" for Indonesia to strengthen implementation of its Integrated Tourism Master Plans (ITMPs) (explored in Chapter 3) and spatial planning system (explored in Chapter 4). Systems can be developed, tested, and strengthened while demand for coastal development is lower than usual. Similarly, mechanisms to guide future fishing effort, including harvest strategies, can be implemented with relatively limited impact on fishing activities, which are currently reduced. As effort levels increase after the pandemic in line with strengthening demand, these systems will increasingly become binding. Currently depressed development and natural resources pressures thus provide an opportunity to accelerate management strengthening without immediately imposing on stakeholders.

(2) Promote a 'blue' recovery for business and jobs

Recovery packages could promote diversified livelihoods in coastal communities and do so in ways that improve sustainability ("bluing the recovery"). There are opportunities to support transitions away from marginal fishing livelihoods towards activities with greater added value and lower resource dependency. Facilitating the move towards livelihood diversification will include skills-building, increasing access to finance, improving infrastructure and services, and efforts to address market barriers. Skill-building can increase employability as the recovery progresses, making beneficiaries more resilient to shocks in the long term. Expanded use of conditional cash transfers and training in activities outside of fishing could support efforts to reduce pressure on marine or coastal resources. These efforts could use the delivery systems of existing programs such as the Village Fund Program or *Program Keluarga Harapan* for relatively efficient rollout.

(3) Support labor-intensive coastal and marine restoration

Conservation and restoration of degraded coastal areas using techniques sensitive to local ecology and other tourism-relevant basic infrastructure development can generate income to local communities while strengthening the resilience of coastal areas. This principle has been recently applied in South Sumatra with a mangrove planting works program implemented in three villages to support economic recovery from the pandemic (Rosana 2020). Similar benefits have been demonstrated elsewhere with earlier pilots in northern Java reporting income generation and reduced coastal erosion through restoration of areas earlier converted to shrimp ponds. These activities could be substantially scaled up in line with the Government's mangrove restoration targets. Another opportunity is the promotion of coastal and estuary clean-up actions in places with high plastic build-up. While valuable, these are relatively short-term interventions. Long-term support via management improvements (i.e., mangrove conservation and marine debris reduction at the source) should be used to complement these efforts.

Policy coordination, efficient financing, and a sound evidence-base support both COVID-19 recovery and long-term reform needs

Looking beyond COVID-19 and the immediate recovery period, the transition to a blue economy will require investments and concerted reforms over the years to come. Overarching needs include strengthened coordination between ministries, levels of government, and stakeholders to avoid policy and investment incoherence. Making more efficient and impactful use of existing government funding, and potentially raising new sources of capital (blue finance), will be increasingly important. The transition will also require quality and timely data as the basis for effective and adaptative marine and coastal management, and investments in research and development. While recovery from the impacts of COVID-19 will be the priority of all governments over the short to medium term, efforts in these areas are aligned with both the recovery and the long-term needs of oceans sectors. These long-term needs, and associated recommendations, are the focus of the remainder of this report.

02. A Sustainable Fisheries Future

Daily catch of fish. Indonesia. Photo: © Curt Carnemark/ World Bank

Oceans for Prosperity

02. A Sustainable Fisheries Future

Indonesia can gain more from its marine capture fisheries sector through improved management.

As the world's second largest fish producer, fisheries play a critical role for Indonesia's economy

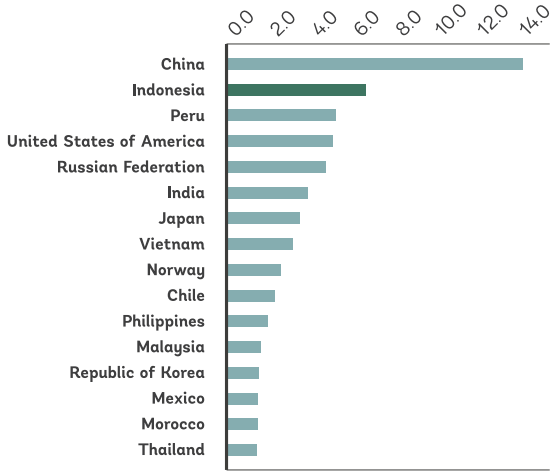
Indonesia is second only to China as the world's largest fishing nation with an annual harvest of more than 6.1 million tonnes of marine fish (Figure 1). Marine capture fisheries and aquaculture together are a crucial source of employment, providing around 7 million jobs.[20] Fish contribute 52 percent of all animal-based protein in the national diet, well above the global average of 16 percent. In 2018, the sector contributed over US$26.9 billion to the national economy (around 2.6 percent of GDP), a larger proportion than that seen in regional peers (Figure 2). In 2018, fisheries contributed export earnings worth over US$4.8 billion, supplying 3 percent of the global market for exported seafood (BPS 2019).

Despite current high production, long-term growth is not assured

Yet, there are risks facing the long-term social and economic value of Indonesia's capture fisheries. Fisheries are natural assets that, if managed well, provide a steady flow of economic returns. Harvesting above biological limits undermines long-term returns by shrinking the size of fish stocks and reducing their yield, lowering the benefits—food, jobs, or income—derived across generations. This pattern is seen in many countries: capture fisheries production globally has plateaued and is now likely in decline and economic returns are well below optimal (FAO 2018b; Pauly and Zeller 2016; World Bank 2017). While Indonesia's annual harvest continues to rise slowly, management practices are not yet in place for the best long-term returns. Earlier published analysis suggests that improvements to capture fisheries management could increase the long-term value of production by over US$3 billion per year, relative to a scenario in which current practices continue and fishery stocks and returns decline (Costello et al. 2016).

Figure 1: Indonesia is the world's second largest marine capture fish producing nation

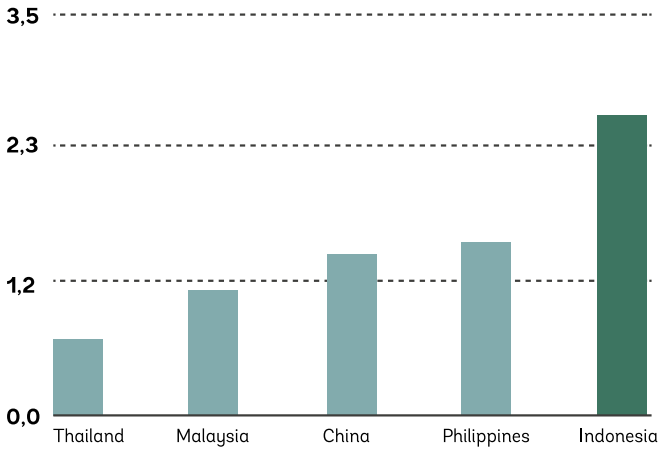
2015-18 avg. annual production, million metric tonnes



Source: FAO 2019

Figure 2: Indonesia Derives a Larger Proportion of GDP from Fisheries than Other Countries in the Region

Fisheries sector as a percent of total GDP



Sources and note: China, Indonesia, and Thailand (2016) from CIEC 2019; Philippines and Malaysia (2015) from SEAFDEC 2019.

Many of Indonesia's fish stocks are depleted due to historical and ongoing overfishing

Realizing this value will require fisheries management that maintain stocks at their optimum levels. In 2017, data from the National Commission on Stock Assessments showed that 38 percent of the nation's capture fisheries were overfished, indicating that biomass had been depleted and current and future yields undermined. A further 44 percent of stocks were fully fished.[21] Depleted stocks imply lower returns for the commercial sector, along with reduced export earnings and government revenues. Depletion further risks the wellbeing of Indonesia's coastal communities, which are

[20] Wild-capture fisheries and aquaculture sectors employ approximately 2.7 million and 3.3 million workers, respectively, in addition to over 1 million workers in the processing and marketing of fisheries products. See CEA (2018).

[21] Marine and Fisheries Ministerial Decree 50/Kepmen-Kp/2017 reports on estimates of the potential, total allowable catch, and level of utilization by fisheries management area.

highly dependent on fisheries, and often experience a rise in conflict and an erosion of food security and incomes when impacted by overfishing (Pomeroy et al. 2007; Muawanah et al. 2012). These problems compound already elevated levels of poverty found within the small-scale fishery sector with the national average fisher income below the minimum wage (Cahagi and Gurning 2018).

This reduces return on investment and business confidence

Avoidance of overfishing is also critical to ensure returns on value-chain investments by both governments and business, and to ensure confidence among private sector investors. A range of important fisheries investments are underway in Indonesia, including development of new traceability systems, cold storage facilities, and ports.[22] These facilities have the potential to increase returns to fishers by improving market access and reducing waste, and will help increase the number of skilled jobs along the value chain. However, it is only with long-term stock sustainability that financial returns to these value-chain investments can be ensured. In the absence of steady and effective resources management, capital outlays risk underuse in the face of diminished raw fish supply with investor confidence undermined.

Indonesia's stance on illegal fishing by foreign vessels has shown success

Past overfishing has occurred both due to activities of foreign vessels and challenges of managing Indonesia's large and varied domestic fleet. The GoI has taken action to address the former challenge, with MMAF seizing, destroying, or repurposing over 530 illegal vessels between 2014 and 2019 as part of a high-profile deterrence campaign. While controversial, analysis suggests that these efforts led to a 25-40 percent reduction in the total pressure on fish stocks within Indonesia's waters (Cabral et al. 2018). This has reduced economic losses from illegal fishing and created a near-term opportunity to rebuild key fisheries.

Yet challenges remain for management of the domestic fleet

Yet, management of the domestic fleet remains immensely challenging. Indonesia's fleet comprises over 600,000 vessels, with small vessels (less than 10 gross tonnes), accounting for more than 90 percent of the fleet and around half the total catch (CEA 2018).[23] The gears used and the species caught vary widely. Fish stocks and vessels cross jurisdictions, and different classes of vessels fall under the responsibility of different levels of government. Small vessels are exempt from licensing and often go unregistered and unmonitored. While under the jurisdiction of provinces, they sometimes operate beyond provincial waters. Coordination across provinces and between levels of governments will require clarification of responsibilities, and robust harvest strategies and control rules are still needed for most fisheries. As a result of these issues and others, Indonesia in 2017 was ranked 22nd out of the largest 28 marine fishing nations for fisheries management effectiveness – the degree to which management objectives are achieved via research, management systems, and enforcement.[24]

Domestic reforms would complement Indonesia's efforts to deter foreign fishing

Improving management of the domestic fleet would help lock in the benefits of Indonesia's eviction of foreign fishing vessels from their waters. The alternative could be a potentially costly loss of value, as experienced in other countries. The United States brought foreign fishing to a halt in 1976 through the Magnuson–Stevens Act. Yet, subsequent increases in domestic fleet capacity undermined these gains, necessitating painful restrictions that continue to inflict hardship to this day (Pew 2011). Closer to home, the Philippines experienced increasing domestic fishing pressure over 70 years from 20,000 small-scale vessels in 1948 to over 250,000 in 2018. The catch per unit of effort declined dramatically, undermining returns. For example, by 2003, the Lingayen Gulf (a major fishing ground) had a catch rate just one fifth of that 15 years prior (Green 2003). Improved domestic fleet management—maintaining harvests within safe limits—is necessary to avoid such outcomes, and to lock in the benefits for Indonesia.

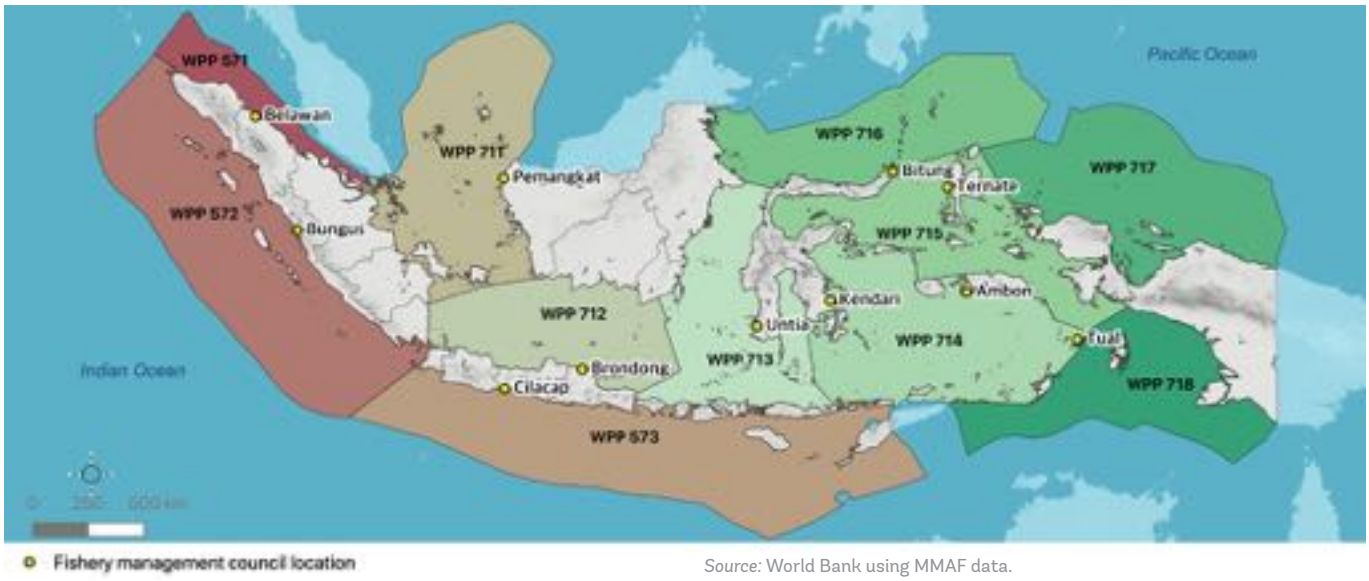
[22] Policy initiatives include incentives for private sector investment in refrigeration facilities, establishment of decentralized export hubs, and continued growth in the marine protected area network. The GoI is promoting exports by investing to improve product quality, marketing, and supply chain management.
[23] Law 7/2016 on the Protection and Empowerment of Fishermen, Fish Raisers and Salt Farmers defines small-scale fishers as those who catch fish for daily needs, without or with vessels smaller than 10 gross tonnes.
[24] These 28 countries together account for 80 percent of the total global catch. See Melnychuk et al. (2016).

Four areas of reform can prevent overfishing and increase returns: (1) operationalize Fisheries Management Areas (WPPs) ...

Four broad categories of reforms are key. The first and most fundamental is completing Indonesia's fisheries management structure. Recognizing the challenges of coordination across provincial boundaries, in 2014 the GoI launched the system of *Wilayah Pengelolaan Perikanan* (WPP) or Fisheries Management Areas.[25] Each WPP contains multiple provincial governments, plus industry and community stakeholders. These groups are represented at a WPP council (*Lembaga Pengelola Perikanan*, LPP), responsible for advising decision-making within that WPP. While the system is recognized as a national priority, the LPPs do not yet have a dedicated budget for their operation and in most cases lack staff, offices, and equipment. In addition, each fishery requires definition of its management objectives, as well as the measures to achieve the objectives agreed. These might include allocation of rights (explored further below), technical measures such as gear design and use, spatial, seasonal and species restrictions, and enforcement and adjustment protocols. These would be codified in the councils' primary management tool – fisheries management plans (*Rencana Pengelolaan Perikanan*, or RPPs) which have not yet been drafted for all managed stocks and remain short of actual management measures.

Figure 3: Indonesia's Fishery Management Area System Comprises Eleven Zones Based on Approximate Ecological Areas

Marked cities indicate fishery management council office locations



Source: World Bank using MMAF data.

(2) improve quality, integration and use of fisheries data for evidence-based management

Second, increased investment in research, monitoring, and reporting would help to inform fisheries management through area-specific and species-specific stock assessments and definition of target reference points for the harvest strategies. Indonesia has strong fishery research and monitoring capacity and multiple sources of data are already available – including those from industry logbooks, onboard observers, vessel monitoring systems, and MMAF's port sampling efforts. However, these data are not yet fully integrated and informing management. While MMAF is making progress on integration of the varied sources of data through *Pusat Data Statistik dan Informasi* (PUSDATIN),[26] the system does not yet contain the detailed data that is required for stock assessments, even though some of this data is already being collected by MMAF's Research Directorate. Improvements in landing surveys, including expanded geographic and species coverage, and refined analysis (for example, use of indicator species instead of aggregated species groups) would be beneficial. Other areas ready for expansion include technologies for e-monitoring, e-reporting, and e-catch documentation. These are being pursued by MMAF including through the e-logbook program — an app-based real-time self-reporting data collection system for both large and small vessels. Upscaled rollout coordinated with data integration efforts would support these data and analytics needs.

[25] Marine and Fisheries Ministerial Decree 18/PERMEN-KP/2014 defines the structure of and roles within the fisheries management area system. (http://jdih.kkp.go.id/peraturan/18-permen-kp-2014-ttg-wilayah-pengelolaan-perikanan-negara-republik-indonesia.pdf)

[26] This "One data" initiative aims to harmonize data, designate collection responsibilities, and increase public access to information (https://kkp.go.id/setjen/satudata).

(3) Use fishing rights to strengthen management

Third, Indonesia could further explore options for rights-based fisheries management, an approach that underpins many of the most successful fisheries internationally. For small vessels and in-shore areas, this could take the form of area-based fishing privileges. Local communities would receive a permit defining privileged resource use and access, and, in return, would undertake long-term sustainable management in accordance with the permit's conditions. The privilege allows the community to control access for long enough to realize the benefits from improve management and must be legally recognized and defensible. Rights-based approaches could also be used for larger vessels off-shore through the granting of a permit to companies or fishing associations for a specific quantity of harvest within an overall harvest limit for the fishery, or for a permitted quantity of fishing effort units such as number of vessels or days spent fishing.[27] To operationalize rights-based management, legal clarification is required to define privileges in a way which avoids legal challenges[28] and mandates a responsible institution for defining and granting those privileges.

...and (4) align financial incentives with Blue Economy goals....

Fourth, the fisheries sector benefits from public financing for infrastructure construction, support services, rural development grants, fuel subsidies, vessel provision, and monitoring, control, and surveillance (MCS) activities. While public investment and support for the sector is undoubtedly vital, not all forms of support are equal. In 2018, capacity-enhancing transfers to the fisheries sector included an estimated US$140 million in fuel subsidies and US$66.7 million for boat construction and renovation (Sumaila et al. 2019). In the absence of strong management, such forms of support elevate pressure on stocks and increase competition between vessels, contributing to long-term cost increases and reduced returns. Other elements of public expenditure clearly support sustainability and productivity, including investments in MPAs (US$41 million), management activities (US$210 million), and fisheries research (US$56 million).

... through efficient public expenditure and policy design

Redirection of some capacity-enhancing transfers could allow increased expenditure on these priorities, as well as allow for increased livelihoods support measures. OECD analysis suggests that payments that support efficient business operations and skills development deliver higher benefits to fishers relative to financial assistance for fishing inputs (OECD 2019). A public expenditure review could be used to inform better alignment of expenditures with sustainability and productivity objectives. Additionally, incentives that run counter to blue economy goals lie hidden in some regulations. Underreporting of harvests, for example, is encouraged by the taxation of catch volumes, while size-based licensing encourages vessel-size underreporting. Linking future rights allocation to track record (e.g., reported catch, fishing days, or size of vessel) could help disincentivize such misreporting. Such incentive measures would be complemented by public disclosure of rigorously monitored performance and subsequent allocations.

Strategic public and private value-chain investment can improve margins...

Indonesia's fishery sector could benefit from further value-chain investments, such as docks, cold-storage, processing facilities, and equipment. Such investments increase prices received and thus the financial margins for fishers and fish-workers. A recent systematic review of experience globally found that investments of these types led to increases in fish product price by 24-48 percent on average. The optimal role of government in value-chain investments should be selective and strategic, focused on providing essential services and infrastructure that in turn supports and facilitates private-sector investment. At times, this could include blended public-private sector investment in essential services and infrastructure such as ports, cold storage, and logistics hubs. In all cases, public investment should be based on analysis that determines market demand and access, stock status, human resources, and the availability of supporting services as a starting point, and proceeds when there is a clear business case.

[27] These are output and input-based rights respectively. Output-based rights regulate catch directly, while input-based rights regulate fishing capacity (e.g., number and size of vessels or number of gears) or effort (e.g., fishing days).

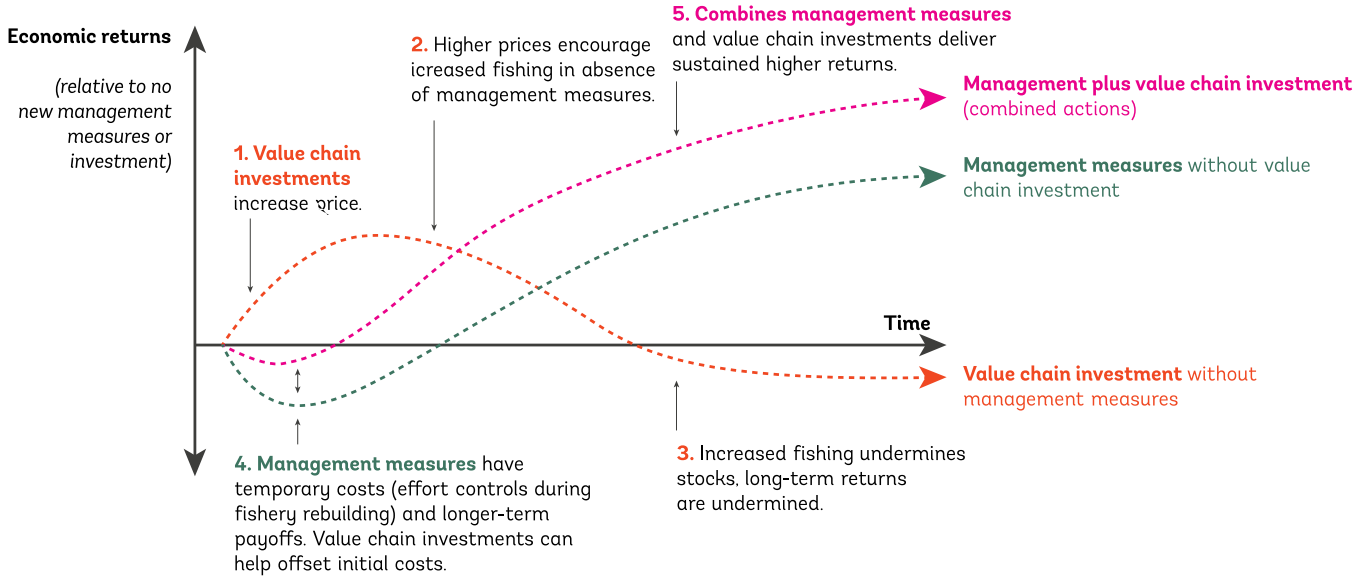
[28] Within existing regulations, the granting of such a privilege is only possible to the adat community, and only providing that their adat practices have been registered and acknowledged by the head of the district or city government. Following a 2011 Constitutional Court challenge, there is not an established legal basis for the granting of fishing privileges to traditional and local communities. A revised legal mechanism – that maintains a higher degree of government control, protects existing rights of communities, and works for a broader public good benefit – is required and while not simple, is in principle feasible. See Waddell (2012).

... but must be complemented by management reforms

Improved management is a critical complement to these value-chain investments. A stable regulatory environment—including clearly defined fishery objectives and management plans—is necessary to facilitate private-sector investment and business confidence. More directly, management measures are required to ensure long-term returns to value-chain investments. In their absence, the margin increases caused by value-chain investments risk incentivizing greater fishing effort, placing pressure on stocks, and eventually diminishing harvests. Revenue derived from the initial investment in these circumstances is undermined by the investments' own success, leaving fishers no better off and the returns on capital dissipated (Figure 4). By corollary, management measures can lock in the benefits of value-chain investments by ensuring that there is a steady supply of fish to benefit from the improved margins. This complementarity may also help alleviate some of the transition costs of management. In cases where overfishing is occurring and thus effort must be reduced, income support measures are required to compensate affected fishers and firms. Well-timed value-chain investments can provide some of this support, along with direct transfers.

Figure 4: Management Measures and Value-Chain Investments are Highly Complementary

Stylized depiction of interactions between management measures (green) and value-chain investments (red)



Sources: Qualitative findings based on research by World Bank, University of California Santa Barbara, University of Hawaii, and MMAF.
Notes: Ongoing analysis aims to quantify the size of these impacts for major Indonesian fisheries.

...and underpin efforts to increase fisheries' fiscal contribution

A well-managed fisheries sector can also contribute more to long-term public revenues. The sector currently contributes non-tax state revenue (*Penerimaan Negara Bukan Pajak*, PNBP) in the form of commercial levies. Fisheries' PNBP contribution is small relative to other resources sectors such as forestry and mining, representing only 0.17 percent of total PNPB in 2017. Tax revenue is similarly low: US$80.2 million was collected in 2017 from around 4,000 listed taxpayers. Between 2011 and 2016, the fisheries sector's ratio of tax-to-GDP contribution of 0.26 percent was well below the national cross-sector average of 11 percent (CEA 2018). Adjustments to taxation arrangements could increase revenues. Importantly, targeting revenue formulas towards value-addition and output, rather than fishing inputs, could help incentivize value instead of fishing effort – benefiting stocks and yields long term. Well-managed fisheries with healthy stocks and high yields are integral to an increased fiscal contribution, as they are for broader social and economic returns for Indonesia.

[29] Ongoing research by University of California Santa Barbara, University of Hawaii, and World Bank staff.
[30] Non-tax state revenue includes commercial fisheries charges (Pungutan Pengusahaan Perikanan) based on vessel licenses and the type of fishing gear used, and fishery levies (Pungutan Hasil Perikanan), which are more like royalties, calculated as a function of production, boat size, and fish price.
[31] This is the subject of work underway by the Fiscal Policy Agency of the Ministry of Finance in partnership with the World Bank.

BOX 2

Aquaculture: A Key Driver of the Blue Economy

Indonesia's aquaculture sector is amongst the fastest growing in the world. While marine capture fisheries production grew by 34 percent over the last decade, from 5.0 million tonnes in 2010 to around 6.7 million in 2018, Indonesia's aquaculture production more than doubled (>+100 percent) over the same period, from 2.4 million to 5.4 million tonnes, with around 3.3 million people directly employed. Of the total aquaculture production, around 43 percent is from the rapidly growing marine aquaculture sector, worth over US$6 billion per year. The growth of Indonesia's seaweed cultivation is even more dramatic, increasing from less than 4 million tonnes in 2010 to 9.3 million in 2018 (>+130 percent), and accounting for nearly 30 percent of global production (FAO 2020b). By value, the most important aquaculture product is shrimp, which contributed US$1.7 billion to export earnings in 2018.

With strong demand for fish products expected to continue, and in the face of declining wild capture globally, there is potential for further aquaculture growth. The GoI has set ambitious targets for aquaculture expansion. However, much of the area suitable for aquaculture contains ecologically sensitive mangrove and coral reef habitats. With these habitats having high biodiversity value, contributing to climate change resilience, and providing critical ecosystem services that underpin fishery, tourism, and other economic sectors (see Chapter 5), aquaculture expansion must be based on sound spatial planning.

The environmental impacts of aquaculture (such as those caused by inappropriate use of feed and antibiotics, deforestation, introduction of exotic species, and biohazards) must also be anticipated and managed. Low-trophic marine species (i.e., those less reliant on external feeds, including shellfish and seaweed) offer strong potential for economic returns and have relatively lower environmental impacts.

03. Realizing Indonesia's Ocean Tourism Potential

Turquoise water beach from top view at Nusa Penida island, Indonesia. Photo: © shutterstock.com

Oceans for Prosperity

03. Realizing Indonesia's Ocean Tourism Potential

To be a leading tourism destination, Indonesia must ensure that its marine and coastal assets are managed sustainably.

Globally, marine and coastal tourism was a fast-growing segment of the ocean economy prior to the COVID-19 pandemic.

Marine and coastal (MAC) tourism[32] represented around 26 percent of ocean-related value-added globally according to OECD in 2016 (OECD 2016). Up until the COVID-19 outbreak, tourism demand was booming globally, especially from China, creating significant opportunities for destinations in Southeast Asia. International tourism arrivals (overnight visitors) grew with an annual average of 5 percent between 2009 and 2019 to around 1.5 billion arrivals worldwide in 2019. Amidst the COVID-19 pandemic, however, global tourism has come to a standstill. While the World Tourism Organization expects international tourism to rebound in the second half of 2021, with domestic tourism expected to resume first, the timing, scale, and nature of the recovery is uncertain. It is estimated that a return to 2019 levels in terms of international arrivals could take 2½ to 4 years (UNWTO 2020).

MAC tourism is already a key driver of visitor growth

Following recovery, Indonesia will be well-positioned to capture a large share of this growth. With more than 17,000 islands, one of the world's longest coastlines, the world's highest coral diversity, and spectacular seascapes, Indonesia's MAC tourism potential is promising. MAC tourism is already a substantial proportion of the overall tourism sector with around 44 percent of foreign visitors undertaking at least some marine tourism activities during their visit (MoT 2016). Out of all overnight stays of international, cruise, and domestic visitors in Indonesia, an estimated 29 percent are in coastal, non-urban destinations (Spalding et al. 2017).

The GoI has identified MAC tourism as a driver of national tourism development

This potential is well-recognized. Out of the ten tourism destinations chosen for priority development by the GoI in the RPJMN 2020-2024, seven are key MAC sites.[33] Increased coastal tourism is envisioned to be a key driver of growth, albeit less so from cruise ship activity in the context of COVID-19, which has brought this industry to a standstill and clouded its long-term outlook. In recent years, the GoI has simplified regulations related to yachting, cruise, and recreational fishing.[34] It has also organized professional surfing competitions, yacht rallies, and free-diving competitions with the aim of promoting Indonesia as a MAC tourism destination.[35] The development of certified diving products and training of local dive guides is also a priority.

MAC tourism is vulnerable to climate change and environmental pressures

However, long-term growth is not assured. The natural assets that attract MAC tourism, such as coral reefs, coastlines, and beaches, are at risk of degradation from intensifying weather and climate extremes, rising sea levels, and oceanic acidification (the focus of Chapter 4). The accumulation of marine debris is another acute threat (Chapter 5).

Gaps in basic infrastructure and services contribute to

Indonesia's MAC assets are also impacted by insufficient basic infrastructure and services for local residents, adding to environmental pressure and undermining health, hygiene, and the destinations' attractiveness for tourists. For example, in 2015, prior to its prioritization for tourism development (including infrastructure

[32] Marine and coastal tourism are distinct but related concepts that encompass a wide range of activities, assets, and income-earning opportunities. Marine tourism refers to activities occurring on, or connected to, the sea, including cruises and sailing, nautical sports, and water-based activities such as scuba diving and whale watching. Coastal tourism refers to on-shore activities for which the water-based elements are the predominant attraction—swimming, sunbathing, coastal walks, etc.—and encompasses tourism in resorts and vacation homes located near a coastline.

[33] These sites are Lombok-Mandalika, West Nusa Tenggara; Labuan Bajo, East Nusa Tenggara; Wakatobi, South Sulawesi; Tanjung Kelayang Beach, Bangka Belitung; Morotai Island, North Maluku; Raja Ampat, West Papua; and Manado-Likupang, North Sulawesi. Non-MAC sites include Borobudur-Yogyakarta-Prambanan, Central Java and Special Region of Yogyakarta; Lake Toba, North Sumatra; and Mount-Tengger-Semeru, East Java.

[34] Examples include: Presidential Regulation No. 105/2015 on Foreign Yacht Visits to Indonesia; and the Regulation of The Minister of Transportation No. 123/2016 Regarding an Amendment to the Regulation of The Minister of Transportation No. 171/2015 Regarding Procedures for Services for Foreign Yachts in Indonesia at 19 Entry/Exit Points.

[35] For example, the Sabang International Freediving Competition of 2018. See also World Surf League (2018).

degradation of MAC assets

development), Lombok's tourist areas were characterized by low household access to piped water supply (45 percent of households had access), sanitation (48 percent), and solid waste collection services (26 percent). In most of Lombok's key tourism areas, 95 percent of projected basic infrastructure gaps were linked to household needs, with the remainder covering growing visitor and business needs (Horwath 2017).[36] The impact of these deficiencies on tourist perception can be seen in online reviews: Topics of dissatisfaction expressed on TripAdvisor by users of beaches along Lombok's southern coast included the poor state of local sanitation and noticeable marine and coastal pollution.[37] These pressures—and the potential for visitor dissatisfaction—are likely to grow as tourist arrivals increase (Figure 5).

If not managed, rapid MAC tourism growth will exacerbate environmental pressures

More visitors adds more pressure on fragile on-shore and off-shore ecosystems, increased consumption of energy and water, and increased waste production (Box 3). If not well-managed, this visitor traffic and associated pollution will strain local infrastructure and public services, contribute to increased waste, nutrient, and sediment runoff into coastal and marine ecosystems, and lead to land use change and loss of natural amenity.

BOX 3

Komodo National Park

Komodo National Park's (KNP) universal values are its superlative land- and seascapes and its biodiversity, especially the Komodo dragon (UNESCO 2013). This attraction, a UNESCO World Heritage Site, is well preserved (IUCN 2017) and drawing more international visitors from 32,000 in 2009 to over 170,000 in 2018. However, the site's seascape is facing emerging negative impacts and threats to its marine species from population growth and unsustainable resource use. The increasing levels of visitation within and around the park may have added further pressure. The proportion of visitors encountering reef damage and marine debris grew from less than 10 percent in 2009 to over 50 percent in 2017 (Figure 6) (Harvey et al. 2018). In 2020, the UNESCO World Heritage Centre expressed concerns regarding infrastructure development within the boundary of the KNP World Heritage property which could potentially impact the Outstanding Universal Value (OUV) of the property. Improvements to management strategies can help protect KNP's OUV and reduce the possibility of these threats deterring visitors in the future.

Source: World Bank.

Figure 5: Bali and Lombok Receive Around Half of Indonesia's Foreign Visitors

Number of international arrivals (bars, left), proportion of international arrivals, percent (lines, right)

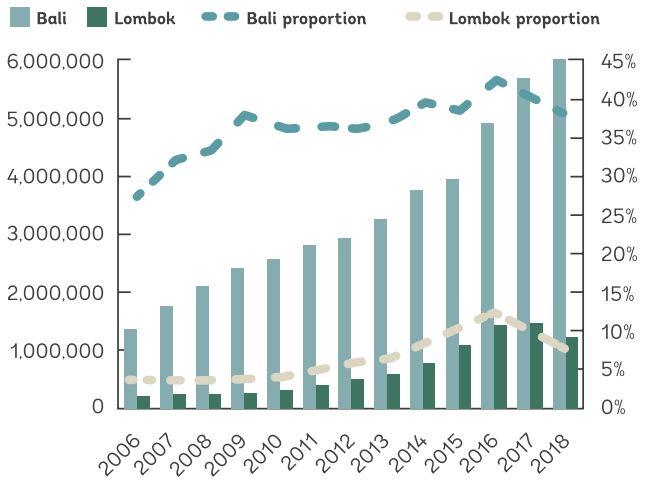
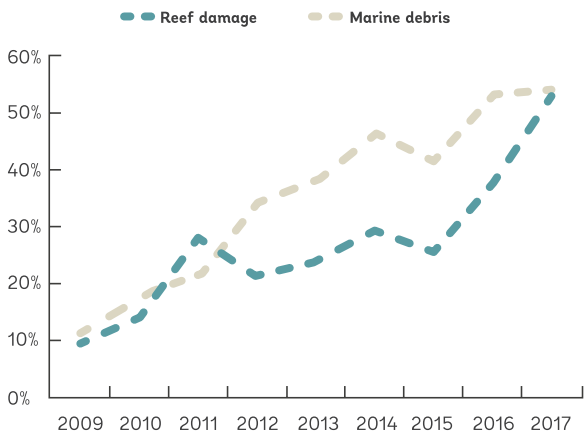


Figure 6: The Proportion of Visitors Encountering Reef Damage or Marine Debris at Komodo National Park has Increased

Proportion of visitors encountering impacts



Source: Left: World Bank staff calculations based on BPS data. Lombok data includes all of Nusa Tenggara Barat province, of which Lombok accounts for around 98 percent of visitors. Right: Harvey et al. (2018).

[36] World Bank staff calculations.

[37] An analysis of user-generated reviews in all available languages of three beach attractions along the southern coast of Lombok on the travel website TripAdvisor (October 31, 2016) indicated the lack of cleanliness and raw sewage as reasons for dissatisfaction.

The environmental impacts associated with over-tourism impose economic costs

In recent years, environmental pollution and damage from tourism growth has forced several world-renowned destinations elsewhere in Southeast Asia to close. Maya Beach, Kho Phi Phi, Thailand, was closed for over two years starting in 2018 in an attempt to heal the damage caused by up to 5,000 visitors and 200 boats per day (Ellis-Petersen 2018). Litter, boat pollution, and potentially sunscreen is estimated to have damaged 80 percent of the bay's coral. The cost of the shutdown was high, given the revenue of around US$12.6 million that the bay's visitors generate each year. Boracay Island, Philippines, a destination which attracts more than 1.7 million visitors per year, was similarly closed for six months in 2018 due to deteriorating environmental conditions. One estimate placed the cost of this closure at US$37.6 million (de Vera 2018).

Sustainable MAC tourism will require monitoring and prevention of environmental impacts, ...

Effective environmental impact monitoring systems are needed at MAC destinations to detect problems early and inform mitigation responses. Recognizing these threats, the GoI has encouraged the establishment of Sustainable Tourism Observatories (STOs) in priority destinations to monitor risks to natural and cultural assets and identify growing pressure points. These observatories, supported by the Ministry of Tourism and Creative Economy, are tasked to monitor selected indicators of 'sustainable tourism' in key tourism areas (UNWTO 2004). Over time, such STOs or other similar institutions for environmental impact monitoring could become standard practice in popular MAC destinations. In the short term, STOs already established can take advantage of the COVID-19 period to monitor ecosystems in the absence of tourism, setting useful baselines to later benchmark tourism impacts. Improved monitoring can support enhanced protection with obligations on developers established in the environmental assessment process. The Integrated and Sustainable Tourism Development Program is currently taking a monitoring role in the destinations it supports.

... management of visitor flow, ...

For MAC destinations that are either at risk of overcrowding or already showing signs of environmental degradation, measures to limit or better manage the flow of visitors are required. These could include: (1) use of tiered pricing with higher access fees for more fragile areas (for example, as applied in the more fragile upper areas of the Annapurna Conservation Area in Nepal); (2) "congestion pricing," whereby above-average entrance fees are charged for certain tourist sites during peak demand periods; (3) setting minimum expenditure thresholds for tourists (for example, as is practiced in Bhutan); (4) the use of new technologies to control crowd flows such as scheduling apps that allocate visitors to specific time slots at key attractions; and (5) the development of alternative tourism attractions to divert and re-distribute visitors away from popular but environmentally-fragile attractions.

... adaptive management strategies, ...

"Carrying capacity" management strategies—restricting the number of visitors to an absolute limit—are one approach towards these goals. However, they have limitations. The impact of tourism depends not only on the absolute numbers of visitors, but also on visitor behavior, infrastructure, and management. Local residents also create potentially negative impacts and use resources. Instead, employing adaptive management strategies based on "limits of acceptable change" can help ensure that the destination values that attract tourists are identified, monitored, and maintained over time. Results from monitoring can then be used to adapt strategies to maintain ecological conditions (Twining-Ward et al. 2018).

... and investment in basic services and infrastructure for residents and tourists

Public investment in basic services infrastructure and systems should be increased to help manage pollution and waste generation in MAC sites, which is predominantly a result of basic infrastructure gaps for residents, but also exacerbated by tourism activity. The Ministry of Public Works and Housing, as part of the government's tourism development program, has active investment programs to expand and accelerate basic services quality and coverage to MAC destinations that are part of the list of priority tourism destinations. Going forward, these investments can be targeted and scaled up in those key tourism areas (including MAC tourism areas) that receive high visitor traffic. The GoI is currently taking an integrated tourism master planning approach for priority development of selected destinations, which aims to mobilize central, provincial, and local government funds, as well as private resources, towards a common objective in each of the destinations (MPWH 2020).

Monetization of MAC sites can provide additional resources to support the preservation of MAC assets

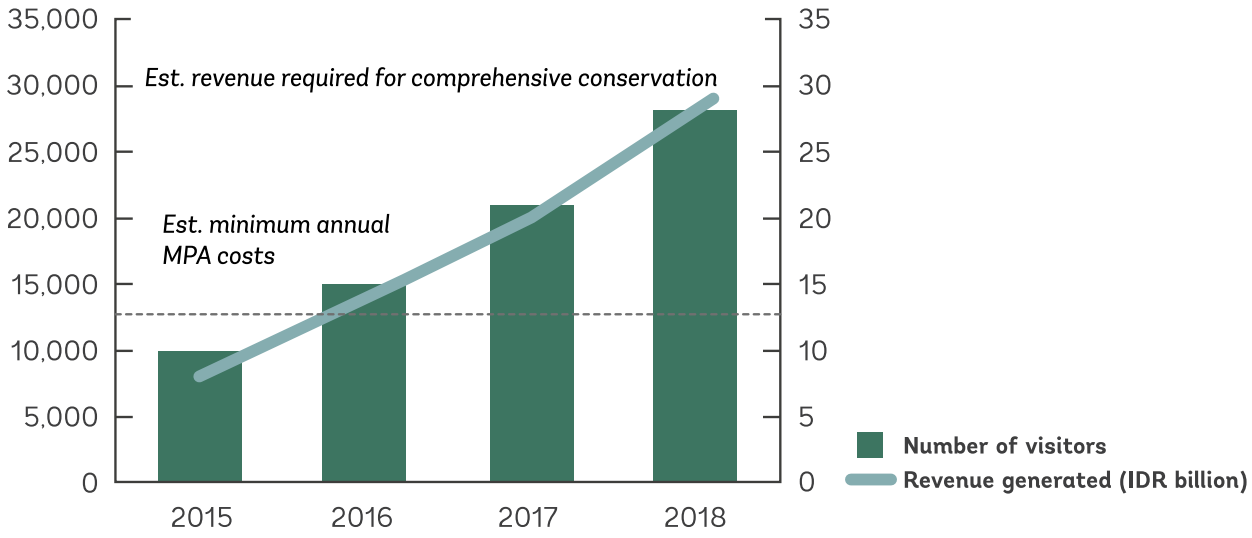
The monetization of MAC sites and assets by designating them as protected areas and charging visitor access fees is one approach to financing their protection. Private initiatives are seen in Papua New Guinea Dive and Surf Associations and in Fiji's Mamanuca Environment Society, where revenues collected from visitors are shared with resource owners and channeled to programs to protect reefs. In Indonesia, visitors to Raja Ampat's five marine protected areas pay an "ecosystem services" fee of US$30-50 administered by a Regional Public Service Agency.[38] In 2018, these visitor fees generated revenues exceeding US$2 million, covering the minimum estimated annual MPA management costs of US$1 million even after deduction of a 30 percent contribution to the local government in support of community development initiatives (Figure 7). Comprehensive conservation and rehabilitation efforts would require more than double this amount but is also within reach.

A systems-wide approach to visitor fees is needed

However, protection cannot be solely dependent on the ability of a given asset to generate income. Many MAC sites are effectively "open to all," making it difficult to collect revenues and manage access, while others do not receive sufficient visitor numbers for meaningful revenue raising. A system-wide approach to financing may be more appropriate in which visitor fee revenue is collected in high-visitation areas, and revenue transfers are used for supporting other areas which are unable to generate their own sufficient revenues. A proportion of revenues should be retained by the original site to incentivize their performance. Additional public funding will be needed to underpin conservation and management efforts at both revenue and non-revenue sites more broadly, particularly given the potential for visitor number fluctuations over time.

Figure 7: Revenue Collection from Visitors to Raja Ampat Covers MPA Management Costs

Number of visitors (bars, LHS), income generated (line, RHS)



Source: Papua Barat Tourism data

[38] Regent Regulation No. 18 Year 2014 on the Environmental Service Fee by the Marine Protected Area Technical Management Authority under the Raja Ampat Marine and Fisheries Agency.

04. Managing Indonesia's Coastal and Marine Assets

Some boats on a blue ocean parking near an island in Belitung, Indonesia. Photo: © shutterstock.com

Oceans for Prosperity

04. Managing Indonesia's Coastal and Marine Assets

Sustainable management of marine and coastal assets is crucial for a prosperous ocean economy.

Indonesia's marine and coastal assets are some of the richest in the world

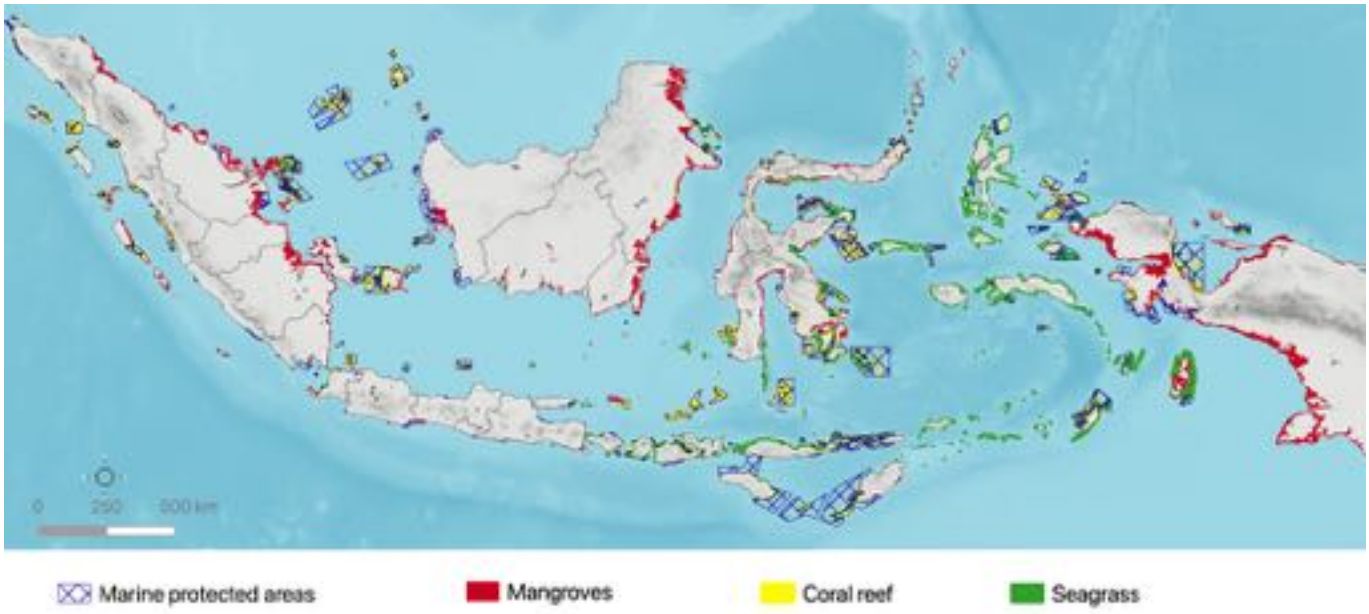
Indonesia has extensive natural marine and coastal assets—mangroves, coral reefs, and seagrasses, among other critical ecosystems—that underpin its ocean economy. The country's mangrove area is the largest and most biodiverse in the world, with 3.31 million hectares accounting for more than 20 percent of the global total (MoEF 2019). Indonesia's reefs span a combined area of over 2.4 million hectares[39] and as home to over 2,100 fish species and 590 coral species, showcase the greatest reef biodiversity of any country globally (Hutomo and Moosa 2005). While scientific understanding of seagrasses is limited, these ecosystems too are considered the most species-rich and extensive examples of their kind worldwide (Unsworth et al. 2018). Across a range of ecosystem types (Figure 8), Indonesia is a global hotspot of natural ocean wealth.

These ecosystems provide valuable services to the economy

These ecosystems provide services necessary to maintain livelihoods in oceans-related economic sectors. Mangroves and seagrasses play a crucial role in the feeding and breeding cycles of many fish species important for Indonesia's commercial catch and food security. Among villages in South East Sulawesi, for example, catches of seagrass-supported fish supply more than half of the region's daily protein intake.[40] Mangroves are also natural filtration systems, removing pollutants from runoff, while seagrasses remove disease-causing pathogens and pollutants from the water, a biocidal function that reduces coral and fish diseases in adjacent reefs (Lamb et al. 2017). These reefs, in turn, are major economic drivers, underpinning tourism revenues estimated at over US$3.1 billion per year, and fishery revenues of US$2.9 billion per year (UN Environment 2018). Marine and coastal ecosystems are also important stores of carbon, with the potential to help Indonesia meet greenhouse gas mitigation targets.[41] Seagrasses and mangroves together hold around 3.4 billion tonnes of carbon, five times more per area than tropical land-based forests (Alongi et al. 2016).

Figure 8: Indonesia's Coastal Ecosystems Cover a Larger Area than Those of Any Other Country

Major areas of key coastal ecosystems (mangroves, seagrass, and coral reef) and designated marine protected areas.



Sources: World Bank staff maps produced using seagrass data from the Geospatial Information Agency (GIA), Indonesian Institute of Sciences (LIPI), The Nature Conservancy (TNC), Coral reef data from LIPI (2007) and GIA (2009), mangrove from MoEF (2018) and marine protected area extents from MMAF, with support from the Global Program on Sustainability (GPS).

[39] World Bank staff calculations based on LIPI data, with support from the Global Program on Sustainability (GPS).
[40] Prominent species associated with seagrass include *Parupeneus barberinus* (goatfish), *Siganus canaliculatus* and *Siganus fuscenscens* (rabbitfishes), and *Lethrinis harak* (emperor fish). See Unsworth, et al. (2014).
[41] Indonesia's nationally determined commitment is to reduce carbon emissions by 29-41 percent from business as usual by 2030.

Yet these assets are threatened by coastal development, destructive fishing, and pollution

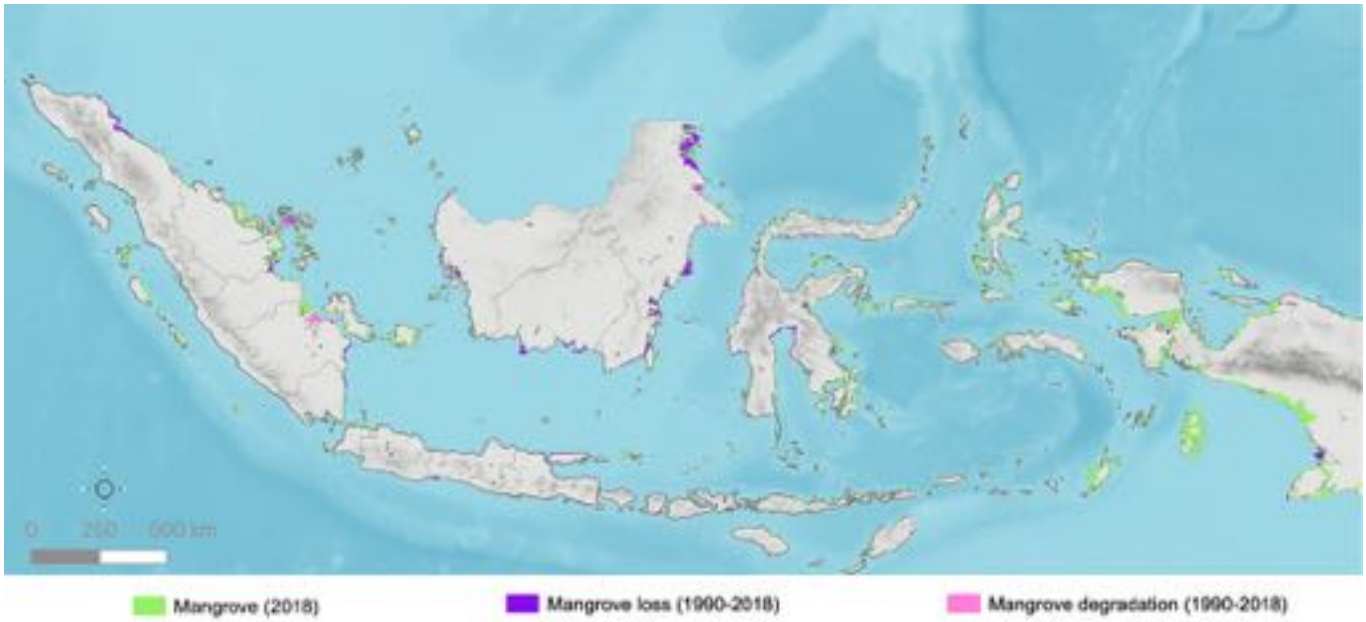
However, Indonesia's coastal ecosystems are degrading in quality and extent, undermining their ability to provide these basic services. Recent surveys by the Indonesian Institute of Sciences (*Lembaga Ilmu Pengetahuan Indonesia*, LIPI) show that around one-third of Indonesia's reefs are in poor condition (LIPI 2020). Factors driving this degradation include climate change, which is causing increasingly severe coral bleaching. More than 80 percent of Indonesia's reefs are expected to experience bleaching five years out of ten by the 2030s (Burke et al. 2012). Other factors include destructive fishing practices, agricultural and urban runoff, and marine plastic pollution (the focus of Chapter 5). Estimates suggest that as much as 40 percent of Indonesia's original seagrass cover may have been lost (Unsworth et al. 2018). Mangroves have similarly suffered substantial losses,[42] and around 1.82 million of the country's 3.31 million hectares are currently in degraded condition (Figure 9) (MoEF (2019).[43] Mangrove loss is driven by coastal development with clearing for aquaculture accounting for nearly half of its removal (concentrated in Kalimantan and Sulawesi), and clearing for oil palm contributing a further 16 percent (concentrated in Sumatra) (Richardson et al. 2018).

...causing economic losses exacerbated by climate change

In addition to reducing the value of coastal ecosystem services for fisheries and tourism, degradation hinders another crucial economic function: community protection. Reefs and mangroves lessen the devastation from storm surge and tsunamis. Less dramatically but more frequently, they moderate wind-waves and swells, reducing chronic shoreline erosion (Guannel et al. 2016).[44] Recent studies indicate that Indonesia's coral reefs protect coastal areas from flood damage worth at least US$639 million annually (Figure 10) (Beck et al. 2018). These values are especially high for reefs near major cities like Jakarta and Surabaya, which are particularly vulnerable. This value is likely to grow as coastal areas become more developed and as climate change becomes more severe. By 2050, rising sea levels and resulting coastal flooding is expected to affect 23 million Indonesians annually (Kulp and Strauss 2019).

Figure 9: Indonesia has One of the Fastest Rates of Mangrove Loss Globally

Mangroves, mangrove loss (between 1990 and 2018), and mangrove degradation (between 1990 and 2018). Areas of loss, degradation, and remaining stands are typically co-located, meaning some smaller areas of change are not apparent at a national scale map.

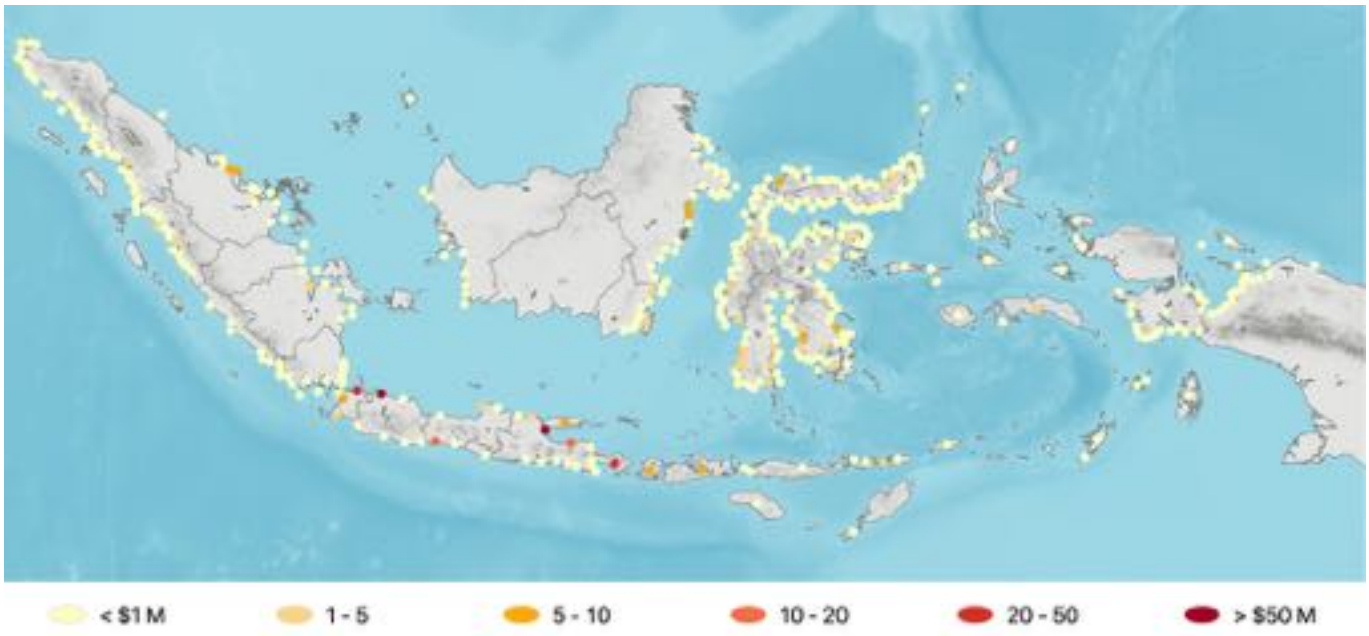


Source: World Bank using data from MoEF 2019.

[42] Estimates of loss rates vary from 6,200 to 52,000 hectares per year, with variation due to the time period of measurement and classification technique used. See Goldberg et al. (2020) and Murdiyarso et al. (2015).
[43] Based on the 2015-2018 average.
[44] Mangroves, seagrass, and reefs provide protection most effectively as intact systems rather than as single habitat types due to their complementary characteristics. Integrated management is thus important.

Figure 10: Coral Reefs Provide Infrastructure and Communities with Protection from Flooding

Color dots indicate the expected annual benefits from coral reefs for flood protection ($US million (M)). The value is calculated as the difference in expected damages to infrastructure with and without the top one meter of reef.



Source: World Bank using data from Beck et al. (2018)

Indonesia is responding to these threats to its marine and coastal assets

Recognizing these values, central and provincial governments are working to enhance protection of coastal and marine ecosystems. A step of fundamental importance has been the introduction of spatial plans, a system for resolving land use conflicts and balancing environmental and economic considerations by delineating zones for specific uses. The GoI and provinces have developed a range of marine-focused plans at national and sub-national levels, including coastal and small islands marine spatial plans (RZWP3K) within provincial waters. These will next be integrated within the broader spatial planning framework (*Rencana Tata Ruang Wilayah, RTRW*). The GoI has similarly made substantial progress in expanding MPAs to over 23 million hectares (meeting its Aichi target[45] of 20 million hectares), with a goal of reaching 30 million hectares by 2030. Improving management is also a priority: The World Bank and GEF-supported Coral Reef Rehabilitation and Management Program (COREMAP), for example, is investing around US$7 million in training, community-outreach, and small infrastructure in the Savu Sea and Raja Ampat MPAs.[46] To monitor progress, MMAF has implemented a scorecard system (E-KKP3K) across MPAs to provide a consistent means of tracking management effectiveness and outcomes.

Indonesia faces challenges in: (1) the implementation of spatial plans for marine and coastal zones…

While the GoI's establishment of spatial plans and new MPAs provides an ambitious framework for oceans governance, achieving impact on the ground requires addressing implementation challenges. Some spatial plans conflict with existing regulations, while budgets and human capacity for their enforcement are lacking. The mandate of provincial governments over coastal zone management was adjusted in 2014 with responsibility for waters between the shore and four nautical miles shifting from district to provincial governments. Most management capacity previously resided in the districts, and many provinces are yet to either devolve authority back to the district (where the capacity resides) or developed their own capacity for this expanded role. As a result, many provincial governments are still building the capacity required to implement spatial plans.

[45] Aichi Target 11 of the Convention on Biological Diversity is a call for countries to effectively conserve at least 10 percent of coastal and marine areas by 2020.

[46] Sawu Sea MPA is located in the Lesser Sunda Sea, adjacent East Nusa Tenggara province. It is Indonesia's largest MPA (3.5 million hectares) and an important habitat for migrating whales. Raja Ampat is located at the northwestern tip of Papua and comprises a network of MPAs encompassing over 1.1 million hectares. It is a biodiversity and tourism hotspot, and home to the first shark sanctuary in Indonesia.

(2) effective MPA management...

The GoI's commitment to a growing expanse of MPA area would be well-complemented by improvements in management systems. Challenges include a lack of budget and human capacity to implement basic management measures such as patrols and enforcement, overlapping mandates between district, province, and central authorities, and limited benefits for local communities who bear the cost of access restrictions to coastal and marine resources. Investment in capacity and greater collaboration with local communities are necessary for MPAs to make progress on management effectiveness and provide the protection that critical marine and coastal ecosystems require.

(3) coastal ecosystem rehabilitation, and...

The GoI target for mangrove restoration—600,000 hectares restored by 2025—is similarly commendable. It is also ambitious in the context of past efforts, with Ministry of Environment and Forestry (MoEF) reporting that around 50,000 hectares of mangroves were rehabilitated between 2010 and 2016, an average of around 7,000 hectares per year. Past progress faced technical difficulties, with specific ecological conditions required for mangrove seedlings to survive (Rahmania et al. 2020). Chosen species have experienced low survival rates in some cases, and rehabilitation costs, of between US$1,450-4,500 per hectare (MMAF 2019), are high relative to mangrove conservation costs. Greater community involvement in the management of planted sites could help survival rates, along with close consideration of site characteristics. Assisted natural regeneration could be preferentially utilized relative to direct seedling planting, given the lower costs and greater success rates seen under this approach in Indonesia and around the world. Yet, while mangrove restoration is laudable, greater emphasis could be placed on reducing mangrove loss in the first place. Indonesia has a moratorium on land conversion for Indonesia's primary forests but there is no equivalent protection for mangroves.

BOX 4

A Cost Benefit Comparison of Conserving Versus Restoring Mangroves Globally

In 2019, the global High-Level Panel for Sustainable Oceans commissioned research (Konar and Ding 2019) into the economic feasibility of major investment categories in support of a global blue economy. As one of their top five options, they considered the costs and benefits of mangrove conservation and restoration.

Drawing systematically on studies globally, they found the global median cost per hectare of new mangrove to be US$9,449 per hectare and opportunity cost (based on an alternative land use of shrimp farming) to be a further US$1,873. Total restoration costs, including establishment or regeneration costs and opportunity costs, were much higher than conservation costs, which include the opportunity cost and monitoring and protection costs only. These numbers are indicative of global experience. For a given location, the actual costs might be lower or higher depending on local conditions.

They compared these costs to the value of benefits typically seen from mangroves, specifically carbon sequestration, fisheries productivity, and coastal protection. The benefit for restoring one hectare of mangrove were estimated at US$30,080 and for conservation US$79,980 over a 30-year period. A key reason for this difference in benefits between conservation and restoration is that the benefits of restoration take several years to materialize (an average of five years growth time was factored into these calculations).

Resulting benefit to cost ratio per hectare were estimated to be 2:1 for restoration and 48:1 for conservation. These ratios are skewed by the relatively high costs of restoration in industrialized economies such as Australia, and the US. Restoration costs in Indonesia are typically significantly lower (MMAF reports costs of US$1,450-4,500 per hectare, which all else equal would give a much higher benefit to cost ratio, but still lower than the conservation benefit to cost ratio). While restoration has a critical role to play given losses already incurred, global experience suggests that conservation is more cost efficient on a per-hectare basis. World Bank research is currently underway to quantify costs and benefits of mangrove activities for specific Indonesian locations.

(4) accurate and frequent monitoring

These actions, among others, would benefit from up-to-date, high-quality data organized wherever possible in a standardized framework. Indonesia has made substantial investments in data capacity,[47] yet remaining gaps continue to hinder strategic and ground-level management decisions. One example can be seen in the lack of information over the basic extent of seagrasses: a recent pilot analysis by the World Bank, drawing on LIPI data, found seagrasses covering 735,000 hectares nationwide. However, this finding relied on a rough patchwork of satellite data and ground observations spread over multiple years. Data are conflicting and year-to-year trends are not available. Consequently, published estimates vary wildly (Sjafrie et al. 2018). Agreement on consistent methods for measurement and harmonizing coastal ecosystem datasets is needed to alleviate such challenges, a task that LIPI is now undertaking through development of mangrove, seagrass, and coral reef health indices (LIPI 2020). Likewise, MoEF formalized a geospatial mapping process for mangroves through the "One Map" program in 2015 although data gaps remain.

These challenges can be addressed through:
(1) accelerated implementation of spatial planning in marine and coastal areas

There is a need to accelerate completion of the spatial planning process for marine and coastal areas. For provinces that earlier completed provincial-level marine spatial plans (RZWP-3K), the focus is now turning to implementation and integration of these within the broader spatial planning framework (RTRW). Monitoring systems and permitting capacities must be strengthened (and in some cases, established) within provincial governments. A national spatial plan scorecard system with indicators and targets akin to the E-KKP3K scorecard system for MPAs could support these efforts. This scorecard would be most effective if it goes beyond measuring inputs and processes (such as regulations, management plans, and budgets) to also include ecological and social-economic impacts (such as ecosystem quality and extent). Business permits issuance should properly consider limitations posed by spatial plans. More broadly, effective coordination of spatial plan implementation across sectors needs to be ensured by the highest-level of decision makers. In provinces, this could be the Governor's office. Longer-term, a marine and coastal cadastre (a spatial title registry, identifying property rights over specific areas including aquaculture sites and tourism facilities) will be needed to complement these systems and help manage conflicts.

(2) Including mangroves under the land conversion moratorium and REDD+ framework

A strong complement to the GoI's mangrove restoration targets would be an extension of the conversion moratorium of primary forests and peatlands to coastal ecosystems. While MPAs tend to cover coral reef and seagrass habitats, mangroves are often located outside of conservation areas and thus need alternative mechanisms for protection.[48] Extending the moratorium to mangroves is attractive in the context of relatively high costs of mangrove restoration efforts. Even with this expenditure, rehabilitation will not reverse overall degradation given current rates of loss. An extension of the moratorium would significantly reduce mangrove destruction and complement rehabilitation efforts. When reviewing its Nationally Determined Contribution (NDC), Indonesia could also consider including mangroves in its land use emissions baseline to allow mangroves to generate emissions reductions payments in existing and future carbon-based schemes, such as REDD+. Greater clarity around institutional responsibility for conserving and restoring mangroves would help facilitate these actions and more effective management broadly.

(3) Improved management of MPAs, including the promotion of partnerships

Further investments are needed to improve MPA management effectiveness, including ranger training, increased patrols and enforcement, community engagement, and small infrastructure. Indonesia's scorecard system—E-KKP3K (which has been recently upgraded)—provides a roadmap for these investments. While the majority of national MPAs are close to or have achieved the E-KKP3K "blue" status, most provincial-level MPAs remain at significantly lower stages ("red" or "green"). Notably, the scorecard requires an MPA to demonstrate that "management activities are carried out as part of a sustainable financing system that engages stakeholders" to reach the highest "gold" status. Further activities that strengthen MPA partnerships with businesses and communities, secure

[47] The Government's COREMAP program, for example, has upgraded research stations, developed data-collection protocols, trained scientists, and monitored ecosystems with the aim of upgrading Indonesia's monitoring and thus management capacity, and represent an investment of over US$100 million since 2014 with financing from the Asian Development Bank and World Bank.
[48] In the province of Sulawesi, for example, less than 12 percent of mangroves are located within MPAs. Based on MoEF (2019).

sustainable financing for management, and contribute to coastal community incomes will thus be needed. There is also a need to ensure MPA zones and boundaries are integrated into spatial plans to ensure alignment of these complementary systems. Meanwhile, benchmarking of the scorecard against global and regional standards, such as the IUCN Green List of Protected and Conserved Areas and Coral Triangle Marine Protected Areas (CTMPAs), will add further credibility to Indonesia's marine biodiversity achievements and international commitments.

(4) Investment in nature-based solutions for coastal protection

If implemented, these planning, management, and restoration efforts would improve the health of coastal ecosystems and consequently their capacity to protect coastal communities from disasters. This complements infrastructure investment for disaster risk mitigation. Traditionally, "grey" infrastructure—engineering projects that use materials such as concrete and steel—have dominated these efforts. An alternative is to use hybrid "nature-based solutions," which combine elements of "green" infrastructure—such as strategically placed mangrove forests—with conventional "grey" structures for cheaper and more effective outcomes (Browder, et al. 2019). The Building with Nature Project in Demak, northern Central Java, is one such example led by MMAF and community partners (Building with Nature 2018). The project is installing a semi-permeable dam made from concrete, bamboo, and gelam wood, mimicking the function of mangrove roots to trap sediment and protect the coast from waves (van Wesenbeeck et al. 2018). Complemented by mangrove rehabilitation and sustainable aquaculture, the approach is expected to reduce erosion, lower costs, and boost economic benefits such as shrimp production, and can be scaled across areas affected by coastal abrasion such as north Java.

(5) Improvement of data and valuation tools

Underpinning these recommendations is a crucial common thread: the need for accurate, integrated, and frequently updated data that can be used to track progress, prioritize actions, and communicate the value of Indonesia's coastal ecosystems. The development of reef, mangrove, and seagrass health indices by LIPI is an important contribution. Much attention is rightly being focused on reaching consensus across government and partners on the validity of data and the methods used. Additional efforts are required to extend physical measurements of ecosystems to economic estimations of the value of those ecosystems. Natural Capital Accounting (NCA) based on international standards such as the System of Environmental Economic Accounting is one well-established approach for more efficient statistics production that can drive better policy outcomes (Box 5).

BOX 5

Using Natural Capital Accounts to Inform Marine and Coastal Ecosystems Policy

Historically, marine and coastal policymaking has not adequately accounted for the value of ecosystems, leading to a prioritization of development over protection. The resulting damage to the natural asset base of the ocean economy has undermined long-term economic returns. Sustainable development requires policies that preserve natural assets or convert assets without net loss.

Natural capital accounting supports such policies by providing standardized data on the status and economic values of natural assets and how these asssets are being affected by human activity. This allows for consistent and rigorous assessment of the economic viability of coastal development projects. NCA provides the data to account for the economic gains and losses of coastal ecosystems in cost benefit analysis, ensuring holistic economic assessment. Similary, NCA data can be used to measure the return on new investments in MPA management or other ecosystems potection efforts.

Indonesia has begun building NCA through the Indonesian System of Environmental-Economic Accounts (SISNERLING), developed with support of the World Bank's Wealth Accounting and the Valuation of Ecosystem Services Global Partnership. SISNERLING provided data for the Low Carbon Development Initiative for Indonesia (LCDI), which led to greenhouse gas emissions reduction targets being incorporated into the RPJMN 2020-2025. Extending SISNERLING to incorporate coastal assets supports similarly important coastal policy priorities. For example, accounts could underpin the inclusion of coastal carbon towards Indonesia's climate commitments.

Source: World Bank.

05. Combating Plastics from Source to Sea

Fishing sailboats, Indonesia. Photo: © Curt Carnemark/ World Bank

Oceans for Prosperity

05. Combating Plastics from Source to Sea

Marine plastic debris represents a significant risk to Indonesia's ocean sectors.

Marine debris causes economic costs in excess of US$10 billion annually in the Asia Pacific region

Realizing the potential of ocean economies worldwide will require addressing the global challenge of marine plastic debris. Modelling suggests that between 4.8 and 12.7 million tonnes of plastic debris flow into the world's oceans each year (Jambeck et al. 2015), and the rate of this "leakage" is increasing (Hoornweg, Bhada-Tata, and Kennedy 2013). It impacts ecosystems, human health, and maritime economies, particularly fisheries, coastal tourism, and commercial shipping. Recent estimates of the damage of plastics to ocean economies exceed US$10.8 billion annually in the Asia Pacific Region alone. The cost to Indonesia is estimated at over US$450 million per year (APEC 2020). These estimates are direct costs only: Costs of remediation and indirect damage to ecosystems, if known, would increase this estimate substantially.

Indonesia is a large producer of marine plastics, up to 0.55 million tonnes every year

Indonesia's extensive coastline, large population, and high proportion of mismanaged waste are the key factors behind the country's substantial flow of plastics into the oceans. A 2020 World Bank study drawing on local data estimated that Indonesia generates 7.8 million tonnes of plastic waste each year, of which 4.9 million tonnes is classified as mismanaged.[49] World Bank modelling indicates that between 0.20 and 0.55 million tonnes of that plastic makes its way into oceans each year.[50] Green procurement refers to mandates or targets within public sector organizations to procure recycled and repurposed plastic in their procurement contracts. There is considerable heterogeneity in the sources and types of this leakage (Figure 11 and Figure 12) with a 2018 World Bank analysis of 15 cities finding rates of mismanagement varying from 7 to 50 percent (Shuker and Cadman 2018).

Figure 11: Rates of Waste Mismanagement Vary Considerably between Indonesia's Cities
(tonnes/day)

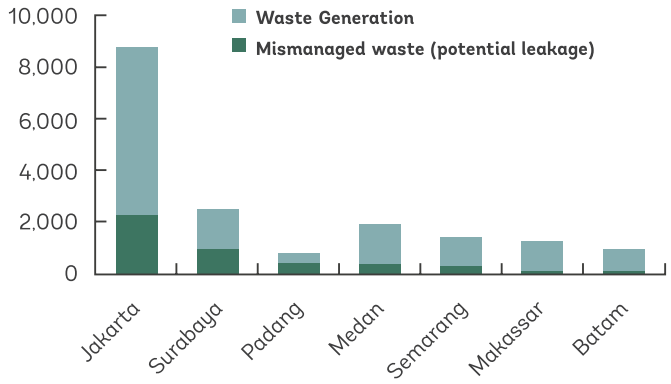
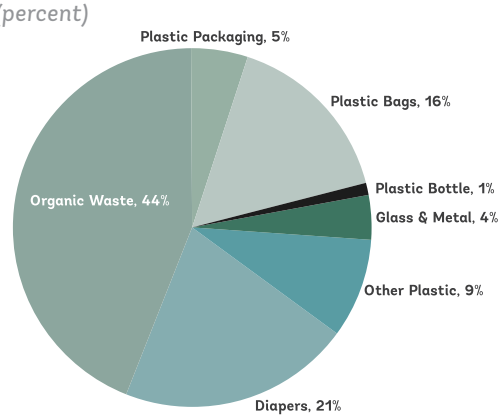


Figure 12: Composition of Waste Found in Waterways in 15 Indonesian Cities
(percent)



Source: Shuker and Cadman (2018)

Marine plastic debris poses a risk to Indonesia's fisheries, ...

Marine plastic debris imposes substantial economic costs on the fisheries sector. Published estimates suggest plastics are responsible for global revenue losses of around $2.2 billion per year through lost income from reduced and contaminated catches, damage to fishing gear, and associated lost time (Trucost 2016). A very rough Indonesia-specific estimate (based on extrapolation from studies elsewhere) places the domestic loss at around US$147 million per year (APEC 2020). A particularly pernicious component of this damage comes from abandoned, lost, or otherwise discarded fishing gear (ALDFG). ALDFG has long-lasting impacts with "ghost" gear continuing to ensnare fish for years following their loss or improper disposal, compromising yields, and damaging ecosystems. Recent research based on interviews of Indonesian fishers in the Arafura Sea found that one-third of trawl fishers and 12 percent of gillnet fishers discarded damaged, unrepairable nets overboard.[51]

[49] Unmanaged municipal plastic waste is that which is not collected, recycled, or disposed of in sanitary landfill, controlled landfill, or other official dumpsites, as defined by the Indonesian Ministry of Public Works and Housing.
[50] Forthcoming publication.
[51] Causes of damage to nets were snagging on obstructions (78 percent) and conflicts and entangling with other fishing gear (19 percent). These incidents are themselves reported to be linked to over-allocation of fishing licenses and unregulated fishing pressures, leading to overcrowding, overcapacity, increased competition, and risk-taking by skippers and crews. Long-term solutions to ghost gear will be best served by addressing the full chain of events that lead to gear loss (many of which are explored in Chapter 2). See Richardson, et al. (2018).

... seafood quality and safety, ...

Marine plastic debris also affects the fisheries sector through threats to seafood safety and quality. Large pieces of plastic disintegrate under the influence of sunlight and wave action to form microplastics (pieces less than 5 millimeters in size) that are mistaken for food by fish and subsequently enter the food-chain. A 2015 study found microplastics in 28 percent of fish and 55 percent of all species sampled in fish markets in Makassar (Rochman et al. 2015). While little is known about the long-term health impacts of plastics, they contain chemicals known to cause toxicological impacts in humans, including reproductive and development abnormalities, increased rates of cardiovascular disease, and type-2 diabetes (Swan 2008; Swan et al. 2005; Lang et al. 2008). With over half of the animal protein consumed in Indonesia provided by fish and seafood, growing per-capita fish consumption, and Indonesia's position as a major exporter of seafood to global markets, plastic debris poses a potential public-health risk.

... shipping, ...

Marine debris is also a threat to navigation, affecting recreational, cargo, and fishing vessels. Larger pieces of debris causes damage by blocking cooling systems or becoming entangled in propellers (Hall 2000), with the most severe impacts on the small vessels with outboard motors that are in widespread use amongst Indonesia's small-scale coastal fisheries (McIlgorm, Campbell, and Rule 2009). The cost of marine debris damage to shipping and fishery sectors based on insurance claims alone (Takehama 1989) is around US$280 million per year for countries in the APEC region (McIlgorm, Campbell, and Rule 2009). While little is known about the cost of marine debris on shipping in Indonesia, its impact is likely to increase as Indonesia develops its shipping lanes in the face of growing traffic.

... and marine tourism development goals

Tourism is clearly also vulnerable to marine debris impacts, suffering both direct costs of cleanup and indirect costs from lost visitor revenue. Just as iconic tourism sites in the Philippines and Thailand were closed by pollution impacts (as discussed in Chapter 3), in 2017 Bali declared a "garbage emergency" as popular beaches such as Jimbaran, Kuta, and Seminyak became overwhelmed by plastic waste. At the peak of the subsequent clean up, workers were removing as much as 100 tonnes of waste per day (Oliphant 2017). A study by the Making Oceans Plastic Free Initiative estimated that plastic bag pollution causes revenue losses of US$140 million annually to Indonesia's tourism sector, with US$55 million from Bali alone (Making Oceans Plastic Free Initiative 2017).

These costs exceed the estimated costs of mitigating marine plastic debris

There is a strong economic rationale for investment in waste management to avoid these and other costs. Based on estimates for five countries (China, Indonesia, Philippines, Thailand, and Vietnam), the economic cost of each tonne of mixed household waste that is burned in backyards, dumped, or discharged in waterways is around US$375 (McKinsey Center for Business and Environment 2016). By comparison, the World Bank estimates the cost of universal (full coverage) waste collection and adequate treatment or disposal to eliminate waste leakages to waterways at between US$50-100 per tonne in middle income countries.

Indonesia's National Action Plan targets a 70 percent reduction in marine debris by 2025 via ...

As a result of recognition of these challenges, management of marine debris is high on the national agenda. Launched in June 2017, the National Action Plan on Marine Debris has an ambitious goal of reducing marine debris by 70 percent by 2025. Achieving this will require concerted efforts from national policymakers and local governments across five reform areas: (1) incentivizing behavioral change; (2) reducing land-based leakage; (3) reducing sea-based leakage; (4) reducing plastic production and use; and (5) enhancing funding, policy reforms, and law enforcement.

Incentivizing behavioral change, ...

Behavior change strategies such as the recent Clean Indonesia campaign ("*Gerakan Indonesia Bersih*") and the Love for the Seas Movement ("*Gerakan Cinta Laut*") are promoting reduced plastics usage (especially single-use plastics), along with increased recycling and proper disposal practices. A successful example of change is seen in Malang, where recycling rates of more than 50 percent have been achieved through locally grounded public outreach campaigns. Other initiatives such as community waste banks ("*bank sampah*") have contributed to waste reductions and increased incomes, albeit on a small scale.[52] Community-led clean-ups have also shown success, with slogans such as "*bersih itu sehat*"

[52] Waste banks are community-based recycling schemes where waste deposits are sold for recycling, providing cash returns for members after covering operating costs. Waste banks have been shown to promote waste segregation, reduce inorganic waste, and encourage composting. See Halimatussadiah et al. (2016).

(to be clean is to be healthy) gaining attention. In Bali, the "garbage emergency" of 2017 sparked "Bali's Biggest Clean-up," which took place in some 115 locations around the island and mobilized over 15,000 people (Taylor 2018). The World Bank and GoI have developed a "Communications Playbook" based on lessons from these and other events, aiming to inform the design of outreach activities to improve community awareness around plastics.[53]

... reducing land-based leakage by targeting coastal and riverside cities, ...

Given that around 80 percent of marine plastics originate from the mismanagement of waste on land, Indonesia could achieve a large proportion of the targeted 70 percent reduction by capturing municipal solid waste that is not currently collected, and by halting leakages from transfer points, treatment facilities, and disposal sites. The GoI has developed a platform to assist cities to improve solid waste management using national budget (APBN) and international donor funding. However, international experience (for example, within EU accession countries) shows that achieving universal waste collection takes many years to achieve, even with such support programs. The total investment needed in Indonesia's urban areas alone is likely to exceed US$5 billion. Indonesia can make efficient progress towards its 70 percent goal by focusing investments in basic waste management systems and services in hotspots such as coastal and riverside cities, and by moving waste management infrastructure away from waterways (Box 6). A good example is the World Bank-supported *Citarum Harum Program* that is applying this approach to cities along the Citarum River.

BOX 6

Targeted Approaches for Reducing Leakage and Increasing Circularity

Cost-effective and targeted actions can reduce plastic pollution in the short term while larger investments in support of a circular economy are put in place for the long term. Analysis to identify priority plastics (those representing a disproportionately high component of marine plastic debris) and priority rivers (those carrying large amounts of plastic debris) will be important for the GoI's prioritizing of policies and investments. For example, a plastics tracking study by LIPI, supported by the World Bank, found that on average, about 65 percent of plastic originating from the Cisadane, Musi, and Bengawan Solo rivers spent some time as stranded beach debris not far from the river's mouth. This provides an option for cost-effective beach clean-ups that can remove stranded debris before it enters the ocean.

Research that targets key elements of circular economy development will also be valuable. While sufficient research already exists to act, analysis of institutional strengthening for monitoring and enforcement would support implementation of Extended Producer Responsibility (EPR) regulations, taxes, and single-use plastics bans. Research can further assess appropriate standards for recycled plastics and support local governments in developing more efficient waste collection (and financing) systems.

Source: World Bank.

...reducing sea-based leakage, ...

Measures to reduce plastic waste discharges from maritime activities and ALDFG include a gear monitoring and loss reporting system, repair facilities at or near ports to extend the life of fishing gear, incentive systems for the retrieval and disposal of end-of-life and ALDFG gear, and port reception facilities for disposal of solid waste from vessels. Collaboration with fishers, ports, and the recycling industry (potentially via public-private partnerships) is key for such measures to be successful. A refund system for end-of-life fishing nets was piloted in Papua province, where ten tonnes of discarded nets were collected by fishers for recycling in return for direct cash payments, and in Java where fishing cooperatives have been engaged in net loss prevention and buy-back schemes for used nets.

...reducing plastic production and use, with economic incentives, ...

Bans and excises on plastic products, particularly targeting single-use and the most polluting applications, and accompanied by a transition plan for impacted sectors, can reduce consumption, raise revenue, and incentivize innovation In 2016, the Ministry of Environment and Forestry, with the collaboration of the Indonesian Retailers Association, piloted an IDR 200 (approx. US$0.01) charge on plastic bags in 27 cities. Despite just three months of implementation, the charge resulted in an estimated reduction in plastic waste of 55 percent. The initiative was not continued due to disagreements with some retailers. However, other initiatives have commenced, with several cities putting in place bans and taxes targeting single-use plastics (Box 7).

[53] CMMAI (2020). Behavior Change Strategy and Playbook (https://maritim.go.id/playbook-penanganan-sampah-english-version/).

BOX 7

Single-use Plastic Bans and Taxes

In December 2018, Bali Governor Wayan Koster introduced an all-encompassing ban against single-use plastic, including plastic bags, Styrofoam, and straws. The ban has an ambitious target of reducing Bali's contribution to marine plastic debris by 70 percent within the year.

That regulation followed in the footsteps of decrees issued in Banjarmasin and Balikpapan, Kalimantan, as well as in Bogor, West Java, that banned the use of plastic bags. A similar regulation was introduced in Jakarta, which accounts for approximately 20-30 percent of Indonesia's plastic waste in July 2020, banning single-use plastic bags in malls, traditional markets, supermarkets, and convenience stores. There are currently 38 cities/regencies and two provinces with some form of plastic bag reduction regulation.

In February 2020, Indonesia's Parliament approved a MOF proposal to include plastics on the list of excisable goods, including plastic bags, plastic bottles, and sachet packages. This excise is expected to discourage use by up to 50 percent, as well as raise around US$113 million in revenue annually (Diela 2020).

Source: World Bank.

...extended producer responsibility and circular economy policies, ...

Extended Producer Responsibility (EPR) regulations oblige manufacturers and importers to take responsibility for the management of plastics from their products throughout their lifecycle, reducing plastic waste upstream and promoting circularity. Recycling rates in Indonesia are low at around 10 percent (World Economic Forum 2020). In late 2019, the GoI passed an EPR regulation on manufacturers, retailers, and the food and beverage industry,[54] requiring them to reduce waste by including a higher proportion of recyclable or degradable material in their products and to manage post-consumer waste for reuse or recycling, with the goal to reduce their total waste by 30 percent by 2029. Implementation is now underway. There are opportunities to support institutional strengthening for monitoring and enforcement of these regulations, and for further EPR measures such as deposit-refund systems and packaging fees. More broadly, technical guidelines could help improve the quality of recycled plastics, specifically food-grade plastics, and reduce dependence on virgin material, with accompanying incentives. There is a need for assessment of measures that can support long-term shifts towards a circular economy and support deeper development of the recycling market. These include standards for recycled material, minimum recycled content requirements, and prioritizing recycled material in public procurement ("green procurement").[55]

... implementation support, ...

Implementation support for waste measures by local governments, cities, and *kabupaten* are also needed. Thus far, the track record of investments in the waste sector supported by the national budget has been mixed. World Bank analysis found that more than 70 percent of local disposal cells and treatment facilities built with central government financing were functioning poorly within a few years of commissioning. Reasons included a lack of capacity, poor integration of community-level collection systems and city-level transport, treatment, and disposal systems, and limited repercussions for poor waste management performance. An important contributing factor is the local operational budget allocation for waste management, which varies widely across Indonesia (0.5-6.7 percent of *Anggaran Pendapatan dan Belanja Daerah* (APBD)). Based on the experience of Indonesian cities with adequate waste services, four percent of APBD appears to be a good benchmark to ensure that operations can be sustained.

... and enhanced funding mechanisms

Such support will require robust sources of financing. Given that waste management fees (retribution) are a critical source of financing at the local level, fee collection rates and the mechanisms for funds flow should be a high priority for reform. The Ministry of Home Affairs is finalizing guidelines for cities on retribution, including a calculator to determine minimum percentage fees. Such technical guidance is urgently needed by cities and regencies to adopt these mechanisms and standards and to enforce collection. Monitoring systems of both funds and outcomes (including towards the 70 percent marine debris reduction target) will strengthen prospects for progress.

[54] Ministry of Environment and Forestry Regulation No.75 of 2019 Regarding a Roadmap for Reduction of Waste from Producers.
[55] Green procurement refers to mandates or targets within public sector organizations to procure recycled and repurposed plastic in their procurement contracts.

06. Conclusion: Integrated Policy for a Blue Economy

Stylophora Coral.
Photo: © shutterstock.com

Oceans for Prosperity

06. Conclusion: Integrated Policy for a Blue Economy

Close ecological and economic links between ocean sectors means that reforms can deliver broad benefits.

Realizing the full potential of Indonesia's ocean economy will require cross-sector reforms ...

This report lays out the rationale for, and steps towards, a blue economy for Indonesia. Fisheries management improvements—through upgraded science and data, decision-making structures, and harvest control measures—have the potential to increase fisheries' social and economic contributions. Protecting MAC assets as part of tourism development will help ensure that visitor growth is sustainable and that 'brand Indonesia'—the country's reputation as a desirable destination—is maintained. Importantly, the benefits of reforms extend across and beyond these sectors. For example, conservation measures that protect coral reefs support productive fisheries, physical protection of coastal communities, and tourism opportunities. Initiatives that reduce the threat of marine debris reduce costs to fisheries, tourism, public health, and shipping. Cross-sectoral investment and planning decisions—sensitive to multiple-objectives—will be critical given this interdependence of ocean-related sectors.

... and strengthened coordination across government

To achieve this, there is a need to strengthen coordination between ministries (those in charge of fisheries, tourism, transport, environment, and public works), levels of government (national, provincial, and district), and other stakeholders (academia, private sector, and civil society) (Box 8). The establishment of a high-level Sustainable Oceans Platform could support this goal by serving as an advisory and monitoring body on issues related to the blue economy. An Oceans Platform could draw on Indonesia's successful experience with the Tourism Coordination Platform that is supporting development of new tourism destinations with coordination arrangements established at the national, province and district level.

There is a range of financing opportunities both within and across these sectors

There are numerous opportunities for financing the investments required. For example, the economic value of Indonesia's reefs for tourism, estimated at around US$3.1 billion per year, can support visitor fees to help finance conservation. Previously published studies show that revenue potential at many key MAC sites, as determined by visitors' willingness to pay, is higher than is currently collected (Pascoe et al. 2014). Such revenues can contribute to tourism-related waste management, while tax revenues raised on a growing tourism industry, or as part of incentive mechanisms to lower plastics use, can help finance clean-ups in tourist hotspots.

more efficient use of existing government funds and securing new sources of financing, and...

Yet, raising new sources of finance will not be enough: There is also a need for more efficient and impactful use of existing government funding. For example, strengthened sustainability criteria in funding allocation decisions made by MMAF's Fisheries Business Capital Management Institute (*Lembaga Pengelola Modal Usaha Kelautan dan Perikanan*, LPMUKP) could help improve sustainability outcomes. Productive use of public funds requires close tracking of expenditure and its results. A public expenditure review for oceans related sectors could be used to identify underperforming areas—for instance, subsidies that are not having their desired impact or that are undermining long-term sustainability goals—and to find opportunities to redeploy those funds towards more productive uses. Meanwhile, instruments such as blue bonds (World Bank 2018) and growing private sector interest in sustainability-orientated investments could increase overall finance and human resources available (Box 9).

Greater data, analysis, and transparency

As emphasized throughout this report, quality and timely data is the basis for effective and adaptative management, particularly in a context of increasing uncertainty under climate change. Improved measurement of ecosystem services such as carbon storage, biodiversity habitat, and storm surge protection will help Indonesia access potential future payments for these services (such as payments for 'blue carbon'), and, more fundamentally, to inform investment and management decisions. As explored in Chapter 4, some of Indonesia's coastal ecosystems— notably seagrasses—are barely quantified in their extent, quality, and trends, and not at all in terms of economic valuation. The GoI has made progress on data collection and public accessibility and should continue to build on these efforts.

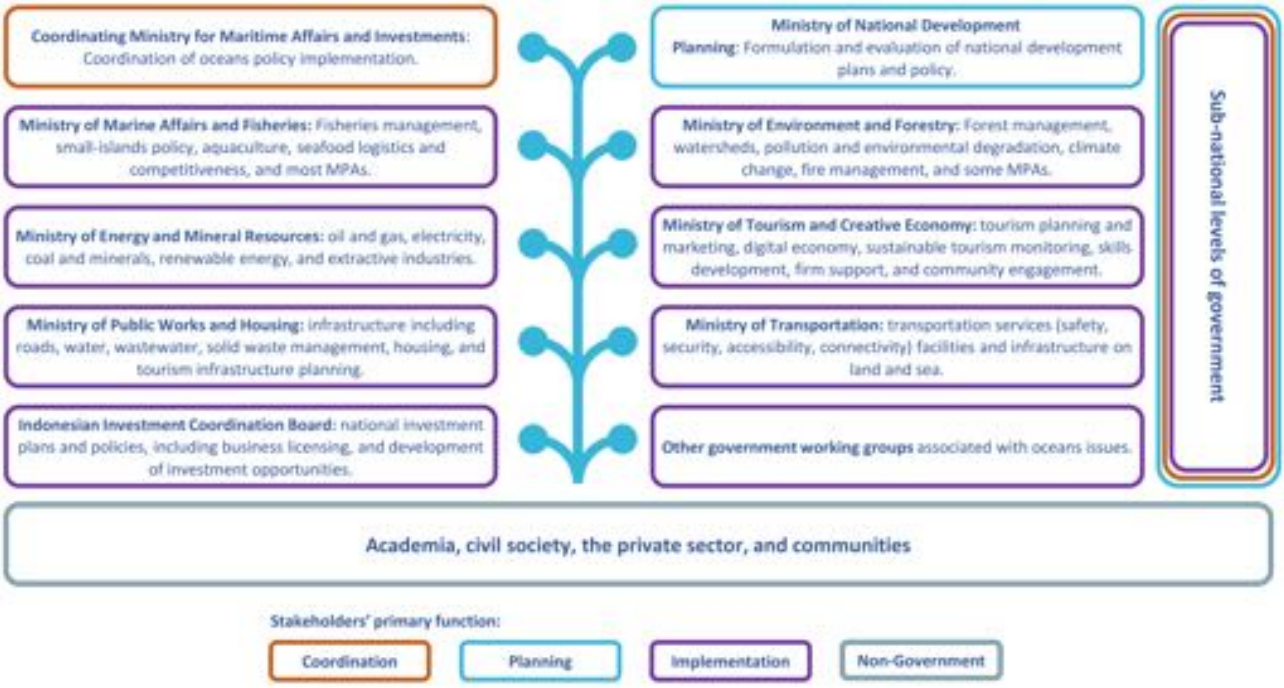
BOX 8

Improving Coordination for Blue Economy Development

Marine and coastal management faces pressures and demands from diverse stakeholders, and implementation of policies in this area requires actions by multiple levels of government and ministries/agencies. Given these complexities, decisions across government entities in Indonesia have not always been well-aligned.

To address this challenge, the Coordinating Ministry of Maritime Affairs and Investment (CMMAI) was formed in 2014 as one of four coordinating ministries in Indonesia. Its role is to coordinate formulation and implementation of policies related to oceans across government, specifically across eight government bodies (Figure 13). Critical ministries in this space include MMAF, which has the most expansive implementation mandate on oceans issues among central ministries, and Bappenas, which ensures implementation of all programs in line with the RJPMN.

Figure 13: Key Stakeholders and Decision-makers in the Oceans Policy Space



An example of an issue with a strong need for cross-sectoral coordination is marine plastic debris management. CMMAI and MoEF co-chair a National Coordination Team responsible for a National Plan of Action (NPoA) on this issue (*Rencana Aksi Nasional Penanganan Sampah Laut*, 2018-2025). The NPoA describes strategies, programs, and activities to meet the GoI's plastic pollution reduction targets over this period involving 16 ministries, agencies, and other stakeholders (from industry, civil society, and academia).

More broadly, a tool under development for oceans coordination is seen in the Indonesian Ocean Policy (*Kebijakan Kelautan Indonesia*). While non-binding, this policy provides guidance for governments to plan, implement, monitor, and evaluate development in the maritime sector. It elaborates on the RJPMN by providing finer resolution ocean development objectives along with a NPoA (under preparation) for their achievement.

Coordination could be furthered by a Sustainable Oceans Platform, a multi-stakeholder group, including representation from a range of oceans-related ministries, as well as non-government actors (academia, civil society, and industry). Members would form a committee of senior decision-makers for policy coordination, an implementation team of officials for technical coordination, and expert working groups to provide advice. Building on the success of similar bodies elsewhere across the GoI, the platform would be a forum for:

- Coordination of planning, implementation, and the activities of donors and financing partners
- Deliberation, progress monitoring, and identification and alleviation of bottlenecks
- Co-generation of knowledge via the exchange of experience and best practices
- Relationship-building between decision-makers, academia, the private sector, and civil society

Source: World Bank

A *blue economy* strategy can help achieve policy integration for sustainable development

Interdependence is at the heart of a blue economy strategy where the development of ocean sectors is governed through cross-sectoral means. A central example—in which Indonesia has the potential to be a world leader—is marine spatial planning. Indonesia's integrated tourism master planning is another such integrated policy instrument crucial for ocean sector outcomes (MPWH 2020). These instruments can be developed in ways that allow for the future integration of additional activities within existing policy and strategic frameworks. These include offshore energy, bioprospecting, and desalination, among others yet to be developed in Indonesia, but could well be part of the country's ocean future.

BOX 9

Financing the Blue Transition

"Blue finance" is the capital required to restore and protect oceans and support sustainable development of oceans resources. Private sources are increasingly providing such capital as environmental, social, and governance (ESG) considerations enter the mainstream of global finance, including in emerging markets. In the past decade, there has been strong increased private demand for 'purposeful development' investment opportunities — projects with explicit environmental and social goals, with assets under active management using ESG principles estimated at US$3 trillion in 2020 (Morgan 2020).

Public and philanthropic sources are also important. Public financing can be used to de-risk private investment opportunities, thus leveraging private finance. Public funds are also required to finance activities which do not have private returns in the short term such as MPA management and research. Public funds can often unlock other streams of financing by increasing donor confidence, signaling government intent, and providing structures for fund flow management. For example, Indonesia could develop a national conservation endowment fund to leverage and manage multiple streams of financing (including philanthropic, private sector, and international development assistance) for MPA management and related activities with high public value. This would build on experience at local and regional levels (such as that in the Bird's Head Seascape, West Papua).

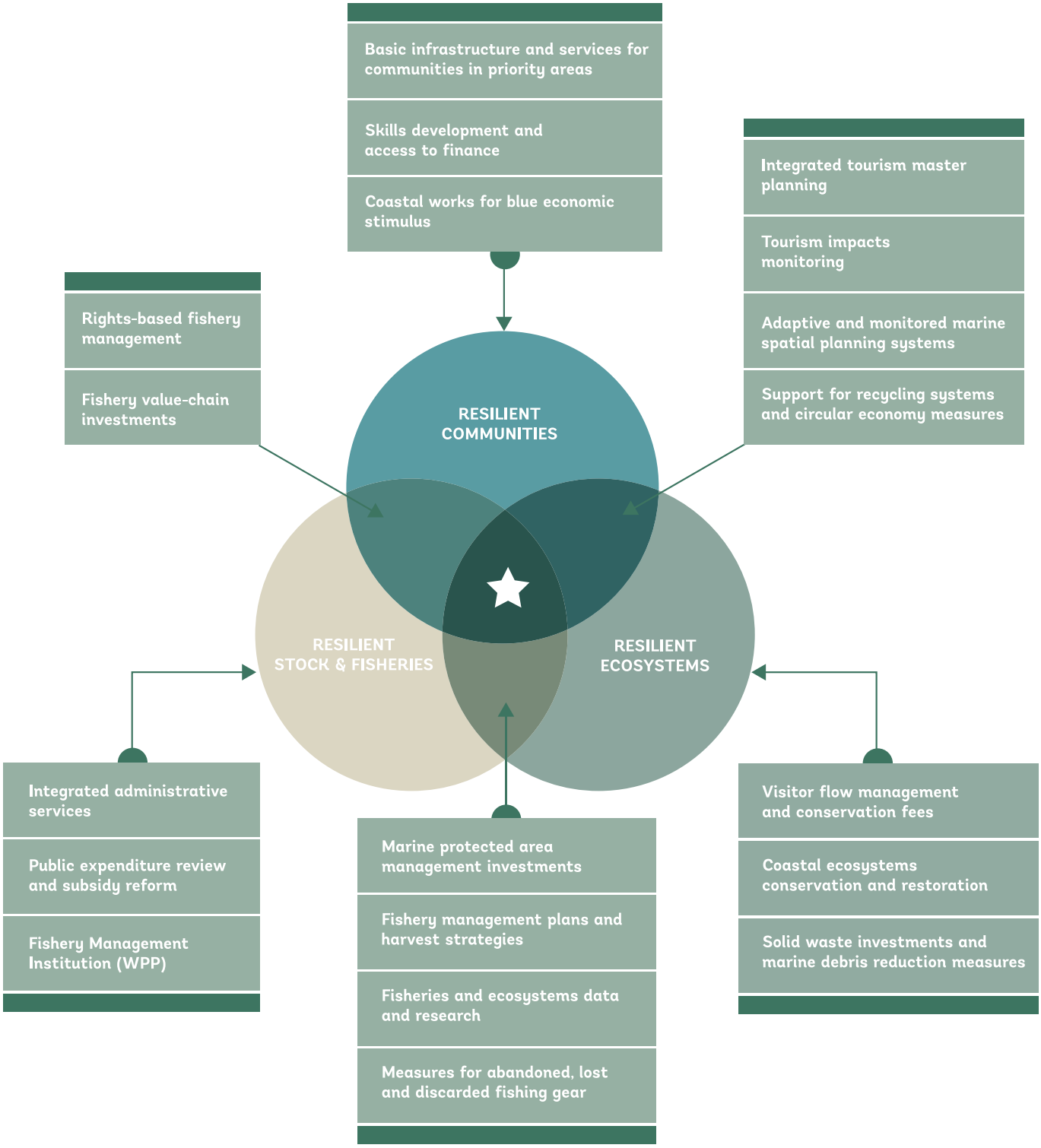
In addition, some governments are borrowing explicitly for activities with clear links to the sustainable development goals (SDGs). Bond issuance linked to SDG goals has risen significantly in recent years. Indonesia has experience with such bonds through its 'green sukuk' initiative (MoF 2018), which raised US$1.25 billion in 2018 for climate-related investments and could provide a basis for similar "blue" bonds. The GoI is currently preparing a Blue Finance Roadmap to mobilize financing from the private and public sectors. Scaling up blue finance will require de-risking investment opportunities, ensuring data are available to show the environmental and social returns to purposeful development, and developing natural resource management policies that provide investor certainty, among other actions.

Blue financing should also be considered in terms of risk mitigation and cost of borrowing. The rise of ESG considerations means many investors are increasingly reluctant to invest in countries that do not adopt sound environmental policies and management metrics. The status of oceans resources will increasingly be tracked not only by NGOs and international organizations, but also by global financial markets. A more diverse range of investors—and more attractive borrowing terms for both private firms and governments—will be interested in Indonesia in the context of sound oceans policy.

Examples of such integrated approaches are underway

Consistent with this integrated vision, the policy recommendations made in this report are mutually reinforcing across sector goals. A growing and sustainable oceans economy will require resilient communities, fisheries, and ecosystems (Figure 14). For example, growth in MAC tourism requires basic infrastructure development, as well as policies for sustainable ecosystems. Those ecosystems support fisheries while also providing physical protection to communities and infrastructure. Transitioning fisheries to sustainable levels of exploitation requires supporting fishers and their communities through skills development, access to finance, and alternative livelihoods, or, more directly, through cash transfer programs, which in some cases will facilitate an exit from the fishery sector. Meanwhile, improved fisheries can underpin investments further up the value-chain that provide new and better paid jobs.

Figure 14: An Integrated Approach to Sustainable Coastal Development Relies on Mutually Reinforcing Policy Elements



Source: World Bank

With these steps, Indonesia's oceans economy has a promising future

Through these measures and others, the GoI has shown strong commitment to integrated development in its efforts to realize a blue economy. The challenges remain substantial: Both upscaling of existing efforts and implementation of new ideas is required, and the effects of the COVID-19 crisis will be felt for many years. However, the success of recent initiatives, and the foundations laid through systems such as the WPP and spatial planning frameworks, provide a strong basis for building a prosperous and sustainable future for Indonesia's oceans for generations to come.

Labuan Bajo is a fishing town located at the western end of the large island of Flores in the Nusa Tenggara region of east Indonesia. Photo: © shutterstock.com

References

Alongi, D.M., D. Murdiyarso, J.W. Fourqurean, J.B. Kauffman, A. Hutahaean, S. Crooks, C.E. Lovelock, et al. 2016. "Indonesia's Blue Carbon: A Globally Significant and Vulnerable Sink for Seagrass and Mangrove Carbon." *Wetlands Ecology and Management* 24: 3-13. https://doi.org/10.1007/s11273-015-9446-y.

APEC (Asia-Pacific Economic Cooperation). 2020. Update of 2009 APEC Report on Economic Costs of Marine Debris to APEC Economies. Asia Pacific Economic Cooperation Oceans and Fisheries Working Group. https://www.apec.org/Publications/2020/03/Update-of-2009-APEC-Report-on-Economic-Costs-of-Marine-Debris-to-APEC-Economies.

Attri, V.N. 2018. "The Role of Marine Tourism in IORA: The Pathways Ahead." Paper presented at the Third Tourism Experts Meeting for the Establishment of the IORA Core Group on Tourism, Durban, South Africa, May 6-8.

———. 2020. Number of Foreign Tourist Visits per Month to Indonesia by Entrance, 2017-Present (Visits). Badan Pusat Statistik. Accessed August 25, 2020. https://www.bps.go.id/indicator/16/1150/1/number-of-foreign-tourist-visits-per-month-to-indonesia-according-to-the-entrance-2017---now.html.

Beck, M.W., I.J. Losada, P. Menéndez, B.G. Reguero, P. Díaz-Simal, and F. Fernández. 2018. "The Global Flood Protection Savings Provided by Coral Reefs." *Nature Communicaions* 9 (1). https://doi.org/10.1038/s41467-018-04568-z.

Bennett, A., P. Patil, K. Kleisner, D. Rader, J. Virdin, and X. Basurto. 2018. Contribution of Fisheries to Food and Nutrition Security: Current Knowledge, Policy, and Research. NI Report 18-02. Durham, NC: Duke University. https://nicholasinstitute.duke.edu/sites/default/files/publications/contribution_of_fisheries_to_food_and_nutrition_security_0.pdf.

Birkenbach, A.M., D.J. Kaczan, and M.D Smith. "Catch Shares Slow the Race to Fish." *Nature* 544 (April 2017): 223-26. http://doi.org/10.1038/nature21728. Epub 2017 Apr 5. PMID: 28379945.

BPIW (Regional Infrastructure Development Agency). 2019. Ministry of Public Works and Public Housing. Integrated Tourism Master Plan. http://bpiw.pu.go.id/itmp.

BPS (Badan Pusat Statistik). 2019. Statistics of Marine and Coastal Resources 2019. Badan Pusat Statistik. https://www.bps.go.id/publication/2019/12/13/b4a2bdc6c65fd6fa57fe47ea/statistik-sumber-daya-laut-dan-pesisir-2019.html.

———. 2020. Number of Foreign Tourist Visits per month to Indonesia by Entrance, 2017 - present (Visits). Statistics Indonesia. https://www.bps.go.id/indicator/16/1150/1/number-of-foreign-tourist-visits-per-month-to-indonesia-according-to-the-entrance-2017---now.html.

Building with Nature (2018). "Building with Nature Indonesia by Building with Nature in Indonesia-Exposure." https://buildingwithnatureindonesia.exposure.co/building-with-nature-indonesia-1.

Burke, L., K. Reytar, M. Spalding, and A. Perry. *Reefs at Risk Revisited in the Coral Triangle*. Washington, D.C.: World Resources Institute, 2012.

Busro, Z.M. 2017. "Burning and/or Sinking Foreign Fishing Vessels Conducting Illegal Fishing in Indonesia: Some Obligations and Loopholes." *Asia-Pacific Journal of Ocean Law and Policy* 2: 174-79.

Cabral, R.B., J. Mayorga, M. Clemence, J. Lynham, S. Koeshendrajana, U. Muawanah, D. Nugroho, et al. 2018. "Rapid and Lasting Gains from Solving Illegal Fishing." *Nature Ecology & Evolution* 2: 650-58. https://doi.org/10.1038/s41559-018-0499-1.

Campbell, S., R. Jakub, A. Valdivia, H. Setiawan, A. Setiawan, C. Cox, A. Kiyo, et al. 2020. "Impact of COVID-19 on small-scale coastal fisheries of Southeast Sulawesi, Indonesia." Preprint, submitted July 7, 2020. https://doi.org/10.21203/rs.3.rs-39895/v1.

Cahagi, D. and R. Gurning. 2018. "A Review on Indonesian Fishermen Prosperity in Coastal Areas." *Applied Mechanics and Materials* 874 (January): 3-9. https://doi.org/10.4028/www.scientific.net/amm.874.3.

CEA (California Environmental Associates). 2018. *Trends in Marine Resources and Fisheries Management in Indonesia: A 2018 Review*. https://www.packard.org/wp-content/uploads/2018/08/Indonesia-Marine-Full-Report-08.07.2018.pdf.

CIEC. 2019. National Accounts Database. Fisheries and Gross Domestic Product Time Series: System of National Accounts, 2008.

Coral Triangle Initiative. 2018. "Well-respected Indonesian Coral Expert Reveals the Current Health Index of Corals of Indonesia." http://coraltriangleinitiative.org/news/well-respected-indonesian-coral-expert-reveals%C2%A0-current-health-index-corals-indonesia.

Costello, C., S. Gaines, and J. Lynham. 2008. "Can Catch Shares Prevent Fisheries Collapse?" *Science* 321(5896): 1678-81. https://doi.org/10.1126/science.1159478.

Costello, C., D. Ovando, T. Clavelle, K.C. Strauss, R. Hilborn, M.C. Melnychuk, T.A. Branch, et al. 2016. "Global Fishery Prospects Under Contrasting Management Regimes." *Proceedings of the National Academy of Sciences* 113 (18): 5125-129.

CMMAI (Coordinating Ministry of Maritime Affairs and Investment) 2020. *Behavior Change Strategy and Playbook*. https://maritim.go.id/playbook-penanganan-sampah-english-version/

de Vera, B. "6-month Boracay closure to cost economy P1.96B." *Philippine Daily Inquirer*, April 25, 2018. https://business.inquirer.net/249787/6-month-boracay-closure-cost-economy-p1-96b.

Diela,T. "Indonesia Parliament Tells Government to Tax a Wider Range of Plastic Products," *Reuters*, February 19, 2020. https://www.reuters.com/article/us-indonesia-economy-tax/indonesia-parliament-tells-government-to-tax-a-wider-range-of-plastic-products-idUSKBN20D0DH.

Done, T. 2011. "Indonesian Reefs." In *Encyclopedia of Modern Coral Reefs*, 594-601. https://doi.org/10.1007/978-90-481-2639-2_97.

Ebarvia, M.C.M. 2016. "Economic Assessment of Oceans for Sustainable Blue Economy Development." *Journal of Ocean and Coastal Economics* 2(2). https://doi.org/10.15351/2373-8456.1051.

Ellis-Petersen, H. "Thailand Bay Made Famous by The Beach Closed Indefinitely." *The Guardian*, October 3, 2018. https://www.theguardian.com/world/2018/oct/03/thailand-bay-made-famous-by-the-beach-closed-indefinitely.

Falahudin, D., R.M. Cordova, X. Sun, D. Yogaswara, I. Wulandari, D. Hindarti, and Z. Arifin, Z. 2019. "The First Occurrence, Spatial Distribution and Characteristics of Microplastic Particles in Sediments from Banten Bay, Indonesia." *Science of the Total Environment* 705 (February): 135304. https://doi.org/10.1016/j.scitotenv.2019.135304.

FAO (Food and Agriculture Organization). 2018a. FAO Yearbook. *Fishery and Aquaculture Statistics 2016*. FAO, United Nations, Rome. 104.

———. 2018b. *The State of World Fisheries and Aquaculture 2018 – Meeting the Sustainable Development Goals*. FAO, United Nations, Rome. http://www.fao.org/3/i9540en/I9540EN.pdf.

———. 2020a. *Addendum to the State of World Fisheries and Aquaculture 2020*. FAO, United Nations, Rome. http://www.fao.org/3/ca9349en/CA9349EN.pdf.

———. 2020b. FishStat Database. http://www.fao.org/fishery/statistics/en.

Gokkon, B. "COVID-19 No Excuse for Dropping Guard Against Illegal Fishing, Indonesia Says." *Mongabay Environmental News*, May 1, 2020. https://news.mongabay.com/2020/05/covid-19-no-excuse-for-dropping-guard-against-illegal-fishing-indonesia-says/.

Goldberg, L., D. Lagomasino, N. Thomas, and T. Fatoyinbo. 2020. "Global Declines in Human-Driven Mangrove Loss." *Global Change Biology* 26: 5844–5855. https://doi.org/10.1111/gcb.15275.

Green, S.J., A.T. White, J.O. Flores, M.F. Carreon, and A.E. Sia. 2003. *Philippine Fisheries in Crisis: A Framework for Management*. Coastal Resource Management Project of the Department of Environment and Natural Resources, Cebu City, Philippines.

Guannel, G., K. Arkema, P. Ruggiero, and G. Verutes. 2016. "The Power of Three: Coral Reefs, Seagrasses and Mangroves Protect Coastal Regions and Increase Their Resilience." *PLoS ONE* 11(7). https://doi.org/10.1371/journal.pone.0158094.

Halimatussadiah, A., D. Widawat, and S. Syahril. 2016. "What Factors Make People Recycle? A Study of Community Waste Banks in Indonesia." *EEPSEA Policy Brief*. http://www.eepseapartners.org/wp-content/uploads/publication/2016-PB9Alin_OnlineEdition.pdf.

Hall, K. 2000. *Impacts of Marine Debris and Oil: Economic and Social Costs to Coastal Communities*. Kommunenes Internasjonale Milj Organisasjon (KIMO). Shetland, U.K.

Harvey, A., T.N. Sujatmiko, V. Rosady, and R. Johnstonnee. 2018. *Assessing the Reliability and Utility of Citizen Science Data for Monitoring and Managing Marine Wildlife and Ecosystems*. Fifth International Marine Conservation Congress. Kuching, Malaysia.

Hoornweg D., P. Bhada-Tata P., and C. Kennedy. 2013. "Environment: Waste Production Must Peak This Century." *Nature* 502 (7473): 615-17. http://doi:10.1038/502615a pmid:24180015.

Horwath, H.T.L. 2017. *Lombok Baseline Demand and Supply, Market Demand Forecasts, and Investment Needs*. http://bpiw.pu.go.id/uploads/20170302_Lombok_Market_and_Demand_Assessment.pdf.

Hutomo, M., and M.K. Moosa. 2005. "Indonesian Marine and Coastal Biodiversity: Present Status." *Indian Journal of Marine Sciences* 34(1): 88-97.

IPCC (Intergovernmental Panel on Climate Change). *Climate Change 2014: Impacts, Adaptation, and Vulnerability*. IPCC.

———. 2018. *Global Warming of 1.5°C: an IPCC Special Report*. IPCC.

IUCN (International Union for Conservation of Nature). 2017. *Conservation Outlook 2017*. Komodo National Park. IUCN. https://www.worldheritageoutlook.iucn.org/explore-sites/wdpaid/67725.

Jambeck, J.R., R. Geyer, C. Wilcox, T.R. Siegler, M. Perryman, A. Andrady, R. Narayan, et al. 2015. "Marine Pollution. Plastic Waste Inputs from Land into the Ocean." *Science* 347(6223): 768-71. http://doi:10.1126/science.1260352.

Kulp, S.A., and B.H. Strauss. 2019. "New Elevation Data Triple Estimates of Global Vulnerability to Sea-level Rise and Coastal Flooding." *Nature Communications* 10(1) 4844. http://doi.org/10.1038/s41467-019-13552-0.

Konar, M., and H. Ding. 2019. *A Sustainable Ocean Economy for 2050: Approximating Its Benefits and Costs*. Secretariat of the High-Level Panel for a Sustainable Ocean Economy, World Resources Institute. https://www.oceanpanel.org/Economicanalysis.

Lamb, J.B., J.A.J.M. van de Water, D.G. Bourne, C. Altier, M.Y. Hein, E.A. Fiorenza, N. Abu, et al. 2017. "Seagrass Ecosystems Reduce Exposure to Bacterial Pathogens of Humans, Fishes, and Invertebrates." *Science* 355 (6326): 731-33. http://doi.org/10.1126/science.aal1956.

Lang, I.A., T.S. Galloway, A. Scarlett, W.E. Henley, M. Depledge, R.B. Wallace, and D. Melzer. 2008. "Association of Urinary Bisphenol A Concentration with Medical Disorders and Laboratory Abnormalities in Adults." *JAMA* 300 (11): 1303-10. http://doi:10.1001/jama.300.11.1303.

Lebreton, L., and A. Andrady. 2019. "Future Scenarios of Global Plastic Waste Generation and Disposal." *Palgrave Communications* 5(1). http://doi.org/10.1057/s41599-018-0212-7.

LIPI (Indonesian Institute of Sciences). 2020. *The Status of Indonesian Coral Reefs 2019*. Jakarta, Indonesia.

Making Oceans Plastic Free Initiative. 2017. "The Hidden Cost of Plastic Bag Use and Pollution in Indonesia." https://makingoceansplasticfree.com/hidden-cost-plastic-bag-use-pollution-indonesia/.

McIlgorm, A., H.F. Campbell, and M.J. Rule. 2009. *Understanding the Economic Benefits and Costs of Controlling Marine Debris in the APEC Region (MRC 02/2007)*.

———. 2011. "The Economic Cost and Control of Marine Debris Damage in the Asia-Pacific Region." *Ocean & Coastal Management* 54(9): 643-51.

McKinsey Center for Business and Environment. 2016. *The Circular Economy: Moving From Theory to Practice*. https://www.mckinsey.com/business-functions/sustainability/our-insights/the-circular-economy-moving-from-theory-to-practice.

Melnychuk, M.C., E. Peterson, M. Elliott, and R. Hilborn. 2016. "Fisheries Management Impacts on Target Species Status." *Proceedings of the National Academy of Sciences* 114(1): 178-83. http://doi.org/10.1073/pnas.1609915114.

Menéndez, P., I.J. Losada, S. Torres-Ortega, S. Narayan, and M.W. Beck. 2020. "The Global Flood Protection Benefits of Mangroves." *Scientific Reports* 10 (4404). http://doi.org/10.1038/s41598-020-61136-6.

MPWH (Ministry of Public Works and Housing). 2020. *Integrated and Sustainable Tourism Development Program*. http://p3tb.pu.go.id/in/main/home

MMAF (Ministry of Marine Affairs and Fisheries). *Resource Management of Mangrove and Seagrass Ecosystem*. Presentation by Sapta Putra at the Workshop on Enhancing Resilience of Coastal and Marine Resources 2019 by Directorate General of Marine Spatial Management, Indonesia: MMAF, 2019.

MoEF (Ministry of Environment and Forestry). *Status of Mangrove Cover, Changes and Quality*. Presentation by Ir. Yuliarto Joko Putranto at the Workshop on Enhancing Resilience of Coastal and Marine Resources 2019, Indonesia: MoEF, 2019.

MoF (Ministry of Finance). 2018. Indonesia's Green Bonds and Green Sukuk Initiative.

Morgan, J.P. 2020. ESG Investing and Development Finance in Emerging Markets. Global Emerging Markets Research, 11 September 2020.

MoT (Ministry of Tourism). *Passenger Exit Survey 2016*. Statistik Profil Wisatawan Mancanegara, Indonesia: MoT, 2016.

Muawanah, U., R. Pomeroy, and C. Marlessy. 2012. "Revisiting Fish Wars: Conflict and Collaboration over Fisheries in Indonesia." *Coastal Management* 40: 279-288.

Murdiyarso, D., J. Purbopusito, J.B. Kauffman, M.W. Warren, S.D. Sasmito, D.C. Donato, S. Manuri, et al. (2015) The Potentials of Indonesian Mangrove Forests for Global Change Mitigation. *Natural Climate Change* 5: 1089-92. http://doi.org/10.1038/nclimate2734.

Northrop, E., M. Konar, N. Frost, and E. Hollaway. 2020. *A Sustainable and Equitable Blue Recovery to the COVID-19 Crisis*. Secretariat of the High-Level Panel for a Sustainable Ocean Economy, World Resources Institute. https://oceanpanel.org/bluerecovery.

OECD (Organisation for Economic Co-operation and Development). 2016. *The Ocean Economy in 2030*. OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264251724-en.

———. 2019. "Relative Effects of Fisheries Support Policies." *Fisheries Policy Brief*. OECD Publishing, Paris.

Oliphant, R. 2017. "Bali declares rubbish emergency as rising tide of plastic buries beaches." *The Telegraph*, December 28, 2017. https://www.telegraph.co.uk/news/2017/12/28/bali-declares-rubbish-emergency-rising-tide-plastic-buries-beaches/.

Pascoe, S., A. Doshi, O. Thébaud, C.R. Thomas, H.Z. Schuttenberg, S.F. Heron, N. Setiasih, et al. 2014. "Estimating the Potential Impact of Entry Fees for Marine Parks on Dive Tourism in South East Asia." *Marine Policy* 47: 147-152.

Pauly, D. and D. Zeller. 2016. "Catch Reconstructions Reveal That Global Marine Fisheries Catches Are Higher than Reported and Declining." *Nature Communications* 7:1-9.

PEMSEA. 2018. "State of Oceans and Coasts: Indonesia." http://pemsea.org/sites/default/files/NSOC_Indonesia.pdf.

Peszko, G. 2020. "Plastics: The Coronavirus Could Reset the Clock." *World Bank* (blog), April 7, 2020. https://blogs.worldbank.org/voices/plastics-coronavirus-could-reset-clock.

Pew Charitable Trusts. 2011. "Managing Fish and Fishing in America's Oceans. Factsheet." https://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2011/08/08/managing-fish-and-fishing-in-americas-oceans.

Pomeroy, R., J. Parks, R. Pollnac, T. Campson, E. Genio, C. Marlessy, E. Holle, et al. 2007. "Fish Wars: Conflict and Collaboration in Fisheries Management in Southeast Asia." *Marine Policy* 31(6): 645-656.

Purba, N.P., D.I.W Handyman, T.D. Pribadi, A.D. Syakti, W.S. Pranowo, A. Harvey, and Y.N. Ihsan. 2019. "Marine Debris in Indonesia: A Review of Research and Status." *Marine Pollution Bulletin* 146, 134-144. https://www.sciencedirect.com/science/article/abs/pii/S0025326X19304254.

Rahmania, R., T. Kepel, T. Arifin, and Y. Yulius. 2020. "Evaluating the Effectiveness of Mangroves Rehabilitation Efforts by Comparing the Beta Diversity of Rehabilitated and Natural Mangroves." IOP Conference Series: Earth and Environmental Science 404 (December): https://doi.org/10.1088/1755-1315/404/1/012070.

Raynaud, J. 2014. *Valuing Plastic: The Business Case for Measuring, Managing and Disclosing Plastic Use in the Consumer Goods Industry*. United Nations Environment Programme, United Nations, Kenya.

Richardson, K., R. Gunn, C. Wilcox, and B.D. Hardesty. 2018. "Understanding Causes of Gear Loss Provides a Sound Basis for Fisheries Management." Marine Policy 96, 278–284. https://doi.org/10.1016/j.marpol.2018.02.021.

Rizal, A., A. Sahidin, and H. Herawati. 2018. "Economic Value Estimation of Mangrove Ecosystems in Indonesia." *Biodiversity International Journal* 2(3): 51.

Rochman, C.M., A. Tahir, S.L. Williams, D.V. Baxa, R. Lam, J.T. Miller, F.C. The, et al. 2015. "Anthropogenic Debris in Seafood: Plastic Debris and Fibers From Textiles in Fish and Bivalves Sold for Human Consumption." *Scientific Reports* 5: 14340-14349. http://doi.org/10.1038/srep14340.

Rosana, D. "A Cash-for-Work Program for Mangrove Planting is Being Carried Out in Ogan Komering Ilir." *Antara News*, November 24, 2020. https://www.antaranews.com/berita/1856484/program-padat-karya-tanam-mangrove-dijalankan-di-ogan-komering-ilir.

Sea Around Us (database). Fisheries, Ecosystems, and Biodiversity. Vancouver. http://www.seaaroundus.org/data/#/eez.

SEAFDEC (Southeast Asian Fisheries Development Center). 2019. Fisheries Country Profile of ASEAN Member States. http://www.seafdec.org/countryprofiles/.

Sherrington, C. 2016. *Plastics in the Marine Environment Report*. Eunomia Research & Consulting Ltd., Bristol, UK. https://www.eunomia.co.uk/reports-tools/plastics-in-the-marine-environment/.

Shuker, I.G., and C.A. Cadman. 2018. *Indonesia Marine Debris Hotspot Rapid Assessment (Synthesis Report)*. World Bank Group, Washington, D.C.

Siry, H.Y. 2011. "In Search of Appropriate Approaches to Coastal Zone Management in Indonesia." *Ocean & Coastal Management* 54(6):469-477. http://doi.org/10.1016/j.ocecoaman.2011.03.009.

Sjafrie, N.D.M., U.E. Hernawan, B. Prayudha, I.H. Supriyadi, M.Y. Iswari, Rahmat, K. Anggraini, et al. 2018. *Seagrass Status in Indonesia or Status Padang Lamun Indonesia*, 2018. Puslit Oseanografi, Indonesian Institute of Sciences, Jakarta.

Spalding, M.D., L. Burke, SA Wood, J. Ashpole, J. Hutchison, P. Ermgassen. 2017. "Mapping the Global Value and Distribution of Coral Reef Tourism." *Marine Policy* 82 (August), 104-113. http://doi.org/10.1016/j.marpol.2017.05.014.

Stanford, R.J., B. Wiryawan, D.G. Bengen, R. Febriamansyah, and J. Haluan. 2013. "Exploring Fisheries Dependency and its Relationship to Poverty: A Case Study of West Sumatra, Indonesia." *Ocean and Coastal Management* 84 (November):140-152. http://doi.org/10.1016/j.ocecoaman.2013.08.010.

Sumaila, U.R., N. Ebrahim, A. Schuhbauer, D. Skerritt, Y. Li, H.S. Kim, T.G. Mallory, et al. 2019. "Updated Estimates and Analysis of Global Fisheries Subsidies." *Marine Policy* 109 (November): 103695. http://doi.org/10.1016/j.marpol.2019.103695.

Suryana, R. "The Covid-19 Pandemic Gives the Sea Time to Rest." *Republika Online*, June 18, 2020. https://republika.co.id/berita/qc45md428/pandemi-covid19-memberi-laut-waktu-istirahat.

Swan, S.H., K.M. Main, F. Liu, S.L. Stewart, R.L. Kruse, A.M. Calafat, C.S. Mao, et al. 2005. "Decrease in Anogenital Distance Among Male Infants with Prenatal Phthalate Exposure." *Environmental Health Perspectives* 113(8): 1056-61. http://doi.org/10.1289/ehp.8100.

Swan, S.H. 2008. "Environmental Phthalate Exposure in Relation to Reproductive Outcomes and Other Health Endpoints in Humans." *Environmental Research* 108(2):177-84. http://doi.org/10.1016/j.envres.2008.08.007.

Takehama, S. 1989. *Estimation of Damage to Fishing Vessels Caused by Marine Debris, Based on Insurance Statistics*. Edited by R.S. Shomura and M.L. Godfrey. Proceedings of the Second International Conference on Marine Debris, Honolulu, Hawaii, 2–7 April 1989, US Department of Commerce (1990), 792-809.

Taylor, L. 2018. "Clean-up Events Shed Light on Indonesia's Waste Crisis." *Jakarta Post*, February 28, 2018. http://www.thejakartapost.com/life/2018/02/28/clean-up-events-shed-light-on-indonesias-waste-crisis.html.

Trucost. 2016. *Plastics and Sustainability: A Valuation of Environmental Benefits, Costs and Opportunities for Continuous Improvement*. The American Chemistry Council, Washington, D.C. https://plastics.americanchemistry.com/Plastics-and-Sustainability.pdf.

Twining-Ward, L., W. Li, E. Wright, and H.M. Bhammar. 2018. *Supporting Sustainable Livelihoods Through Wildlife Tourism (English)*. Tourism for Development knowledge series. World Bank Group, Washington, D.C. http://documents.worldbank.org/curated/en/494211519848647950/Supporting-sustainable-livelihoods throughwildlife-tourism.

UN Environment, ISU, ICRI, and Trucost. 2018. *The Coral Reef Economy: The Business Case for Investment in the Protection, Preservation and Enhancement of Coral Reef Health*. https://wedocs.unep.org/bitstream/handle/20.500.11822/26694/Coral_Reef_Economy.pdf?sequence=1&isAllowed=y.

UNESCO (United Nations Educational, Scientific and Cultural Organization). 2013. *Adoption of Retrospective Statements of Outstanding Universal Value (WHC-13/37.COM/8E)*. World Heritage Committee. 37th session, June 2013. https://whc.unesco.org/en/decisions/4964.

Unsworth, R.K.F., S.L. Hinder, O.G. Bodger, L.C. Cullen-Unsworth. 2014. "Food Supply Depends on Seagrass Meadows in the Coral Triangle." *Environmental Research Letters* (September): https://doi.org/10.1088/1748-9326/9/9/094005.

Unsworth R.K.F., R. Ambo-Rappe, B.L. Jones, Y.A. La Nafie, A. Irawan, U.E. Hernawan, A.M. Moore, et al. 2018. "Indonesia's Globally Significant Seagrass Meadows are Under Widespread Threat." *Sci Total Environ* 634 (September): 279-86. http://doi.org/10.1016/j.scitotenv.2018.03.315.

UNWTO (World Tourism Organization of the United Nations). 2004. *Indicators of Sustainable Development for Tourism Destinations: A Guidebook*. Madrid: UNWTO.

———. 2011. T*ourism Towards 2030 / Global Overview - Advance Edition Presented at UNWTO 19th General Assembly - 10 October 2011*, UNWTO.

———. 2019. *World Tourism Barometer*. Madrid: UNWTO (version 21/01/19), 2019, UNWTO.

———. 2020. *World Tourism Barometer*. Vol. 18(7): December 2020, UNWTO.

———. "World Tourism Organization International Network of Sustainable Tourism Observatories (UNWTO INSTO)." http://insto.unwto.org/observatories.

van Wesenbeeck, B.K., T. Balke, P. van Eijk, F. Tonneneijck, H.Y. Siry, M.E. Rudianto, J.C. Winterwerp. 2015. "Aquaculture Induced Erosion of Tropical Coastlines Throws Coastal Communities Back into Poverty." *Ocean & Coastal Management* 116. http://doi.org/10.1016/j.ocecoaman.2015.09.004.

Waddell, S. (2012). "Property Rights for Natural Resources Management in Indonesia: Have they Been Ruled Unconstitutional?" *Indonesia Law Review* 2 (May-August). http://ilrev.ui.ac.id/index.php/home/article/view/17/pdf_79.

World Bank. 2012. *What a Waste: A Global Review of Solid Waste Management*. Washington, D.C.: World Bank.

———. 2017a. *The Potential of the Blue Economy: Increasing Long-term Benefits of the Sustainable Use of Marine Resources for Small Island Developing States and Coastal Least Developed Countries*. Washington, D.C.: World Bank. https://openknowledge.worldbank.org/handle/10986/26843.

———. 2017b. The Sunken Billions Revisited: Progress and Challenges in Global Marine Fisheries. Environment and Sustainable Development series. Washington, D.C.: World Bank. https://doi.org/10.1596/978-1-4648-0919-4.

———. 2018. "Sovereign Blue Bond Issuance: Frequently Asked Questions." October 29, 2018. https://www.worldbank.org/en/news/feature/2018/10/29/sovereign-blue-bond-issuance-frequently-asked-questions.

———. 2019a. *Indonesia Economic Quarterly: June 2019: Oceans of Opportunity*. Jakarta: World Bank.

———. 2019b. *Project Appraisal Document for Improvement of Solid Waste Management to support Regional and Metropolitan Cities*. Washington, D.C.: World Bank.

———. 2020a. Rebuilding Tourism Competitiveness: Tourism Response, Recovery and Resilience to the COVID-19 Crisis. World Bank, Washington, DC. http://hdl.handle.net/10986/34348

———. 2020b. Findings from COVID-19 Business Pulse Survey in Indonesia. Round 1 (May-June 2020).

———. 2020c. *Indonesia Economic Prospects: December 2020: Towards a Secure and Fast Recovery*. Jakarta: World Bank. https://www.worldbank.org/en/country/indonesia/publication/indonesia-economic-prospect.

World Economic Forum. 2020. Radically Reducing Plastic Pollution in Indonesia: A Multistakeholder Action Plan and National Plastic Action Partnership, Geneva: World Economic Forum. https://globalplasticaction.org/wp-content/uploads/NPAP-Indonesia-Multistakeholder-Action-Plan_April-2020.pdf.

World Surf League. "Corona Bali Protected Welcomes World's Best Surfers to Keramas." May 26, 2018. http://www.worldsurfleague.com/posts/327898/corona-bali-protected-welcomes-worlds-best.

WTTC (World Travel and Tourism Council). "WTTC Data Gateway." https://wttc.org/Research/Economic-Impact/Data-Gateway

Yang, W. 2020. "Conservationists Concerned by PPE Showing up at Beaches, Nature Trails." *The New Paper*, July 27, 2020. https://www.tnp.sg/news/singapore/conservationists-concerned-ppe-showing-beaches-nature-trails.

Deck and bungalow at one of the tourist beach in Papua, Indonesia. Photo: © André Rodrigues Aquino

Disclaimer:
This report is a product of the staff of the International Bank for Reconstruction and Development/The World Bank. The findings, interpretations, and conclusions expressed in this paper do not necessarily reflect the views of the Executive Directors of the World Bank or the governments they represent. The World Bank does not guarantee the accuracy of the data included in this work. The boundaries, colors, denominations, and other information shown on any map in this work do not imply any judgment on the part of the World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

Copyright Statement:
The material in this publication is copyrighted. Copying and/or transmitting portions or all of this work without permission may be a violation of applicable law. The International Bank for Reconstruction and Development/The World Bank encourages dissemination of its work and will normally grant permission to reproduce portions of the work promptly.

For permission to photocopy or reprint any part of this work, please send a request with complete information to the
Copyright Clearance Center, Inc.,
222 Rosewood Drive,
Danvers, MA 01923, USA,
telephone 978-750-8400,
fax 978-750-4470,
http://www.copyright.com/.

All other queries on rights and licenses, including subsidiary rights, should be addressed to the Office of the Publisher,
The World Bank,
1818 H Street NW,
Washington, DC 20433, USA,
fax 202-522-2422,
e-mail pubrights@worldbank.org.

Suggested Citation:
World Bank (2021). Oceans for Prosperity: Reforms for a Blue Economy in Indonesia. The World Bank, Washington, D.C.