Kementerian PPN/ Bappenas

OECD

BLUE ECONOMY

DEVELOPMENT FRAMEWORK FOR INDONESIA'S ECONOMIC TRANFORMATION

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Blue Economy Development Framework for Indonesia's Economic Transformation

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FOREWORD

Blue Economy Development Framework for Indonesia's Economic Transformation provides a solid basis for future blue economy policy planning and implementation in Indonesia. As an archipelagic country with an ocean covering more than two-thirds of the country's area, building a sustainable ocean economy is vital for Indonesia. Indonesia's strategic position has also provided the potential for Indonesia in influencing political and economic stability in the region, and taking leadership in the sustainable ocean development. Nevertheless, these needs alignment with its current threats and future challenges, including coastal and natural resource degradation, climate change, and ocean pollution. A sustainable and prosperous ocean economy could contribute to higher revenue from ocean-based activities that could channel back into ocean conservation, encourage sustainable livelihoods for coastal communities, and preserve ocean biodiversity with a recovering ocean and coastal ecosystem.

The formulation of the framework applies an integrated and comprehensive approach by taking into account the huge potential of ocean resources in Indonesia, the needs to increase synergies among actors and sectors, as well as several opportunities and challenges that arise in the endeavor to achieve integrated ocean management.

The framework also elaborates the relevant direction of the Indonesia's National Long-term Development Planning (RPJPN) 2005-2025, particularly to realize Indonesia as a sovereign, advanced and resilient archipelagic country through the implementation of sustainable development supported by (i) maritime awareness among people and government; (ii) the development of quality human resources, and ocean knowledge and technology; (iii) the management of national ocean territory; (iv) the development of ocean industry including ocean transportation, maritime industry, fishery, marine tourism, ocean-based energy and mineral resources, as well as ocean structure and services; (v) the reduction of ocean disaster, degradation and pollution; and (vi) the development of economic activities to create jobs and increase prosperity for poor households in coastal areas. The scope of the framework also acknowledges the direction outlined in the Indonesia's National Medium-Term Developing Plan (RPJMN) 2020-2024 that a well-managed ocean-related sector is a key to achieving Indonesia's development agenda.

This document also supports the global initiative in achieving the 2030 Agenda on Sustainability Development Goals, especially goal 14 on the "conservation and sustainable use of the oceans, seas and ocean resources for sustainable development", one of which is indicated by an increase in economic benefits from the sustainable use and conservation of ocean resources (SDG 14.7).

Finally, our endeavor to balance the conservation and sustainable use and management of ocean and coastal resources is expected to create welfare for the Indonesian people, and contribute towards global transition to a more sustainable ocean economy and prosperity. We also thank OECD for the support in the formulation of the framework. We look forward to future collaboration with development partners for the formulation of blue economy development road map for Indonesia.

Suharso Monoarfa
Minister of National Development Planning/Head of BAPPENAS

FOREWORD

Oceans provide resources that can derive more value-added goods and services for prosperity. Oceans can support the livelihood of billions of people from traditionally exploited ocean resources, either living resources or non-living resources, as well as tourism, research, and shipping activity. Indonesia is the country with the most significant ocean economy in ASEAN. Indonesia's fishery and aquaculture employ around 5.23 million fishers and fish farmers in 2019 and 1.25 million seafarers in 2021. The added value of the fishery sector in Indonesia has reached about USD 27 billion. There are also numerous opportunities to strengthen Indonesia's marine-based economy, particularly in new and emerging ocean-based industries like renewable energy, biotechnology, and ocean-based research and education.

A comprehensive strategy is required to manage and utilize Indonesia's vast ocean resources and marine-based economic activities for the welfare of all levels of society. This is especially important given that unsustainable practices of ocean economy have resulted in environmental challenges and marine degradation, which can have an impact on coastal livelihood and the economy. Therefore, transitioning to a blue economy provides an opportunity to boost GDP growth while also achieving the Sustainable Development Goals (SDGs) by promoting sustainable consumption and production, sustainable industrialization, environmental and biodiversity preservation, and social inclusivity through poverty reduction and job creation.

The Blue Economy Development Framework for Indonesia's Economic Transformation promotes better policy formulation and effective blue economy implementation in Indonesia. This framework explains the opportunities of a diverse range of marine and coastal-based economic activities while promoting long-term development, research, and innovative advances in the blue economy. This framework also identifies implementation challenges, such as limited institutional and technological capacities, as well as social and economic trade-offs associated with the transition to a blue economy. It also emphasizes the importance of integrating various funding sources and partnerships to support innovation in the blue economy. Such partnerships and collaborations can help to strengthen the implementation of the blue economy by providing new data, project initiatives, evidence, and extensive application to Indonesia's current ocean-based economy.

This document is the first attempt to build a framework for Indonesia's sustainable blue economy development concept. It will be an essential reference for the planning and implementing the blue economy-related policy and programs and for building collaboration among relevant stakeholders in Indonesia.

Finally, we highly appreciate the solid collaboration between Bappenas and OECD in preparing the framework. We hope this document could be the primary reference to further developing the blue economy concept and become the catalysts for stakeholders' collaboration to achieve long-term ocean prosperity for the well-being of all people in every part of Indonesia.

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Deputy Minister for Economic Affairs, Ministry of National Development Planning/BAPPENAS

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EXECUTIVE SUMMARY

The earth's oceans power the global systems that maintain the planet livable for humanity. It possesses enormous resources and potentials for generating economic growth, employment, and innovation. How we manage and use the resources is crucial for humanity's survival and for reducing the global implications in the next decades, such as food security, climate change, and energy availability. Although the ocean has immense potentials for solving these problems, it is currently under stress due to overfishing of the world's fish populations, ocean acidification, marine pollution, and climate change. Hence, realizing the ocean's full potentials is deemed sensible for sustainable economic growth and welfare.

This document is the first joint work by the OECD and BAPPENAS to provide a framework for Indonesia's sustainable blue economy development concept. The National Medium-Term Development Plan (RPJMN) recognizes that a well-managed ocean-related sector is critical to fulfilling Indonesia's development goals. The framework intends to contribute to Indonesia's integrated ocean management and development. Integrated policy approaches are required to ensure policy coherence, identify and manage trade-offs among ocean-related sectors, and capitalize on policy synergies that benefit many sectors. The scope of blue economy in this document is built based on economic realities and the latest accessible data, and it serves as a supplement to evidence-based policymaking. It also serves as a source of motivation for all stakeholders concerned.

The blue economy has the potential to transform and diversify Indonesia's economy. Blue economy can also provide the solution to the impact from climate change in the marine sector through low-carbon ocean development, sustainable marine tourism, and marine energy development. Within the context of Indonesia's economic transformation, the blue economy covers the non terrestrial resource management and utilization within the green economy framework.

Marine living and non-living products are two sources of industrial development in blue economy. Developing marine-based primary sectors can fulfill industrial raw resources, product quality, and add value to manufacturing fisheries. The marine non-living sector includes sources of ocean economy other than marine-based sectors. This includes the chemical, shipbuilding, and salt industries. The maritime sectors benefit from appropriate capture fisheries and aquaculture facilities. Depending on the market value of the fresh captured fish in international market, fresh fish export may become an option to be expanded. Another option is to promote the development of marine-based processing close to its source. This will provide more added-value and local job creation. Encouraging greater engagement in export and global value chain (GVC) is crucial. Allowing foreign investment in the marine-based industry may increase participation in global value chain, and higher added-value of marine-based products. All of these factors are important for the fisheries industry since demand is increasing due to population expansion, while at the same time people, particularly in coastal areas, need to improve their livelihood.

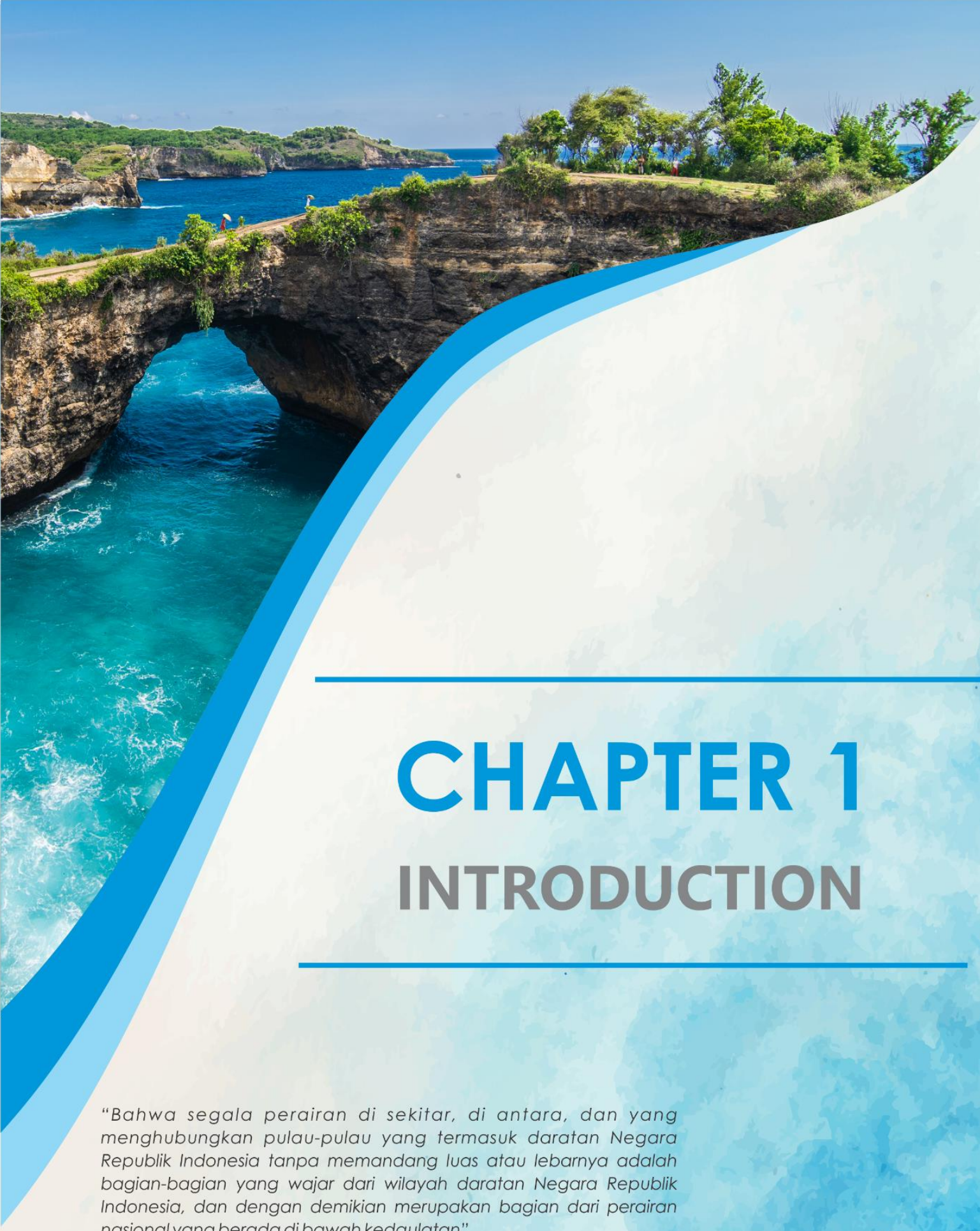
Other ocean-based sectors, such as tourism, trade, transportation, and logistics are also an important of blue economy. As an archipelagic country, these sectors support local economic development and employment creation including in small and remote islands. These sectors also promote the growth of new economic growth center in many parts in Indonesia.

Aside from the huge ocean resources, the development of blue economy in Indonesia still face some challenges related to water pollution including the one brought through rivers (terrestrial based activities), ocean waste, endangerment of ocean fauna, and environmental degradation. In addition, moving commodities across islands, let alone to export markets, is still challenging in Indonesia.

Sound policies and regulations are essential for tackling those challenges. The laws and regulations must be non-discriminatory, less restrictive, and enforced transparently and consistently. At the same time, the quality of institution is critical to uplift law enforcement, reduce gaps in procedures, and increase efficiency. The policy also needs to take into account the importance of increasing people's and businesses' awareness towards sustainable ocean management.

The framework of blue economy development outlined in this document also suggest for Indonesia to utilize the ocean resources to develop renewable energy, bio-economy and biotechnology, research, and education. These are the future-proofing sectors for Indonesia's blue economy. The development of these sectors, however, requires better enabling environment that incentivizes new investment in the sectors. This will allow the creation of new markets for low- to no-emission economic activities and leveraging investment from multipurpose infrastructure. The recently expanding ocean research and innovation needs also to be sustained with sufficient funding, and support for improving conservatory practices and economic productivity. Improvement in education and training system is also outmost important for providing skilled talents. With the rapid technology cycle in the blue economy, businesses are also required to keep up with changing market demands and dynamics.

All areas covered in this document are also expected to provide references for better recovery post COVID-19 pandemic, a model for building economic resilience and advancing economic transformation, as well as contribution to a global effort to accelerate the transition to a more sustainable blue economy for the benefit of the people and future generation.



CHAPTER 1
INTRODUCTION

"Bahwa segala perairan di sekitar, di antara, dan yang menghubungkan pulau-pulau yang termasuk daratan Negara Republik Indonesia tanpa memandang luas atau lebarnya adalah bagian-bagian yang wajar dari wilayah daratan Negara Republik Indonesia, dan dengan demikian merupakan bagian dari perairan nasional yang berada di bawah kedaulatan"

"That all waters around, between, and connecting the islands which are part of the land area of the Republic of Indonesia regardless of the extent or width are natural parts of the land territory of the Republic of Indonesia, and thus are part of the national waters under the absolute sovereignty of the Republic of Indonesia"

Djuanda Declaration 1957

Indonesia's ocean economy generates significant wealth and employment, and has the capacity to do so in the future as an archipelagic country with over 17,000 islands and the world's sixth largest exclusive economic zone (EEZ). Indonesia's waters offer economic opportunities in a variety of sectors, including marine living and non-living resources, industry, tourism, transportation, and logistics. Indonesia's utilization of ocean economies, on the other hand, is limited to conventional sectors, with marine fishing, aquaculture, and fish processing accounting for 83 percent of total value added. Additionally, low sustainability in harvesting techniques and tourism, pollution, and the impact of climate change are found, resulting in marine ecosystem deterioration, hurting the health of marine ecosystems, and affecting critical economic sectors such as tourism and fisheries.

COVID-19 pandemic has left the Indonesian economy into disarray and exposed structural issues. Numerous ocean-based sectors have been severely impacted, and tourism is projected to be particularly hard struck. As a result of COVID-19's implications, Indonesia must strengthen the resilience and sustainability of its ocean-based sectors in order to more firmly establish a path of sustainable and equitable growth. Blue recovery, in particular, has the potential to transform both established and emerging ocean-based sectors into catalysts for long-term shared prosperity.

Indonesia’s endeavor to recover better will also be complemented by initiating economic transformation. The economic transformation will capitalize on the country's maritime strengths by incorporating better ocean resource management to leverage the blue economy development for increasing environmental sustainability as well as building competitive, innovative, and sustainable maritime sectors. The economic transformation is expected to help boost employment, productivity, and value added.

Blue Economy Development Framework for Indonesia’s Economic Transformation

This document lays the groundwork for Indonesia's transition to a blue economy. It provides a vision and strategy for developing Indonesia's ocean and marine-based sectors. It will also serve as the policy framework for the social, environmental, and economic sustainability of Indonesia's marine-based sectors. Indonesia's subsequent attempts should be guided by the development of a road map for executing this blue economy framework.

For Indonesia, the transition towards blue economy is expected to reduce the economy's reliance on the extractive activities by serving as a model for sustainable marine-based industry development. The framework outlined in this document can also be used to guide policies and program for achieving Indonesia’s 2045 vision, including to escape from the middle-income trap before 2045. Additionally, the Indonesia’s blue economy development framework will contribute to enrich global effort in transitioning towards a more sustainable blue economy through the conservation and responsible use of ocean and coastal resources that benefit people and future generation.

Content and Structure

The structure of this chapter will be continued with Chapter 2 illustrating the scope of Indonesia's blue economy. It begins with an outline of the issues Indonesia faces following the COVID-19 pandemic, and the government's initiative to revamp Indonesia's economic transformation strategy. Sustainable Development Goals (SDGs), including their target and objectives for ocean sustainability will also be covered in Chapter 2. The final section will discuss the significance of the blue economy for Indonesia's economic change and local economic development.

Chapter 3 focuses on the sustainable blue economy and discusses the key components of sustainability. This chapter also examines the concepts and perspectives of ocean economy, ocean-based industry, and sustainable ocean economy. The key features and sectors of the blue economy are also elaborated, including the sectors that delve into the blue economy's conventional and the growing sectors. Additionally, this chapter discusses the current state of the blue economy and highlights some good practices from other countries that have successfully implemented the blue economy. The final section of the chapter discusses the enabling ecosystem for Indonesia's blue economy development, including policies and regulations, Indonesia's blue economy commitments, and institutional frameworks.

Chapter 4 covers an economic analysis of Indonesia's blue economy prospects, focusing on the traditional, emerging, and future sectors. Marine life, marine non-living, processing industry, tourism, trade, transportation, and logistics are all classified as traditional sectors. Renewable energy, bio-economy, and biotechnology, as well as research and education, are among the emerging and future sectors. This chapter also discusses the environment and resource management.

Finally, Chapter 5 outlines a path forward for this framework of the blue economy. This chapter details upcoming milestones. This framework will serve as the foundation for the development of an Indonesian blue economy roadmap. Additionally, it discusses several other blue economy-related events for which Indonesia must prepare in the future.

CHAPTER 2

DEVELOPMENT CONTEXT

"...we will maintain the health and sustainability of our oceans and coastal resources for the benefit of food security, poverty eradication, preservation of traditional culture and knowledge, conservation of biodiversity and facilitation of trade and investment"

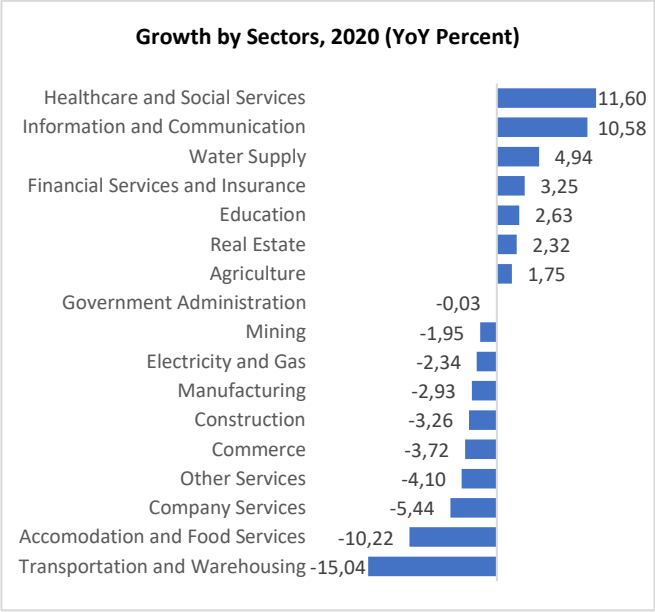
2013 APEC Indonesia Leaders' Declaration

2.1 COVID-19 Crisis and Economic Challenge for Indonesia

Indonesia has made remarkable strides in economic growth and poverty reduction since the 1997 Asian financial crisis, moving from lower middle-income to upper middle-income country status in 2019 (World Bank, 2020a). Since 2000, GDP growth rates have maintained a relatively high and stable average of 5.3 percent and the share of individuals living below the national poverty line halved from 19.1 percent of the population to 9.4 percent in 2019 (OECD, 2018a; World Bank, 2020b). Natural resources have played a significant role in the country's economic development, with a mix of land and ocean-based sectors such as mining, agriculture, forestry and fishing accounting for 20 percent of GDP and 50 percent of exports in 2017 (OECD, 2019a).

The COVID-19 pandemic has devastated global economies, including Indonesia. This crisis could jeopardize Indonesia's recent development gains and is likely to cause disproportionate health and economic impacts on the poor and the vulnerable population. In 2020, Indonesia's economy contracted by 2.07 percent, the first contraction since the Asian financial crisis in 1997/1998. Various sectors contracted, including manufacturing and trade sectors, the first and second largest contributors to Indonesia's GDP, contracted by 2.93 percent and 3.75 percent respectively. On the other side, healthcare services and social activities grew by 11.60 percent (Figure 2.1).

Figure 2.1 Sectors Growth, by Sectors (2020, YoY percent)



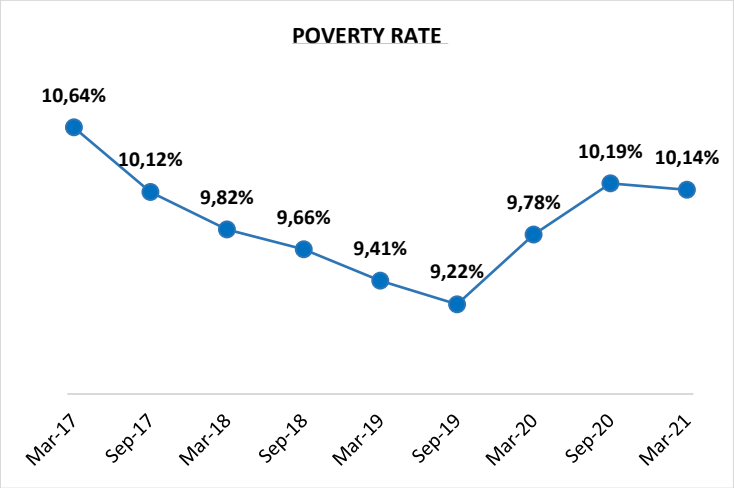
Source: BPS

The COVID-19 pandemic has hit hard many ocean economy sectors, due to both the high fatality rate in Indonesia and the international travel restrictions. Fisheries and aquaculture have already been severely impacted by lower demand and disrupted supply chains (OECD, 2020a). Early statistics also show the average monthly income of fishers fell sharply to around a third of their usual earnings (Parama, Rahman and Gorbiano, 2020).

The pandemic has also impacted socio economic conditions in Indonesia. The unemployment rate increased by 1.26 percentage points in 2 years from 5.23 percent in August 2019 to 6.49 percent in August 2021. This means about 2.0 billion workers lost their job. More than 24 million workers had also experience reduction in working hours. This further decreased Income across all groups, shown

by a decrease in wage rates, both in real and nominal terms, and increase the poverty rate to the level of three years ago, which is around 10.14 percent (Figure 2.2).

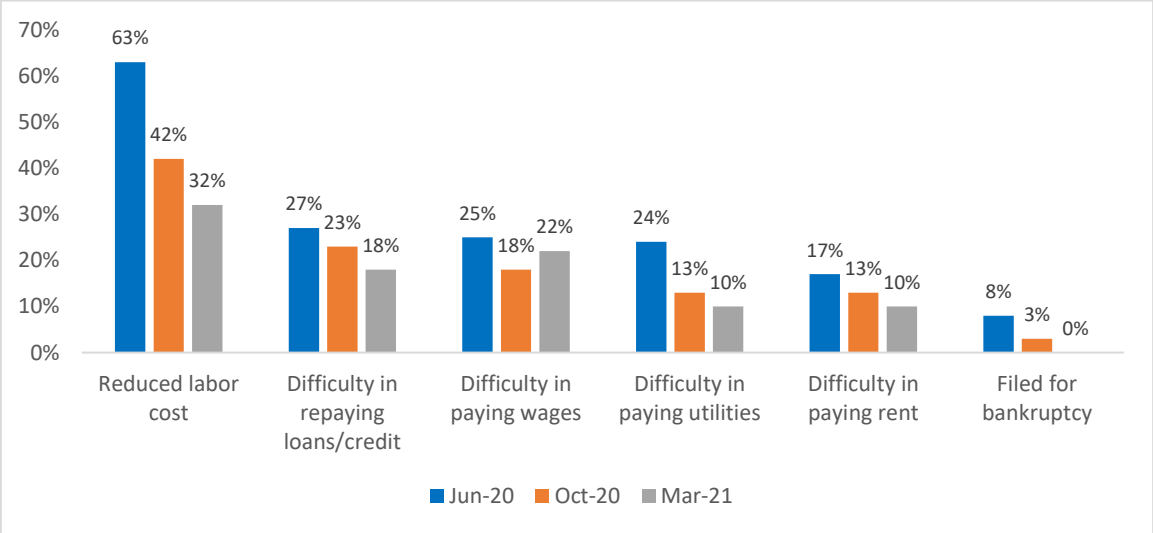
Figure 2.2 Indonesia Poverty Rate



Source: BPS

Business sectors also suffered during the COVID-19 pandemic. Many businesses went out of business. Those that survived the pandemic did so by reducing the number of employees, cutting salary costs, and reducing work shifts. The World Bank Business Pulse Survey found that 9 percent of companies declared bankruptcy while 86 percent experienced a decline in sales in June 2020. Nevertheless, in March 2021, fewer firms experienced financial pressures to cover most operational cost (Figure 2.3).

Figure 2.3 Share of Firms that Experienced Financial Pressures



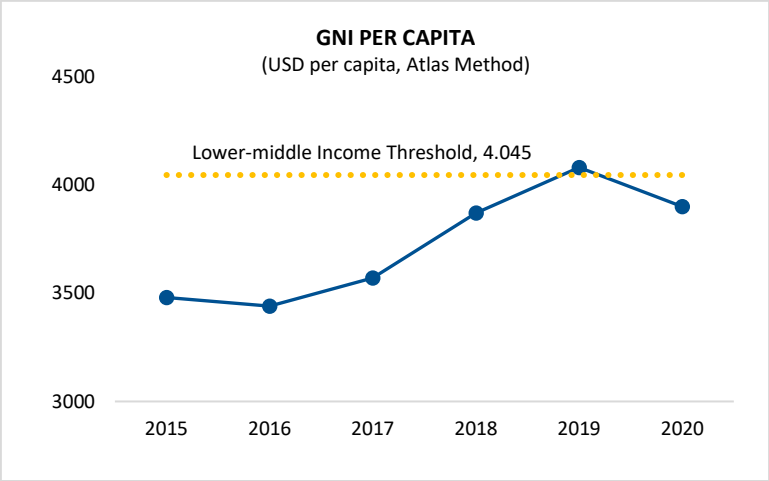
Source: World Bank, 2021a

2.2 Transformation of Indonesia for Inclusive and Sustainable Development

Indonesia has enjoyed several episodes of high economic growth in the past decades and managed to become an upper-middle income country in 2019, before falling back to lower-middle income group due to the COVID-19 pandemic (Figure 2.4). However, a large proportion of Indonesia's population are

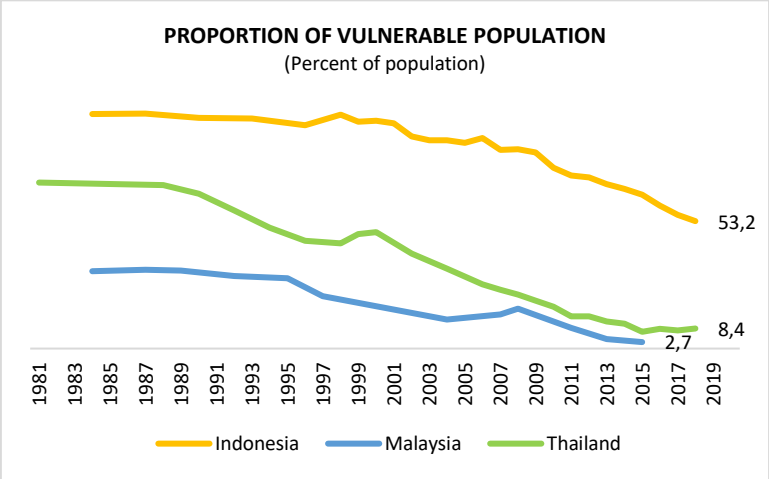
still poor or near poor. About 140 million (53 percent) of Indonesia's population still earn less than USD 5.5 per day in 2019, much higher than Malaysia (3.7 percent) in 2015 and Thailand (8.4 percent) in 2019 combined (Figure 2.5). Further, development gains have been unequally distributed and are geographically concentrated despite the overall fall in poverty levels. The country's GINI coefficient increased from 30.2 in 2000 to 39.0 in 2018 (World Bank, 2020c). A development divide persists between the western and eastern regions of the country. For example, Java Island contributes almost 60 percent of the country's national GDP while representing a small part Indonesia (7 percent of Indonesia's landmass).

Figure 2.4 Indonesia's GNI Per Capita



Source: World Development Indicators

Figure 2.5 Proportion of Vulnerable Population

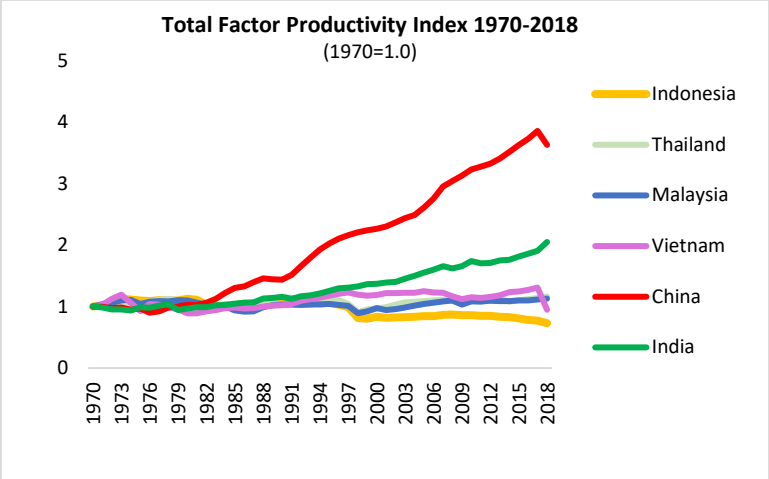


Source: World Development Indicators

COVID-19 pandemic has further exposed structural issues in the Indonesian economy, especially compared to the peer countries. First, in terms of productivity, the pandemic has increased the gap between Indonesia and other countries. Indonesia's total factor productivity is now at the lowest since the downward trend that started in 1998 (Figure 2.6). Second, Indonesia's incremental capital output ratio (ICOR) is higher than peer countries indicating lowest economic efficiency (Figure 2.7). Third, the proportion of innovation and research and development (R&D) activities are negligible (only 0.25 percent of GDP). Fourth, extractive sectors are dominating the economy, as indicated by its proportion

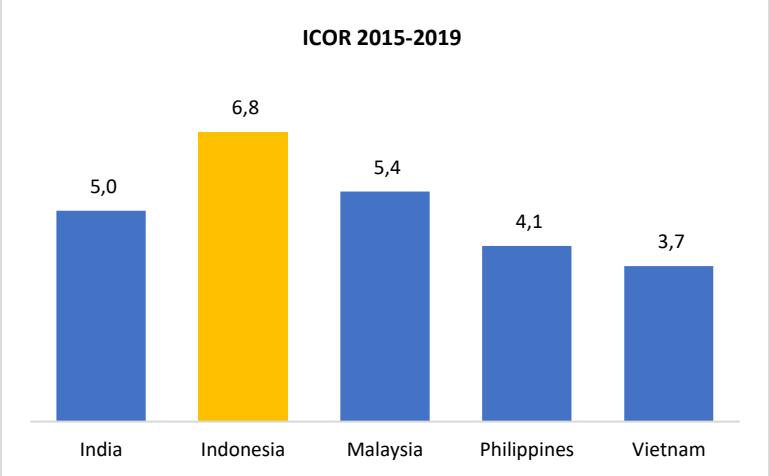
of the export figures. Next, income inequality is still high as 1 percent of the population controls 37 percent of national assets, while 10 percent controls 66 percent (Credit Suisse, 2021). Finally, the pandemic has exposed Indonesia's rigid fiscal structure as revenue has declined but the obligations to finance the economy have increased. The tax ratio has declined for the last 8 years and it is now at the lowest in the last 50 years.

Figure 2.6 Total Factor Productivity Index of Indonesia and Peers



Source: APO, 2020

Figure 2.7 ICOR 2015-2019 of Indonesia and Peers



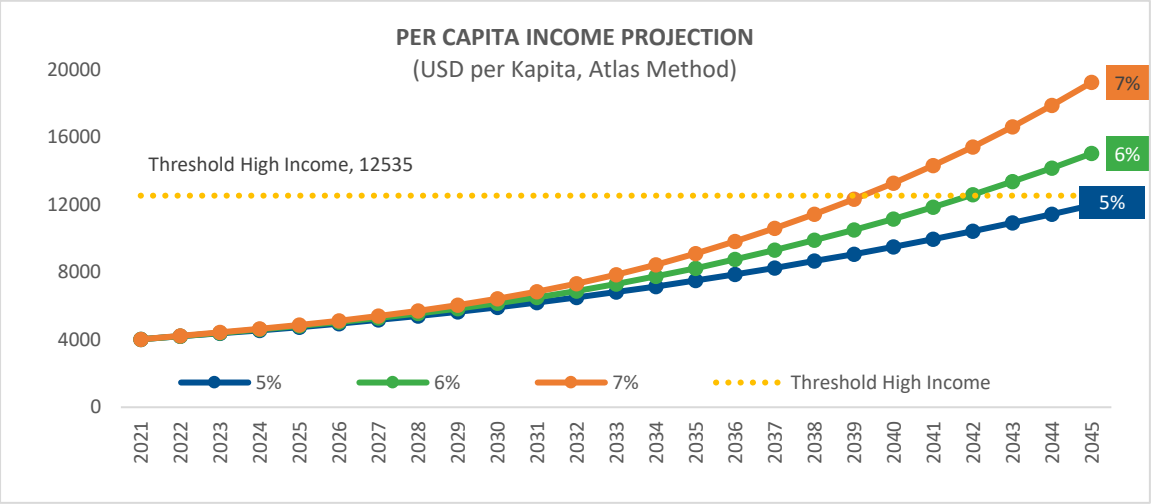
Source: World Development Indicator

Indonesia should also account current global trends for its development path, mostly triggered by the impact of COVID-19 pandemic. The pandemic has made significant changes in global interaction, communication, and cooperation. As the pandemic put barriers for people to travel between countries, they manage to find other ways to do collaboration by using borderless technology. Countries need to adjust towards a digitalized, contactless, green, and sustainable economy. Ideas, knowledge, and various non-physical outputs, including money, can be transferred just in a second. People also change the way they consume and force smaller businesses to adopt digital technology. The way companies do production and collaborate to make goods and serve the world are also changing. The use of automation in production is expected to accelerate.

These trends prompt the Indonesian people to increase their capability to respond and participate in digital transformation. At the same time, it is a challenge for Indonesia to ensure its people to adopt and become main players in the digitalization era. As Indonesia still relies on many labor-intensive sectors, various jobs are vulnerable to being replaced by automation. On the other hand, the use of the Internet of Things (IoT) can increase the productivity. To cope with these trends, Indonesia need to expand the information and communication technology (ICT) infrastructure and the quality, as well as providing supportive and sound policies in order to improve the enabling ecosystem for digital transformation.

At the same time, the global awareness to keep the world safe and healthy has increased. Many countries have committed to adopt sustainable principles in various economic activities that aim to meet people's needs while also managing natural resources and the environment to be not depleted and remain available for future generations. While it is still challenging for a developing country to embrace green growth concepts, Indonesia has made various green economy commitments. Moreover, since Indonesia is the largest archipelagic country in the world, maintaining ocean and adopting sustainable concepts in its economic activities become crucial.

Figure 2.8 Per Capita Income Projection



Source: Bappenas's Calculation

The global dynamic post COVID-19 pandemic has also put challenges for Indonesia to devise better recovery strategies while maintaining its course towards the goal of becoming a developed country before 2045, a hundred year after its independence (Bappenas, 2020). The pre-pandemic scenario requires Indonesia to grow by, on average, 5.7 percent per annum to become a developed country in 2036. However, the pandemic has put a brake to that ambition and brought higher requirement for Indonesia to fulfill its ambition. The scenario has changed. Now, Indonesia has to grow by on average of 6 percent per annum after the pandemic to escape the middle-income trap by 2043 (Figure 2.8).

This post-pandemic scenario requires Indonesia to undergo significant structural changes. Indonesia should step up its efforts from business-as-usual scenario. The structure of the Indonesian economy must be improved and should focus on higher productivity. The economic activities must shift from relying too much on extractive sector and cheap labor force to those that create values and rely on the brain.

To fulfill the 2045 vision, the Government of Indonesia through the Ministry of National Development Planning/BAPPENAS is preparing a Design for Indonesia's Economic Transformation Strategies. Six key

strategies have been devised to guide medium- and long-term roadmaps for Indonesia to achieve a high and sustainable productivity (RPJPN and RPJMN). The six key strategies are:

1. Strengthening Competitive Human Resources

The development of human resources is the most important part in economic development since humans are both development actors and the main beneficiaries of development. Strengthening the capacity and capability of human resources to become healthy, smart, and innovative is, hence, important for Indonesia's economic transformation.

2. Increasing Economic Productivity

Increasing economic productivity plays an important role in achieving a high and sustainable economy. Productivity must increase in all sectors (within sectors), along with a shift in the economic structure towards sectors with high added value (between sectors). This can be achieved by increasing labor productivity, modernizing agriculture, industrialization, strengthening tourism, as well as strengthening micro, small and medium enterprises (MSMEs) and creative economy.

3. Strengthening the Implementation of the Green Economy

Indonesia’s economic transformation takes into account environmental sustainability so that natural resources can be optimally managed for current needs and for future generations, which is manifested in high, quality, and sustainable economic growth. This can be achieved by implementing a low-carbon development strategy (green, blue and circular economy), increasing the use of new and renewable energy, as well as making efforts to mitigate and adapt to climate change.

4. Digital Transformation

Digitalization now becomes a necessity in the daily lives and, at the same time, essential to accelerate recovery and economic growth. Digitalization has major potential to drive innovation, generate economic and environmental efficiencies, and increase productivity. Digitalization can be achieved by accelerating the development of digital infrastructure, improving the quality of human resources, accelerating the use of digital technology in various sectors, and creating a conducive digital ecosystem, including through supporting regulations and policies.

5. Strengthening Domestic Economic Integration

Economic integration between regions in Indonesia is an important component in Indonesia's archipelagic setting. Economic integration can help diversify the economy and increase domestic and international trade activities. This can be achieved by strengthening connectivity between regions and between Indonesia and abroad, as well as strengthening the domestic value chain.

6. Development of the New Capital City

The relocation of the capital city is one of the efforts to create new sources of economic growth and to equalize development in all regions in Indonesia. The relocation of the capital city from Java Island to Kalimantan Island is also expected to encourage inter-regional trade within Indonesia.

2.3 The Urgency of Blue Economy Development for Indonesia’s Economic Transformation

Strategy 3 of the Indonesia’s Economic Transformation: Strengthening the Implementation of the Green Economy, in particular, highlights the plan to conserve oceans, seas, and coastal areas for

sustainability development. At the same time, it is directed to accelerate and nurture ocean based economic activities as a part of strategies to improve productivity and value added, as well as to increase national welfare. This refers to the development of blue economy.

Blue economy is different from the green economy in ways that it focuses on the management and use of non terrestrial resources. Blue economy also applies many approaches that contribute to addressing climate change in the marine-based sector, whether through low-carbon development in the ocean, sustainable marine tourism, and/or the development of clean energy. Nevertheless, considering the similarity in the stewardship towards sustainable development, blue economy, hence, is part of the green economy strategy framework within part of Indonesia economic transformation.

Blue economy constitutes a sustainable development framework where marine resources are the basis of development by considering the integration of conservation in spatial planning, sustainable use, extraction of oil and mineral wealth, bio prospecting, sustainable energy production, and sea transportation. Blue economy allows to revisit development approach beyond business as usual where the ocean has been considered as a means of free resource extraction and waste disposal; with costs excluded from economic calculations. The development strategy for blue economy, hence, should incorporate ocean values and services into the economic aspect, infrastructure development and trade, resource extraction and energy production, and decoupling socioeconomic development from environmental degradation (World Bank and United Nations Department of Economic Social Affairs, 2017).

For Indonesia, the potential to drive economic transformation and diversification through a sustainable ocean economy, the blue economy, is high. Indonesia is among the countries that have the world's richest regions for ocean resources. The ocean-based sectors have significantly contributed to the country's economic dynamism in the past two decades. However, Indonesia needs to manage its ocean better. The Ocean Health Index (OHI) ranks Indonesia 137 out of 221 countries, indicating low sustainability of its activities, largely driven by unsustainable seafood harvesting practices and tourism (OHI, 2020). Multiple factors including pollution – especially from plastics – and the impacts of climate change are leading to marine ecosystem degradation, affecting the health of marine ecosystems, and affecting key economic sectors such as tourism and fisheries.

Blue economy has a positive impact on multi-dimensional sustainable development in Indonesia if implemented with the right strategies and action plans (Keynote Speech Minister of National Development Planning in Webinar: Blue Economy Strengthening After the COVID-19 Pandemic Towards a Resilient Indonesian Economy (August 16, 2021). Particular attention to the marine based economy and the wealth of ocean-based resources becomes a strong basis to employ blue economy as one of Indonesia's economic transformation strategies. The blue economy concept in Indonesia needs to cover four aspects. First, economic aspects can be done by improving the safety and efficiency of marine activities, including management of fish catches, maintaining marine security, and preventing an increase in marine pollution. Second, the social aspect should ensure decent and sustainable livelihoods for fishermen, and increase the role of the ocean for poverty alleviation. This can be done by increasing fishermen's to seafarers' income, developing fish processing industries, increasing port efficiency, and expanding access to global markets. In addition, the marine potential can also be utilized to encourage the role of women in the economy, which may result in improvement of the coastal communities and fishing community groups' welfare. Third, the blue economy contributes to sustainable development and environment by cleaning waters and beaches, reducing air pollution and greenhouse gas emissions from marine fleets, more responsible tourism and fishing, and integrating coastal area management.

Indonesia also needs to enhance the resilience and sustainability of its ocean-based sectors as a way to set more solidly on a path of sustainable and inclusive development. This takes into account the significant impact of COVID-19 pandemic in several ocean-based sectors. The development of blue recovery can help turn the ocean-based sectors into catalysts for long-term shared prosperity.

2.4 The Course of Blue Economy Development in Indonesia

Since the early years (1957) following Indonesia's independence, the country had paid attention to the maritime economy as issued in the Djuanda Declaration. It stated that in building the nation and the economy, it must be based on the potential and sovereignty of the archipelagic state (Keynote Speech Minister of National Development Planning in Webinar: Blue Economy Strengthening After the COVID-19 Pandemic Towards a Resilient Indonesian Economy, August 16, 2021).

The Declaration reiterated the identity of Indonesia. As the biggest archipelagic country, Indonesia has 17,508 islands which all of its regions rely on and are connected by sea. The Indonesian sea covers 65 percent of the total area of Indonesia with a total ocean area of about 6,400,000 km^2, consisting of:

1. Inland waters and archipelagic waters of 3,110,000 km^2;
2. Territorial sea area of 290,000 km^2;
3. Indonesia's additional zone area of 270,000 km^2;
4. Exclusive Economic Zone (ZEE) area of 3,000,000 km^2; and
5. The area of the Indonesian Continental Shelf is 2,800,000 km^2.

Within the ZEE, Indonesians have the right to manage and utilize all of its natural resources for the purposes of exploration and exploitation, conservation and development of natural resources (Djuanda Declaration on IATK-ITB, 2020).

Djuanda Declaration already emphasized that management and utilization of the sea and all its contents require reliable human resources, sophisticated infrastructure, mastery of science and technology, innovative research, and qualified researchers. By mastering science and technology and through research, the various potentials contained in marine waters, both those on the bottom of the waters, in the water column, as well as other potentials in the high seas can be used for the national interest and public welfare.

With regard to reorientation of Indonesia’s economic development into optimizing its maritime potentials, several years ago, the Government of Indonesia has made a breakthrough by establishing the Ministry of Maritime Affairs and Fisheries (KKP). This initiative was strengthened by President Joko Widodo's commitment which emphasized that Indonesia is a maritime nation.

As a ‘major sea country’, oceans are central to Indonesia’s prosperity through marine-based economic activities. Indonesia's marine natural resources include: (i) fishery biological resources, and the three main coastal ecosystems, namely: coral reefs, seaweed beds and mangrove forests; and (ii) physical resources, namely mineral mining, and energy resources such as ocean currents, tides, waves, and differences in sea surface and deep sea temperatures. Indonesia has modality as the world’s second largest fishery sector. It accounts for about 20 per cent or USD 27 billion to GDP, 50 percent of exports in 2017, and provides around 5.23 million fisherman and fish farmers in 2019, and 1.25 million

seafarers in 2021 (KKP, 2021d; Ministry of Transportation, 2021). The ocean is also becoming the central stage for a new range of economic activities, including off-shore wind energy, growing industrial-scale aquaculture, marine biotechnologies, deep seabed mining, and others.

Based on the Ministry of Marine and Fisheries Report in 2021, the provisional calculation of the potential value of the marine economy is USD 1,334 billion or equivalent to IDR 19,371 trillion. This economic value is potentially generated from various activities, including (i) optimization of marine living products and marine non-living resources; (ii) development of other sectors such as energy, tourism, salt industry, and biotechnology; (iii) strengthening of shipbuilding industry; (iv) development and revitalization of supporting facilities and infrastructure, including connectivity and logistics system with sea toll bases; (v) environmental and waste management; as well as (vi) development of human resources and services. The development of these various marine-based activities applies two main approaches, which are:

1. Management of economic resources which includes the fulfillment of food and agriculture as well as management of marine, water resources, and energy resources.
2. Acceleration of value-added growth in traditional sectors (marine living, marine non-living, industry, tourism, trade, transportation, and logistics) and emerging sectors (renewable energy, bio-economy and biotechnology, research and education), as well as improvement of environment and resource management (circular economy).

In the national medium term development plan 2020-2024, marine and fisheries sectors support the achievement of the national development agenda, particularly for strengthening economic resilience for quality and equitable growth agenda, improving the environment and increasing disaster resilience agenda, strengthening the stability of political, legal, and security affairs, and transforming public services agenda. The implementation is conducted through the management of maritime affairs, marine affairs, and fishery improvement priority program, as well as several strategies that include: (i) promoting fishery management areas (FMA/WPP) as a basis for sustainable fisheries management; and coastal and sea spatial plans; (ii) managing marine ecosystems and utilizing marine resources in a sustainable way; (iii) increasing production, productivity, quality assurance, and safety of marine and fishery products; (iv) facilitating access for financing, technology, and the marketplace; empowering and improving the welfare of fishermen in an integrated manner; (v) improving the quality and competency of human resources; boosting technological innovation and research in the collective maritime, marine, and fishery sector; and (vi) strengthening the maritime and fishery database. These strategies are complemented with (i) preventing and controlling pollution in marine and coastal areas; (ii) monitoring marine ecosystem health; (iii) restoring damaged ecosystems and the environment surrounding coastal and marine areas, including mangroves, coral reefs and sea grass beds; as well (iv) strengthening marine security.

2.5 Blue Economy for Local Economic Development

According to UN Environment Program (2015), the purpose of blue economy growth is larger than merely the ocean, including multi-sector and multi-scale activities. The implementation of blue economy must ensure that it features social equity and environmental sustainability as core tenets (Bennett et al., 2019). The blue economy need to focus on how and by whom the ocean will be developed, how and to whom benefits will be given, how harms will be minimized, and who will take responsibility for environmental and social results. In principle, the ocean potential should flourish and enrich the lives of coastal communities who live and engage in socio-economic activities

connected to coastal and ocean resources. Coastal communities are heavily dependent on ocean resources through several jobs: fishermen, sand miners, fish farmers, and sea transportation.

The livelihood of communities should be in the center part of Indonesia's responsibility to safeguard, restore, and sustain ocean resources for future generations. The current condition in Indonesia shows that most of the communities in many coastal areas in Indonesia have only engaged in traditional sectors – particularly fisheries, and to some extent marine-based processing. This is particularly evidenced in the Eastern regions of Indonesia where the fishery sector contributes around 7,95 percent of GDP in the last six years (BPS, 2021a). Nevertheless, the contribution has not yet created welfare for the people, as they are often associated with a high poverty rate, notably in Maluku and Papua (BPS, 2021a). This prompts the need for the government to improve the coastal community's capacity to tap into new economic opportunities in blue economy. At the same time, the knowledge and capacity of coastal community in marine resource management needs to be improved so that they can participate in tackling the challenges related ocean resource degradation and pollution, overfishing, and climate change.

As the blue economy is a multi-sector concept in nature, Indonesia also needs to mitigate potential conflicts of interest among stakeholders in managing and utilizing ocean space and resources. This leads to the necessity to have an inclusive governance involving diverse actors from civil society, the corporate sector, and governments in decision-making for sustaining blue economy development (P.J. Cohen et al., 2019; Bennet et al., 2019).

UNESCO's Intergovernmental Oceanographic Commission (UNESCO-IOC) and the European Commission has provided the "International Guide on Marine/ Maritime Spatial Planning" (UNESCO-IOC & EC, 2021) aiming to support better management and allocation of coastal and marine space and resources among relevant stakeholders. The guide acknowledges that there is no model of marine spatial planning that fits all. Nevertheless, it suggests structured planning, monitoring and evaluation processes that will assist the stakeholders to participate in the blue economy decision-making process. It starts with building a consensus among the stakeholders on the economic, social and environmental goals based on the use of ocean resources, followed by conducting a comprehensive planning, policy making and actions, in which the achievement can be measured according to mutually agreed principles, targets and indicators. The guideline also highlights the importance of open data and analysis as well as the use of technology to build trust and maintain interactions among stakeholders.

2.6 Blue Economy and Sustainable Development Goals

The Sustainable Development Goals (SDGs) were adopted by all member states of the United Nations in 2015 as a universal call to action to eradicate poverty, protect the planet, and guarantee that all people live in peace and prosperity by 2030. The 17 SDGs are interconnected—that is, they recognize that action in one area will have outcomes in others, and that development must strike a balance between social, economic, and environmental sustainability.

Protecting our oceans is one of the 17 Global Goals, which is SDG 14 "Life Below Water" aiming to manage marine and coastal ecosystems sustainably and to safeguard them from pollution, as well as to combat the effects of ocean acidification. SDG 14 recognizes that the oceans of the planet — their temperature, chemistry, currents, and life – power the global systems that keep the earth habitable for humans. The management of this precious resource is critical for the future of mankind and for mitigating the consequences of climate change.

Figure 2.9 Strategies to Transform Indonesia's Economy

Source: BAPPENAS, 2021

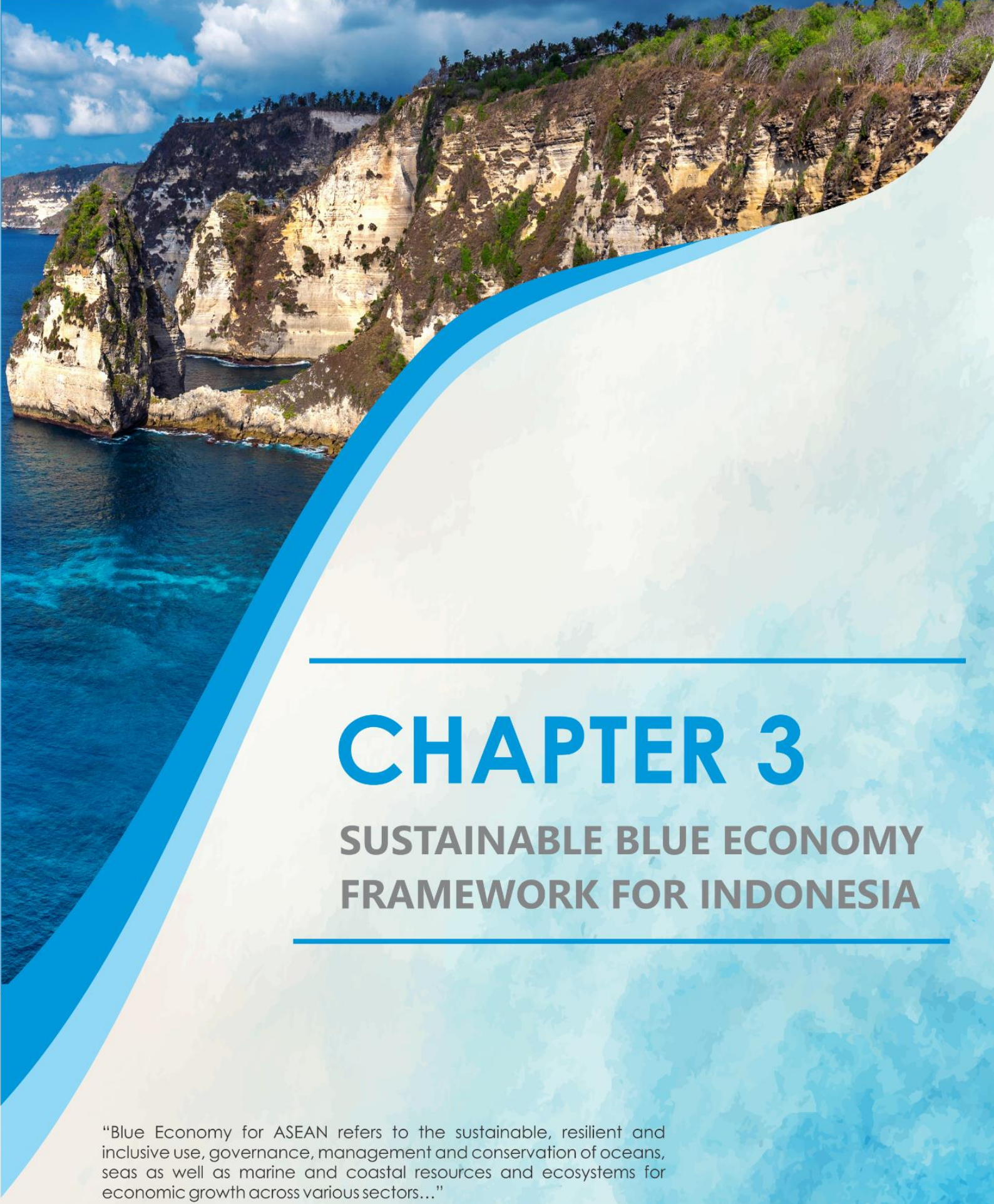
Over three billion people derive their livelihoods from marine and coastal biodiversity. However, 30 percent of the world's fish stocks are already overexploited, with yields falling below the level required for sustainable production. Oceans also absorb around 30 percent of the carbon dioxide created by humans, and we have seen a 26 percent increase in ocean acidification since the industrial revolution began. Marine pollution, the vast majority of which originates on land, has reached catastrophic proportions, with an average of 13,000 pieces of plastic waste per square kilometer of water (UN, 2021).

Enhancing conservation and sustainable use of ocean-based resources through international legislation can assist minimize some of the ocean's issues. The ocean and seas package included in SDG 14, "Conserve and sustainably utilize the oceans, seas, and marine resources for sustainable development," with its seven objectives and three implementation requirements, is critical. The goal, its objectives, and means of implementation reinforce and reaffirm existing international prescriptions on oceans and seas derived from the 1992 United Nations Conference on Environment and Development, the 2002 World Summit on Sustainable Development, the 2012 United Nations Conference on Sustainable Development (Rio+20), and the 1994 United Nations Convention on the Law of the Sea.

The Indonesian government, through BAPPENAS (2020), has adapted these targets to the Indonesian context by developing several additional indicators in addition to those established by the United Nations (Appendix 1). From the seven objectives and three implementation requirements developed by the UN, BAPPENAS adjusted and added various indicators to fit with the situation in Indonesia. For example, the first objective under SDG 14 is to prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution by 2025. The objective contains two indicators, the first of which is a reference to global indicators established by the UN, and the second of which is a proxy for global indicators developed by BAPPENAS. The indicators have been adopted in the national medium-term development plan (RPJMN) 2020-2024.

SDG 14 will lay the groundwork for the blue economy, one of the possible strategies for Indonesia's economic change following COVID-19 pandemic. While numerous other sectors have the potential to contribute to the blue economy – such as offshore renewable energy, decarbonized shipping, climate-resilient ports, marine non-living resources, circular economy, and pollution prevention, including plastics in manufacturing and services – the blue economy has been adequately addressed in SDG 14.

Blue economy development is also relevant and supports global initiatives in achieving other SDGs, such as Goal 2 Zero Hunger; Goal 7 Access to Affordable, Sustainable and Modern Energy for All; Goal 8 Sustainable and Inclusive Economic Growth, Full and Productive Employment Opportunities and Decent Work for all; Goal 9 Infrastructure, Inclusive and Sustainable Industry and Innovation; Goal 12 Responsible Consumption and Production; Goal 13 Climate Acton; and Goal 17 Global Partnership for Sustainable Development.



CHAPTER 3

SUSTAINABLE BLUE ECONOMY FRAMEWORK FOR INDONESIA

"Blue Economy for ASEAN refers to the sustainable, resilient and inclusive use, governance, management and conservation of oceans, seas as well as marine and coastal resources and ecosystems for economic growth across various sectors…"

ASEAN Leaders' Declaration on The Blue Economy 2021

3.1 Core Mission

The Blue Economy Development Framework for Indonesia's Economic Transformation is prepared by the Ministry of National Development Planning/Bappenas and the Organization for Economic Co-operation and Development (OECD) with the aim to provide a reference for all stakeholders in defining the blue economy as a new engine for Indonesia's sustainable and inclusive economic growth. This Framework is also an elaboration of the mandate of Indonesia's National Long-Term Development Plan (RPJPN) 2005-2025, in particular to realize Indonesia as a sovereign, advanced, and resilient archipelagic country through the implementation of sustainable development, as well as Indonesia's National Medium-Term Development Plan (RPJMN) 2020-2024 which emphasizes the importance of good marine management to achieve sustainable development agenda.

The Blue Economic Development Framework is directed at optimizing the modalities that Indonesia has as an archipelagic country with a diversity of marine resources, and Indonesia's political and economic strategic position in the region. Management of marine resources and ecosystems is also directed to be able to overcome challenges related to coastal and natural resource degradation, climate change, and marine pollution, as well as the socio-economic vulnerability of coastal communities affected by changes in marine and coastal ecosystem conditions.

Indonesia has great potential to carry out a blue recovery in respond to the COVID-19 pandemic, encourage the transition from extractive efforts to creating added value and productivity, as well as promote new innovations and creativity. The development of blue economy in Indonesia is also expected to expand high value-added economic activities, such as quality tourism, renewable energy development, circular economy, and marine resource-based processing industry.

The preparation of the Blue Economy Development Framework applies an integrated and comprehensive approach, considering that the blue economy covers various sectors and across actors. It highlights the need to build and strengthen synergies between actors and sectors to be able to address several opportunities and challenges in achieving a balance between conservation and the use of marine and coastal resources to create a more sustainable prosperity.

3.2 Concept and Scope

The sustainable ocean economy is understood as part of a new wave of economic thought that emphasizes the sustainable use and conservation of natural resources in the world’s oceans, seas and coastal areas for sustainable development, in line with the 2030 Agenda for sustainable development (OECD, 2020b). It includes ocean-based and coastal economic activities that explicitly integrate sustainability (e.g. such as sustainable fisheries, sustainable tourism, etc.) as well as specific actions to reduce marine pollution and enhance ocean health (SDG14 targets 14.2 and 14.3), to conserve marine and coastal ecosystems (SDG14 target 14.2 and 14.5), and to increase resilience and climate action.

The ocean economy has diverse components and varies in each country. The OECD defines the ocean economy as the set of sectors either directly or indirectly dependent on ocean resources. They include traditionally exploited marine resources – whether living resources (capture fisheries) or non-living resources (oil, gas and marine manufacturing and construction) – as well as the use of oceans for tourism, education, seaport and shipping. They also include ocean-based sectors that have recently emerged because of advancements in science and technology, such as: offshore wind, tidal and wave energy, marine aquaculture, seabed mining for metals and minerals, marine biotechnology and bio

prospecting. An environmental service such as coastal protection also contributes significantly to economic and other human activity.

Based on the above concept and scope of ocean economy, the Blue Economy Development Framework outlined in this document proposes the following scope for categorizing traditional, emerging, and environmental activities (Table 3.1).

Table 3.1 Emerging and Established Sectors of the Blue Economy

Established	Emerging
Capture fisheries and seafood processing	Marine aquaculture
Shipping and ports	Deep-water and ultra-deep water oil and gas
Shipbuilding and repair	Offshore wind energy
Offshore oil and gas (shallow water)	Ocean renewable energy
Marine manufacturing and construction	Marine and seabed mining
Maritime and coastal tourism	Maritime safety and surveillance
Marine business services	Marine biotechnology
Marine research and development and education	High-tech marine products and services
Dredging	

3.3 Challenges and Opportunities

Before the COVID-19 pandemic, the OECD estimated the growth rate of the ocean economy would outpace that of the global economy (OECD, 2016a). However, developing countries are not yet benefitting significantly from these new economic opportunities. For instance, collectively, Small Island Developing States (SIDS) and coastal Least Developed Countries (LDCs) account for 0 percent of off-shore wind farming, the fastest growing sector of the ocean economy, and for 0.09 percent of aquaculture, the world's fastest growing food production (Jouffray J.B. et al., 2020).

At the same time, traditional ocean-based sectors, such as tourism and fisheries, for many developing countries have already become key sources of income and jobs, and globally more than three billion people rely on the ocean for their livelihoods. Too often, however, these sectors have expanded with no sufficient consideration for environmental and social sustainability, creating low paying jobs and leading to environmental degradation. The fishing sector, the tourism sector, and increasingly the shipping industry, are already facing the economic costs of greater pollution, overfishing, and a changing climate. For instance, in Thailand, Indonesia and other countries, key touristic attractions had to be closed because of the levels of pollution and ecosystem deterioration reached, with considerable economic costs. In South-East Asia alone, the cost of losses in reef-related fisheries is estimated at USD 5.6 billion (annual value in 2050) (Ebarvia, 2016), with Indonesia bearing amongst the highest of these losses.

Therefore, the way existing and emerging ocean economy sectors will develop in the future could either accelerate progress towards sustainable development or exacerbate the current unsustainable

trends in developing countries. A sustainable ocean economy holds an immense promise for achieving fundamental goals such as eradicating hunger and extreme poverty, creating more jobs, and combating climate change.

The way these sectors will develop will also affect the health of the global ocean, which is already under unprecedented conditions of ocean warming, loss of oxygen, ocean acidification, growing dead-zones, and sea level rise (IPCC, 2019). These effects are putting at risk the socio-economic benefits that society derives from the ocean just as much as the global life-giving functions performed by the ocean – such as climate regulation, carbon storage and oxygen production, which make life as we know it possible on this planet.

As ocean economic activities accelerate globally, there is an opportunity to boost sustainable development if new and existing ocean economy activities will be pursued sustainably. From offshore wind energy, to growing aquaculture, to marine biotechnologies, the ocean is becoming the center stage for a new range of economic activities. These activities are growing fast under the impulse of the needs of a growing global population and the new possibilities from technological innovations.

Existing industries that are transitioning to more environmentally sustainable practices may also get benefits from blue economy development. These sectors may receive new and innovative investment in the form of better technologies and business models for promoting or restoring ocean health, as well as creating jobs and increasing people's well-being. Economic benefits may also result from tradable sector exports due to increased demand from a growing number of global populations who are aware of sustainability principles. If the blue economy concept is also adopted in the research and education sectors, it can produce a generation that fully understands how to maximize the economic and social benefits of maritime potentials while also protecting the environment in the long run.

3.4 Blue Economy Sectors

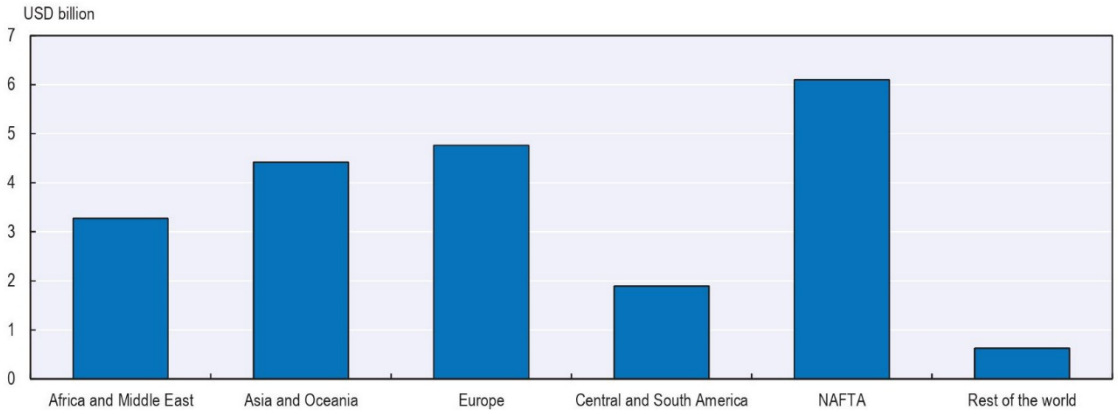
3.4.1 Established Sectors

3.4.1.1 Capture Fisheries

In 2010, the total global value added from industrial capture fisheries was estimated to be around USD 21 billion. NAFTA accounted for the largest percentage of global industrial capture fisheries value added (almost USD 6 billion), followed by Europe and Asia (Figure 3.1). According to OECD calculations, the value added from marine fishing alone is highest in the grouping of lower middle-income countries, at approximately USD 40 billion in 2015, followed by high-income countries (approximately USD 20 billion) and upper middle-income countries (USD 10 million) (OECD, 2020b). Globally, industrial capture fisheries support around 11 million full-time jobs. Asia and Oceania combined had the highest employment figures in capture fisheries in 2010, with about 7 million full-time jobs.

Looking ahead, the impacts of overfishing, climate change, coastal pollution, biodiversity loss and illegal, unreported and unregulated fishing will take a toll on seafood production, as they add to the inherent challenges of artisanal fisheries (OECD, 2020b). Some countries will increasingly need more effective strategies for marine conservation and sustainable fisheries management to rebuild stocks for nutritional security (Hicks et al., 2019). The economic downturn provoked by the COVID-19 crisis will particularly impact fish trade and local economies that are reliant on exports.

Figure 3.1 Value Added of Industrial Capture Fisheries by Region in 2010



Source: OECD, 2016b

3.4.1.2 Aquaculture

Aquaculture is considered to be one of the sectors with the largest potential for growth (FAO, 2018) and has expanded substantially in recent years, driving up total fish production against a more stagnating trend for wild fish catch. In 2016, global aquaculture production, including both inland and marine production, was 110.2 million tones and was worth approximately USD 243.5 billion (FAO, 2018). At least 64.2 percent of aquaculture production is inland and dominated by freshwater fish such as carp species. Aquaculture in coastal areas includes both species farmed in saltwater ponds, such as shrimp, and species produced in cages and man-made structures either adjacent to or on the coast, such as seaweed and mollusks.

Developing marine aquaculture could be an opportunity for selected developing countries, although it should not come at the expense of coastal ecosystems. Aquaculture can provide an additional source of income for vulnerable coastal populations, who may otherwise rely on farming or fishing. Further, technical improvements in aquaculture systems have greatly increased the feed efficiency of aquaculture in recent years and many systems now achieve a feed conversion ratio similar to poultry systems, albeit with significant variation (Fry et al., 2018). More complex and still at a demonstration stage, open ocean farming projects also have potential for more sustainable fish production (OECD, 2019b).

Figure 3.2 shows the top countries in seafood production, including both fisheries and aquaculture. The production has evolved between 2005 and 2015 in terms of live weight tones. China has remained the leader, and Indonesia rose to second place in 2015, followed by the United States, Peru, the Russian Federation, India, Japan, Vietnam, Norway and Chile. Crustaceans (e.g. shrimps and crabs) and mollusks are increasingly important in seafood production for many developing countries, not only for national consumption but as tradable goods (OECD, 2020b).

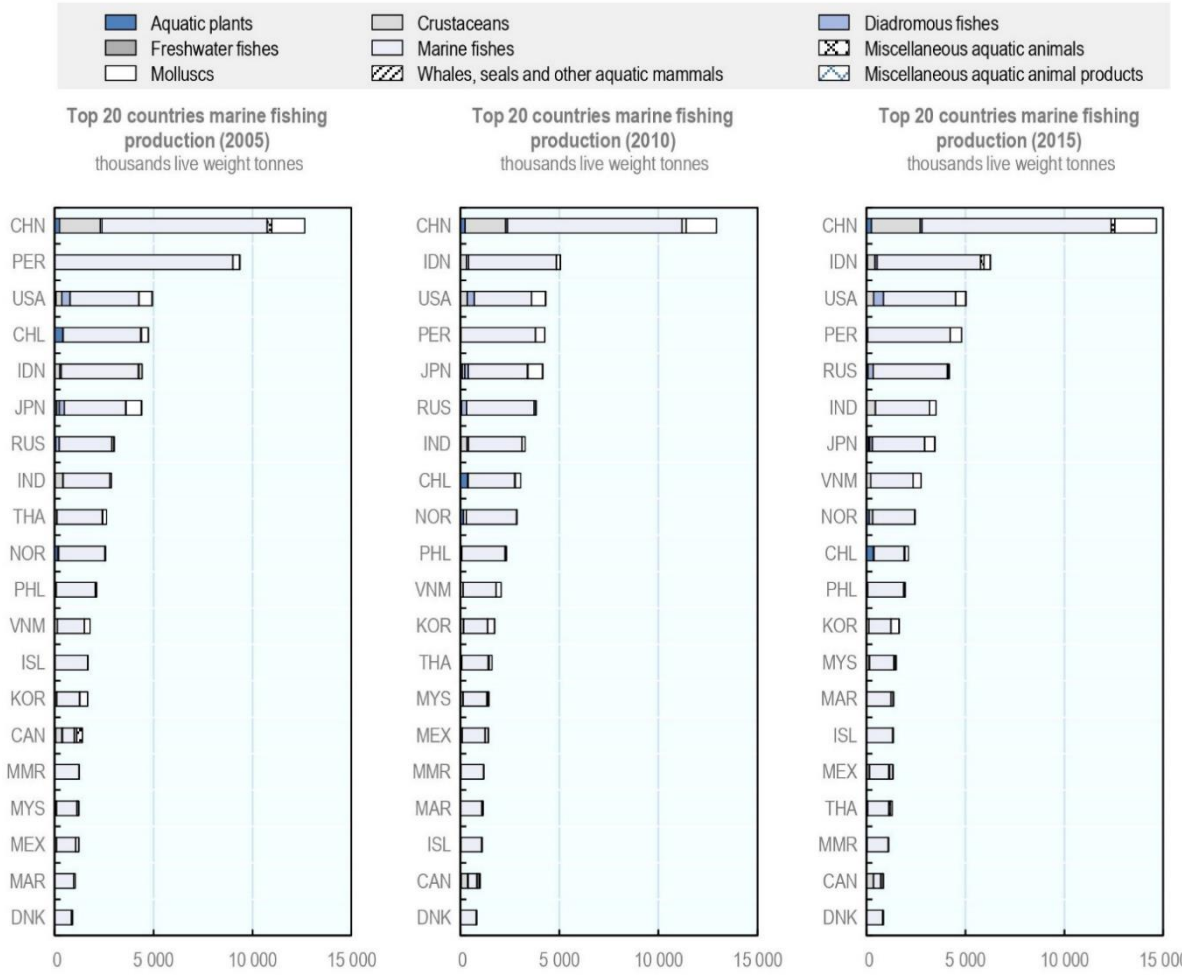
3.4.1.3 Seafood Processing

Fish processing's global value added in 2010 was projected to be around USD 79 billion. Figure 3.3 demonstrates that, when combined with robust aquaculture and capture fisheries production, Asia created the most value added, accounting for 54 percent of worldwide value added in fish processing, followed by Africa and the Middle East (16 percent) and Europe (14 percent). China, Indonesia, India, Vietnam, Peru, the United States, Myanmar, the Russian Federation, Japan, Bangladesh, Norway, the Philippines, and Thailand were the world's major players in seafood processing. In 2010, the total

number of full-time jobs in the fish processing industry was roughly 2.4 million. The majority of jobs were created in Asia, which is a major fish-processing region.

Figure 3.2 Top 20 Countries in Seafood Production in Live Weight Tones, 2005-15

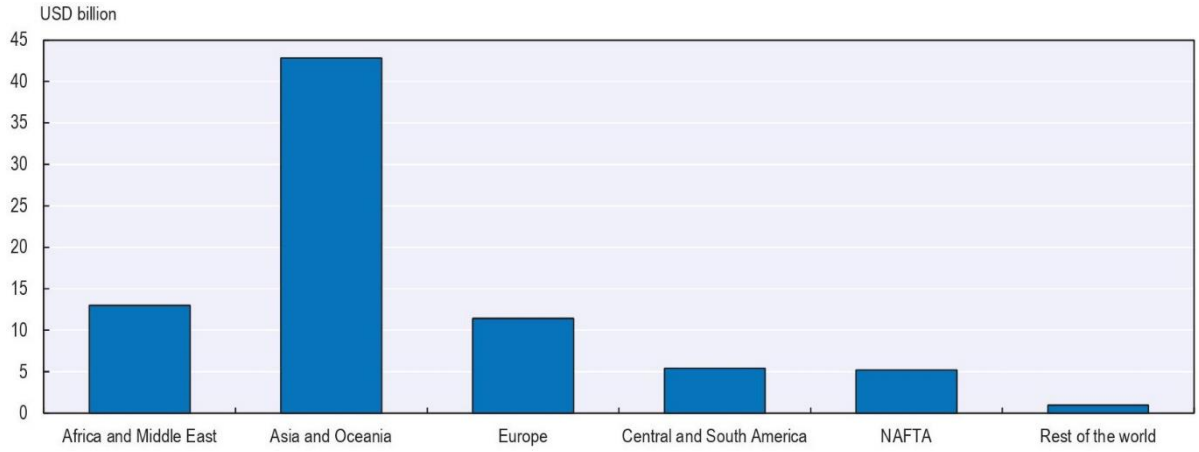
Total annual production in thousands of live weight tones by species division



Source: OECD, 2020b

Overall, millions of people and particularly women are involved in artisanal fish processing, making it an important ocean-based industry in developing countries, but one that faces some common challenges (OECD, 2020b). Post-harvest facilities such as drying equipment, ice plants and cold storage facilities are often lacking. Such installations are needed for adding value to the seafood product and obtaining better prices, but also to reduce post-harvest losses that occur in artisanal fisheries (Rosales et al., 2017). When no storage facilities are available in the ports with no ice, the fishers sometimes tend to sell their unsold fish at cheaper price or face spoilage of their catches. The Food and Agriculture Organization estimates that approximately 35 percent of the global harvest is either lost or wasted every year (FAO, 2020a). Economic development across the entire fish production system is therefore highly dependent on enhancing post-harvest processing, as well as exploring further sustainable fishing practices (e.g. certifications and eco-labels).

Figure 3.3 Value Added of Fish Processing by Region in 2010

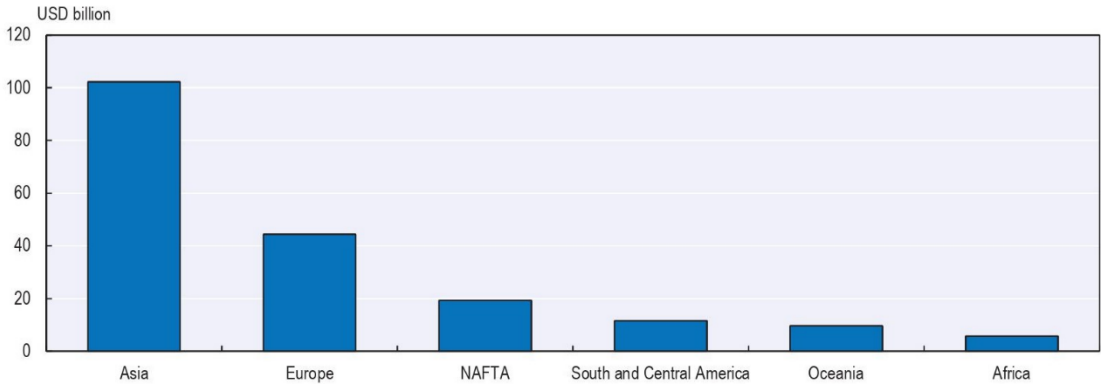


Source: OECD, 2016b

3.4.1.4 Seaports

The direct value contributed of global port throughput was estimated at roughly USD 193 billion in 2009, according to the OECD's ITF Database of Global Port Activities, which includes the 830 biggest ports in the world in terms of tonnage and nearly 100 percent of cargo handling worldwide. Figure 3.4 demonstrates that Asia contributed around USD 102 billion to the global economy, accounting for more than half of the global value added of port activities. Asia accounted for 53 percent of worldwide port volume, followed by Europe (23 percent), NAFTA (9 percent), South America (6 percent), Oceania (5 percent), and Africa (1 percent). In 2009, more than 1.7 million full-time jobs were anticipated to be directly supported by global port activities (see Liebender et al. [forthcoming] for details). An impact survey conducted for OECD's The Competitiveness of Global Port-Cities: Synthesis Report (Merk, 2013) also indicated that around 800 jobs are directly or indirectly created from port activities at the volume of one million tones on average.

Figure 3.4 Direct Value added of Global Port Throughput by Region in 2009



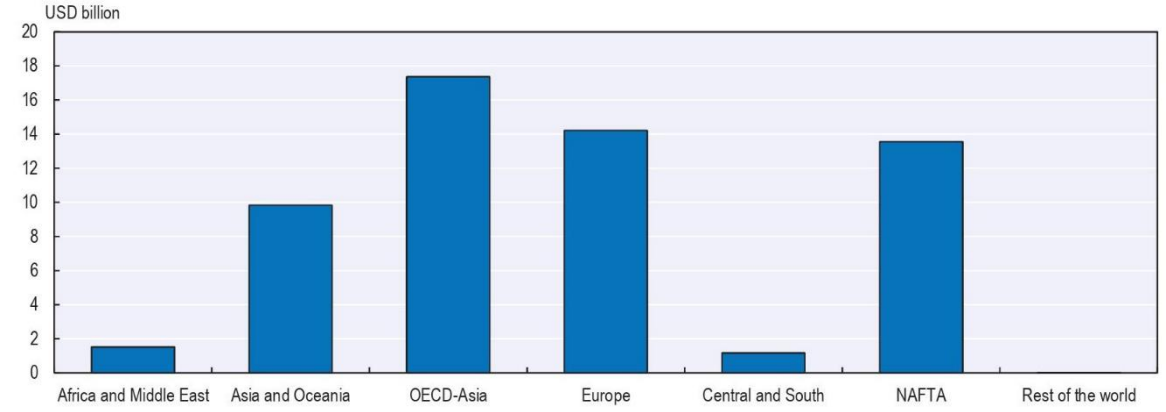
Source: OECD, 2016b

3.4.1.5 Shipbuilding and Repair

In 2010, 96.4 million GT (gross tones) of cargo was constructed, with the majority of it coming from container, bulker, and tanker construction, which accounted for roughly 77 million GT. The value of the vessels finished in 2010 was expected to be around USD 58 billion. With 47 percent of the market, Asia was anticipated to have the largest share, followed by Europe (25 percent) and North America

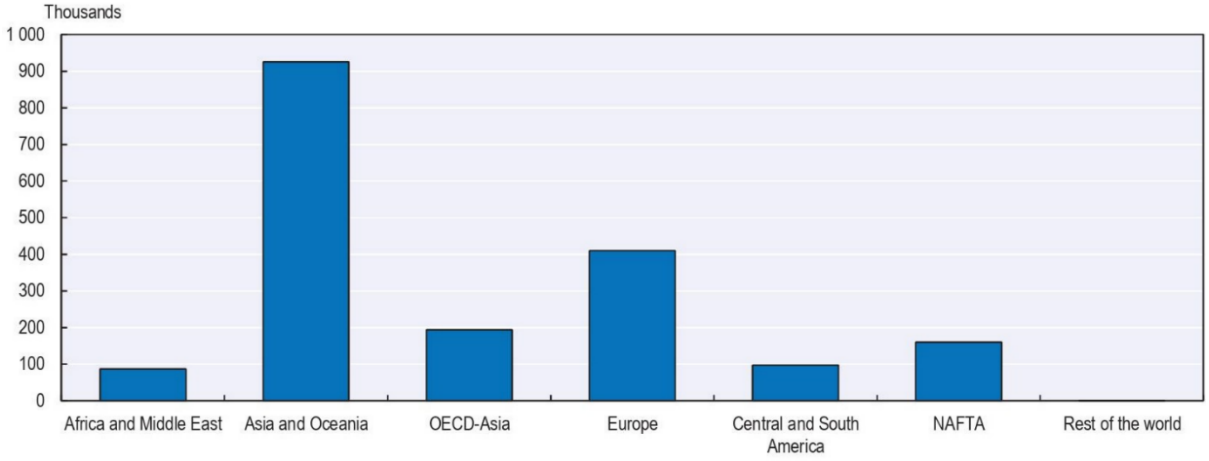
(23 percent) (Figure 3.5). However, it should be remembered that 2010 was in the midst of an extremely high period of shipbuilding, which resulted in overcapacity. Approximately 1.9 million people worked in shipbuilding and repair in 2010. Because the majority of shipyards are in Asian countries, the majority of jobs are in this region, particularly in China, Indonesia, Japan, and Korea. In the global shipbuilding and repair industry, these countries accounted for over 60 percent of all jobs.

Figure 3.5 Value Added of Shipbuilding and Repair by Region in 2010



Source: OECD, 2016b

Figure 3.6 Employment in Shipbuilding and Repair by Region in 2010



Source: OECD, 2016b

3.4.1.6 Offshore Oil and Gas (Shallow Water)

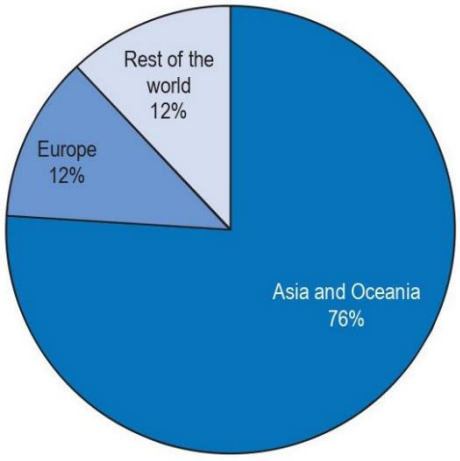
The offshore oil and natural gas industry represents the largest share of today's ocean economy and contributes to many developing economies, particularly in Africa and Latin America, despite important environmental externalities (OECD, 2020b). Projects in Indonesia, Malaysia, Myanmar, Thailand and Vietnam are also ongoing, with around 60 percent of current production in the Southeast Asia region coming from offshore fields located in shallow waters of less than 450 meters in water depth. Offshore projects generated nearly USD 90 billion of cash flow for publicly traded exploration and production companies in 2019, the third strongest year of the past decade in terms of revenues (Bousso, 2020). The COVID-19 pandemic brought the industry to a sudden halt in early spring 2020 as demand collapsed at a time when supply, already overabundant, was still significantly increasing (IEA, 2020). This will have strong economic impacts on many developing countries.

The momentum for new extraction licenses built on the results of recent oil and gas exploration programs, particularly from the Atlantic coast. These include the discovery in West Africa of large deposits off the coasts of Senegal in the MSGBC basin (Mauritania, Senegal, Gambia, Guinea-Bissau and Equatorial Guinea), all since 2015. Several countries in the region have been working to grow and structure their local industry through training in particular, while also strengthening regulatory institutions to deal especially with the many environmental aspects of the developments. Given the uncertainty surrounding oil demand and price recoveries in the short to medium term, it is conceivable that investments in some offshore oil and gas projects will be delayed or cancelled due to low prices stemming from the reduced demand and oversupply.

3.4.1.7 Marine Manufacturing and Construction

In 2010, the global value added in marine equipment was predicted to reach USD 168 billion, with Asia accounting for the largest part. Over three-quarters of the global market was accounted for by Asia, with China and Korea alone accounting for more than half. Japan, the rest of Asia, the EU-28, and the rest of the globe each contributed 12 percent. (Figure 3.7). According to Balance Technology Consulting (2014), maritime equipment employed 2.1 million people full-time in 2010.

Figure 3.7 Value Added of Marine Equipment by Region in 2010

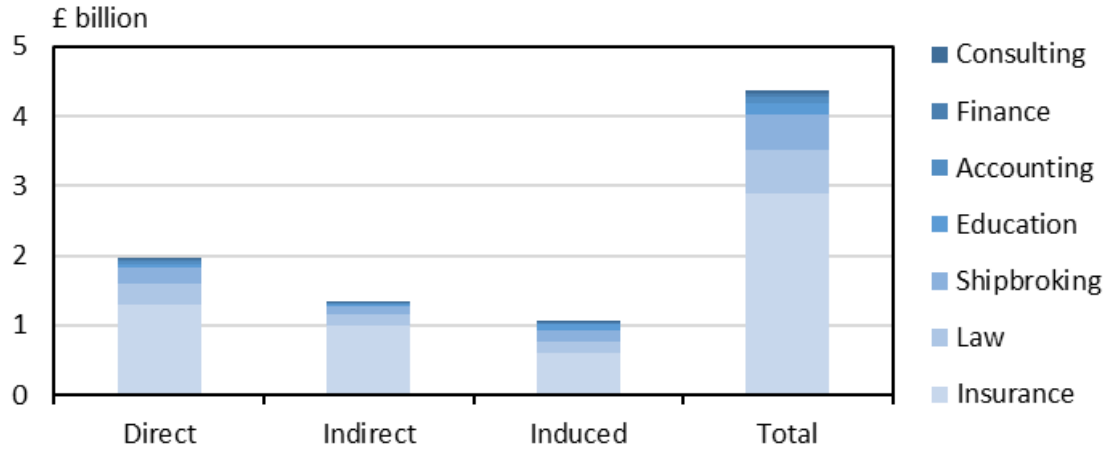


Source: OECD, 2016b

3.4.1.8 Marine Business Services

Marine business services is a growing sector in the marine economy. It includes insurance and finance, marine consultancy, renting, technical services, inspection and survey, labor supply services, and other associated activities. However, the whole global marine business service activities are not well captured in the data. This is due in part to difficult access to data at international level. As a point of reference, a study from PwC in 2016 reported that maritime business services contribute £4.4 billion annually towards the UK economy (Figure 3.8) and directly support the employment of 10,000-11,000 people. The report defined direct contribution as the contribution of each sector in terms of employee costs, profit (before depreciation) and tax contributions. Indirect contribution was defined to include additional demand created in the supply chain for maritime services. Induced contribution was the effect of the additional consumption of employees (directly and indirectly) employed in the sector.

Figure 3.8 Contribution of Marine Business Service to UK GVA



Source: Adapted from PwC (2016)

3.4.1.9 Marine R&D and Education

Research and education are critical enablers of maritime sustainability. Efforts in research and education are aimed at making the blue economy more competitive and sustainable in the future. These sectors include the promotion of literacy, skills, and innovation in the field of marine ecosystems, as well as the response to ensure the survival of marine wildlife.

The importance of marine and coastal scientific research in providing critical information for the development of marine and coastal policy and management interventions cannot be overstated. Despite technological limitations, as well as the vastness and complexity of the oceans, ocean research capabilities have steadily improved in recent years. The coastal states have also recognized the importance of marine scientific research for economic and industrial development, as effective marine pollution prevention requires a better understanding of the marine environment.

Without skilled workers, the development of the blue economy will be impossible. That is why literacy, competencies, and opportunities are crucial. Skills required for the enhancement of existing marine education provision and the development of specialized training tailored to the maritime industry (for example, shipbuilding urgently requires education/training in the digital domain, green technologies, and soft skills).

3.4.1.10 Coastal Tourism

Coastal and ocean-related tourism has many forms, including diving tourism, marine archaeology, surfing, cruises, eco-tourism and recreational fishing operations. Coastal areas account for 80 percent of tourism, with beaches and coral reefs being the most popular destinations. It also has a high contribution to the economy. For example, the tourism sector in Indonesia generates the equivalent of 8.5 per cent of GDP and become a major source of income and employment (OECD, 2020b). The direct contribution to GDP was half of the number but the indirect contributions from downstream sectors are most likely higher. In 2017, it supplied 12.7 million jobs, representing 10.5 per cent of total employment.

Despite the major income offered by coastal tourism, the development of tourism will bring about potential environmental problems, including (i) the loss of valuable habitats such as coral reefs; (ii) wetlands and mangroves used for tourism infrastructure; (iii) a large consumption of resources, including locally available food and clean water sources; and (iv) pollution caused by the discharge of untreated sewage and large amounts of solid waste. Tourists, particularly from Asian countries, are

increasingly choosing cruise ships, and the industry has grown at a compound annual growth rate of 34% since 2012 (OECD, 2020c). Nevertheless, the cruise industry also faces a series of similar challenges, such as direct air emissions from burning fuel and passing ballast transfer of invasive water species.

There are some risks if the coastal tourism is poorly managed. First, there could be loss of income due to degradation of the natural landscape that attracts tourists and residents. Second, the reputational damage and loss of customers could occur due to actual or perceived environmental violations. Third, there could be operational disruption, fines or legal proceedings due to environmental issues (such as sewage dumping, land conversion) and failure to meet environmental standards and lose the license to operate in a certain area

There are some advantages if the coastal can be managed with sustainable principles. First, it could save costs through more efficient use of resources. Second, it will grow sustainable tourism market and strengthen brands to market to customers as well as develop relationships with governments. Third, the operational areas can be expanded for development. Finally, there will be new revenue from costumers.

A well managed marine tourism, hence, can become an important and sustainable source of social, economic and environmental well-being of many countries, including small island developing states (SIDS) and coastal least developed countries. Sustainable tourism can become part of the blue economy, promote the protection and sustainable use of the marine environment and species, generate income for local communities (thus reducing poverty), and maintain and respect local culture, traditions and heritage.

3.4.1.11 Coastal Flood Defense (Dredging)

Population growth has driven an increase in utilization of coastal ecosystems and natural resources and, at the same time, an increase in pollution. There has been a growing tendency of migration to coastal locations since the turn of the century. According to the United Nations Atlas 2010, one out of every three persons on the planet now lives within 100 kilometers of the sea, and 44 percent of the world's population now resides within 150 kilometers of the coast (more people than populated the entire globe in 1950). The average population density in coastal zones is three times that of the rest of the world, and in recent decades, coastal population growth has outpaced that of inland communities (Crawford Heitzmann, 2006). These patterns are expected to continue in the next years, according to projections. According to Neumann et al. (2015), the population of deltas and flood plains, i.e. areas most vulnerable to flooding, is anticipated to grow fast - by 50 percent between 2000 and 2030. It is hence important to include coastal flood defense or dredging as one of the existing ocean-based sector to be dealt with in blue economy development.

3.4.2 Emerging Sectors

3.4.2.1 Renewable Energy

Electrification is a major challenge in many middle and low-income countries that remain dependent on imported fossil fuel for energy generation. The cost of fossil fuels has put a burden on government budgets, business and households, and disproportionally affects people already struggling with poverty (OECD, 2020b). To lower the cost of energy and transition towards greener, low-emission development pathways, several renewable solutions are being tested thanks to recent innovations in offshore wind farms and solar and geothermal resources. These renewable energy sources are however often combined with diesel generators to function effectively in developing countries.

The share of renewable energy in meeting global energy demand is expected to increase by a fifth over the period of 2018-2023, reaching 12.4 percent in 2017 (IEA, 2019). Offshore wind in particular is a rapidly growing sector (IEA, 2019). It has expanded at an extraordinary rate over the last 20 years or so in developed and emerging countries, from almost zero to a total global capacity of 18 gigawatts (GW) in 2017. The cost of offshore wind generation has also dropped progressively, and projections suggest that offshore wind could reach between 15 to 21 GW per year by 2025 to 2030 (GWEC, 2019). This growth is expected not only in Europe, China and OECD countries, but also in several developing countries where offshore wind can expand electricity access and increase the share of renewable resources in the energy mix, thus contributing to the commitments made under the Paris Agreement on climate change. Nevertheless, the long-term impacts of large offshore wind farms on the ocean environment is slowly starting to be considered.

The offshore wind sector presents some opportunities but also many specific challenges for middle and low-income countries. Technical difficulties can be vast due to geographic characteristics and remoteness, for SIDS in particular. Offshore wind farms still require rather large upfront investments.

Marine renewable energy – wave, current and tidal energy – is also considered an important potential source of power generation for the transition to a low-carbon future (IEA, 2019). However, ocean energy technologies are for the most part still at the demonstration stage, with only a few prototypes moving towards the commercialization phase. In many cases, the installation of wind turbines on land or as offshore platforms is not possible due to topographical constraints and competition for space with other ocean-based sectors, typically coastal tourism. This is particularly the case for many SIDS that are considering these marine renewable energy options.

3.4.2.2 Marine Biotechnologies

To date, the potential of marine bio-resources remains largely untapped, although many developing countries have extensive and valuable marine resources such as corals, sponges and fish (OECD, 2020b). As ocean processes become better known, many countries are developing strategies to foster marine biotechnology for future pharmaceutical drug development and cosmetic products for health and well-being as well as for food production using algae, biofuel, etc. (OECD, 2017). Marine bio-resources research is already essential in many sectors, for instance in the pharmaceutical sector for the development of new generations of antibiotics. Marine genetic resources could be at the core of new solutions to fight pandemics.

An increasing number of developing countries have already integrated this marine bio-resources dimension in their respective ocean economy strategies, among them the Seychelles, and more are doing the same. However, the gap between developed and developing countries on bio prospecting is growing, with ten developed countries accounting for more than 98 percent of the patents associated with a gene of marine origin (Blasiak et al., 2018). Despite international conventions on the protection of biodiversity (e.g. the Convention on Biological Diversity and the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization), several multinationals are using patents to acquire genetic resources or traditional knowledge. A single corporation – BASF, headquartered in Germany and the world's largest chemical manufacturer – registered 47 percent of all patent sequences based on genes of marine origin. The Yeda Research and Development Co. Ltd., the commercial arm of the Weizmann Institute of Science in Israel, registered more than half (56 percent) of all university patents, more than the combined claims of 77 other universities. At this stage, there are no internationally agreed definitions concerning the crucial marine genetic resources that are still being discovered. However, negotiations are ongoing for access to and benefit sharing of these resources (OECD, 2020b).

3.5 Post COVID-19 Pandemic Blue Sector Development

The impacts of the COVID-19 pandemic could have long-lasting effects on ocean-based sectors in general. They could also accelerate developments in specific emerging ocean-based sectors, such as marine biotechnologies for medical applications (OECD, 2020b). For instance, the test being used to diagnose the novel coronavirus COVID-19 –and in other pandemics such as HIV/AIDS and SARS – was developed with the help of an enzyme isolated from a microbe found in marine hydrothermal vents (Hugus, 2020). The policy responses to the COVID-19 crisis may also potentially lead to further development in renewable energy systems, as investments in the energy infrastructure are re-evaluated in both developed and developing countries (Birol, 2020).

Indonesia and other developing countries should consider exploring and potentially engaging in a sustainable way in these activities. An important first step to avoiding irreversible damage to fragile ecosystems may be linking with existing knowledge and innovation networks to form partnerships, and base any future activities on scientific evidence. This can be built based on some local success cases or international smart practices.

3.6 Current Development of Blue Economy: Some Best Practices

3.6.1 The Eradication of IUU Fishing in Indonesia for Fisheries Resources Sustainability

The Indonesian Government through Presidential Regulation No. 115 of 2015 endeavor to strengthen the eradication of illegal, unreported, and unregulated (IUU) fishing that covers all of fishing activities, both on the high seas and in national jurisdictions. It has proven to gradually reduce overfishing, which positively contribute to productivity and the welfare of coastal communities.

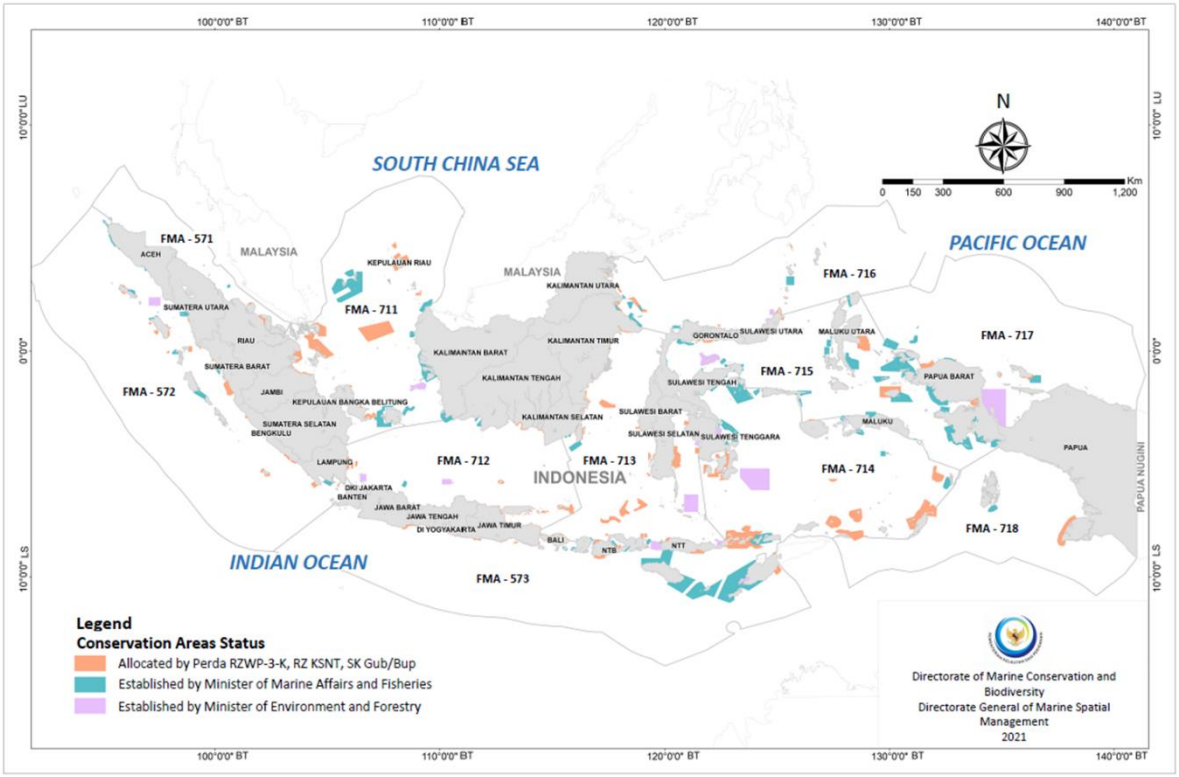
IUU fishing activities cause damage to natural resources and ecosystems, which results in depletion of fish resources and loss of human and non-human life. Illegal IUU fishing has been going on in Indonesia for decades. Abundant fish resources with weak patrol surveillance have caused Indonesia to become one of the countries with the highest rate of IUU fishing activities.

Since 2000s, IUU fishing in Indonesia has created economic loss about USD 7 million per year. With the implementation of the anti-IUU fishing policy, the loss has decreased at least 25 percent within the exclusive economic zone (EEZ). Indonesian fisheries capture production has also increased. The total production of capture fisheries was 6.5 million tones in 2014, up to 7.2 million tones (IDR 140 trillion) in 2018. Nevertheless, there are still unreported fisheries capture production that needs to be dealt.

3.6.2 Managing Marine Protected Area

To achieve SDG 14, Indonesia has committed to allocate 10 percent of its territorial waters or 32,5 million hectares as marine protected areas in 2030. By the end of the third quarter of 2021, around 28,4 million hectare of marine protected area has been established, comprising of 9,9 million hectares managed by the central government, and 18,5 million hectares managed by the provincial government.

Figure 3.9 Distribution and Status of Conservation Areas in 2021



Source: KKP, 2021e

The establishment of MPAs, while protecting important marine ecosystem, is expected to ensure sustainable use of marine resources, so that people whose livelihood depends on the ocean could reap the benefits from the establishment of MPAs.

Using zoning system, Indonesia's MPAs are divided into 4 zones, based on the level of utilization. Core zone is a fully closed area, protected from any form of exploitation except for research and education. This zone is expected to serve as nursing ground and replenishment center for marine resources and provide spill over for its surrounding zone. Sustainable fishery zone, utilization zone, and other zone are open for limited sustainable activities such as environmentally friendly fisheries and eco-tourism.

3.6.3 Making Near-Shore Fish Stocks More Sustainable through Improved Fisheries Management and Capacity Building in Indonesia

In 2018, USAID partnered with Rare (an international conservation organization) and the Indonesian government to establish the world's largest Territorial Use Rights in Fisheries (TURF) network. Under this framework, 58 local leaders in Dampier Strait signed an agreement for the establishment of 21 inshore marine waters protected areas. Near-shore marine ecosystems in Indonesia are the most critically endangered from overfishing and ecosystem degradation, but 90 percent of fishers operate in these areas. The establishment of these new protected areas came both with exclusive fishing rights granted to local communities and a new fishery regulatory framework, which included a number of conservation measures such as fish minimum size limits, prohibition of destructive fishing, and seasonal restrictions.

Besides combining social and environmental components, this project also enables fishers to access credit and upgrade their fishing equipment and techniques. Through improved marine conservation

and coastal fisheries management, this project will increase the environmental sustainability of the fishery sector, while at the same time strengthening the livelihoods and food security of fishers. This project is part of a larger effort of USAID to support marine ecosystems in Maluku, North Maluku and West Papua, through its five-year Sustainable Ecosystems Advanced Project (USAID SEA).

3.6.4 Norwegian Sustainable Ocean Policies and International Engagements

The government of Norway has taken a lead in developing international policies for ocean economy. Reducing marine litter and plastics in the oceans has been one of the central challenges the Norwegian government has lifted on the international arena.

Close cooperation between businesses, the research and development sector, workers and governments has been central in the historical development of Norway's blue economy. In 2017, the government published its ocean strategy new growth, along with two white papers "The place of the oceans in Norway's foreign and development policy" and "Update of the integrated management plan for the Norwegian Sea". In 2019, the ocean strategy was updated with the Norwegian Government's Updated Ocean Strategy: Blue Opportunities.

In 2020, the Norway's integrated ocean management plans for Barents Sea-Lofoten area; the Norwegian Sea; and the North Sea and Skagerrak were published. It aims to balance the increased activity and continued value creation with environmental needs and sustainable use of the ocean. The government published a Holistic National Plan for Protection of important areas for Marine Nature in 2021. This plan aims towards protecting vulnerable areas, rebuilding ecosystems and mapping and protection of carbon rich areas to halt climate changes. A report on the significance of the ocean for Norway and the world was also published in 2021. This report, named Blue Ocean, Green Future, aims at mapping the importance of both the ocean and ocean related businesses, and gives an overview of the governments ocean policies for the last eight years. It also looks ahead to future challenges.

3.6.5 Maldives Ventures into the Blue Economy

Almost half of Maldives's population and more than 70 percent of its critical infrastructure lie within 100 meters of its shoreline. This proximity to the ocean makes the island nation a prime location to benefit from the blue economy, which refers to the sustainable use of ocean resources for economic growth and better lives. Nevertheless, with 1,190 coral islands scattered over 90,000 square kilometers, Maldives' dispersed geography also provides unique challenges.

Water is a prime example. While almost all residents of the capital city Male' have access to safe water, this proportion drops to 15 percent for those living in outer atolls. Research predicts that per capita groundwater and rainwater availability will decline by 34 percent by 2035 while demand will continue to increase. To make matters worse, rising sea levels caused by climate change will likely further foul water as saltwater seeps into the ground in many areas. Sewage and a growing amount of waste also threaten the pristine environment that contributes to tourism revenues.

To preserve its shores and boost its burgeoning blue economy, Maldives' Ministry of Environment is implementing the Coastal Protection Projects with support from the World Bank. The projects focus on protecting coral reef and coastal wetlands, which are rich in biodiversity and have immense recreational value and act as bulwarks against coastal erosion.

The Maldives boasts over 250 species of corals and 41 islands with unique wetland ecosystems. Since it started in 2013, the Coastal Protection Unit in the Ministry of Environment and Energy has completed projects on fifteen different islands. By protecting these marine ecosystems and its fauna, Maldives is also protecting two sectors, tourism and fisheries, which contribute almost 80 percent to

its economy. Building on these efforts, the government has also committed to modernizing fisheries and preventing overfishing while also exploring the massive potential of mariculture to help diversify the sector.

After adopting the blue economy principle, Maldives has succeeded in managing waste. The country's resort islands and its international airport generate nearly six times the waste produced by local populations. Untreated sewage contaminates groundwater: A 2010 survey in 70 islands reported that water was not suitable for drinking in almost all of them. Innovative solid and liquid waste management is urgent as Maldives currently does not have policies or regulations in place to reduce the use of hazardous chemicals in its industries and agriculture.

The Government of Maldives is keen to implement a national solid waste management strategy to increase bulk water uptake as an alternative to plastic bottles as well as promote recycling and reuse. The capital city Malé, which is home to one-third of the population, shows that achieving environmental sustainability is possible. All residents are connected to a sewerage system and universal access to sanitation has been achieved. Now, the World Bank is supporting the construction of a sewerage treatment plant in Hulhumalé, in the south of the North Male Atoll, to prevent untreated sewage from being released into the ocean. Overall, out of 186 islands, 66 have adequate sewer facilities, while work on 27 other islands is ongoing.

3.7 Enabling Ecosystem for Indonesia

3.7.1 Current Regulation on Blue Economy

Indonesia has well-defined legal frameworks governing the ocean environment issue from the constitution, laws, and other related regulations. The 1945 Constitution article 25 stated that Indonesia is an archipelagic state where the boundaries and rights of whose territory shall be established by law. Furthermore, Indonesia ratified the 1982 United Nations Convention on the Law of the Sea (UNCLOS) by Law No. 17 of 1985 to abide by the convention that governs Indonesia's territorial sea sovereignty and legal status. Also, Indonesia implemented the Safety of Life at Sea (SOLAS) 1974 and ratified it into Presidential Decree No.65 of 1980. Therefore, Indonesia already has a collection of fundamental regulations that could act as an enabler policy for the blue economy, classified by their respective subsector and purposes to support the implementation of the blue economy concept. For information, some laws regulate in one or more than one sector.

1. Regulations to Support the Ocean Economy Concept
    a. Law No.32 of 2014 about the Sea;
    b. Law No.11 of 2020 about Job Creation (10 amendments to Law No.32 of 2014); and
    c. Presidential Regulation No.16 of 2017 about Indonesian Ocean Policy. It consists of the Indonesian Ocean Policy national document and a four-year action plan document. The first action plan is for 2016 – 2019. The following action plan document will be stipulated through a separate presidential regulation.
    d. Presidential Regulation No.18 of 2020 about National Medium Term Development Plan 2020-2024.

2. Regulation to Support Implementation of Business Process in Maritime and Fisheries Sector
    a. Law No.45 of 2009 about fisheries, amending Law No.31 of 2004, and Law No.11 of 2020 about Job Creation;
    b. Law No.5 of 1983 about the Indonesia Exclusive Economic Zone (ZEE). Note: not yet addressing management rules for fishing activities on the high seas that cause potential economic loss;
    c. Government Regulation No.60 of 2007 about conservation of fish resources stocks (Ref: Law No.31 of 2004); and
    d. Government Regulation No.27 of 2021 about Business Process in the Maritime and Fisheries Sector.
3. Regulation for Ocean Spatial Planning (Ocean Protection and Waste Management)
    a. Law No.26 of 2007 about Spatial Planning, amending law No.24 of 1992. Note: not fully regulated spatial marine zoning for conservation;
    b. Act No.6 of 1996 about Indonesian Waters;
    c. Law No.23 of 2014 Article 14 about Local Government;
    d. Law No.32 of 2009 about Environmental Protection and Management;
    e. Law No.18 of 2008 about Waste Management; and
    f. Law No.1 of 2014 about Management of Coastal Area and Isles, amending Law No.27 of 2007.
4. Regulation to Support Implementation of Sea Transportation
    a. Law No.17 of 2008 about Shipping;
    b. Government Regulation No.37 of 2002 about Rights and Responsibilities of Foreign Ships and Aircraft on Exercising Archipelagic Sea Lane Passage Right through and over Designated Archipelagic Sea Lane;
    c. Government Regulation No.31 of 2021 about Implementation of Shipping Sector;
    d. Law No. 17 of 1985 for the ratification of UNCLOS 1982; and
    e. Presidential Decree No.65 of 1980 for the ratification of SOLAS 1974.
5. Regulation to Protect Energy and Mineral Resources as well as Non-Conventional Natural Resources based on Blue Economy
    a. Law No.1 of 2014 about Management of Coastal Area and Isles, amending Law No.27 of 2007;
    b. Law No.30 of 2007 on Energy;
    c. Law No.32 of 2014 about the Sea; and
    d. Government Regulation No.25 of 2021 about the Implementation of Energy Resources and Mineral Resource Sector.
6. Regulation to Manage Sea Construction, Sea Industrial, and Biotechnology
    a. Law No.26 of 2007 about Spatial Planning, amending law No.24 of 1992;
    b. Law No.7 of 2004 about Water Resources;
    c. Law No.32 of 2014 about the Sea; and

d. Government Regulation No.27 of 2021 about Business Process in the Maritime and Fisheries Sector.

7. Regulation to Support Sea Usage for marine Tourism and Business Activities in Coastal Area and Isles

   a. Law No.32 of 2014 about the Sea;

   b. Act No.6 of 1996 about Indonesian Waters;

   c. Law No.10 of 2009 about Tourism; and

   d. Law No.1 of 2014 about Management of Coastal Area and Isles amending Law No.27 of 2007.

3.7.2 Indonesia Commitments in International Cooperation

Indonesia has also acknowledged the importance of partnership between countries that support the development and cooperation of the blue economy. Currently, Indonesia has joined some International Declarations and Joint Statements consisting of bilateral and multilateral cooperation between Indonesia and other countries. These include:

1. Jakarta Declaration on Blue Economy - Declaration of the Indian Ocean Rim Association on the Blue Economy in the Indian Ocean Region (Jakarta, 8 – 10 May 2017)

   The declaration stresses the need to promote communication and maritime connectivity in the Indian Ocean region, and collaborate and cooperate with relevant stakeholders to advance the blue economy in the Indian Ocean region. It also sets the principles for developing and applying blue economy approaches to achieve sustainable development.

2. Joint Statement on Cooperation in the Field of Blue Economy between Sweden and Indonesia (Stockholm, 25 October 2021)

   The joint statement mainly focused on cooperation in the field of the blue economy. Sweden has recently developed its maritime strategy while Indonesia is developing its roadmap for the blue economy. This partnership supports and provides solutions to grow the Indonesia blue economy and create the Road Map for the Blue Economy in Indonesia in 2021-2022.

3. ASEAN Leaders Declaration on the Blue Economy (Brunei Darussalam, 26 October 2021)

   The declaration was officially adopted at the 38th ASEAN Summit. This declaration is ASEAN's commitment to taking the lead on regional cooperation to the blue economy and exploring collaboration on the blue economy subsectors. It recognizes the need for ASEAN collective effort and holistic response to mitigate the impact of COVID-19, and acknowledges ocean and seas are critical drivers of economic growth while considering the need to ensure ocean sustainability.

4. Australia-Indonesia Joint Statement on Cooperation on the Green Economy and Energy Transition (Rome, 30 October 2021)

   While the blue economy development is not the main focus of this agreement, it promotes sustainable development in cooperation on marine sustainability and the blue economy. The agreement encourages the development of a blue economy in some ways, such as based on spatial planning, collaboration to develop marine science and technology, and protection and conservation of the marine and coastal environment.

Besides the cooperation above, Indonesia played a leadership role in developing shared practices on IUU fishing among ASEAN countries, including contributing to the Guidelines for Preventing the Entry of Fish and Fishery Products from IUU Fishing Activities into the Supply Chain. Indonesia also became the first nation –and the only nation in ASEAN—to share its Vessel Monitoring System (VMS) data with the Global Fishing Watch, an NGO platform working on improving transparency on fishing activity worldwide to address overfishing and IUU fishing.

3.7.3 Institutional Framework

A sustainable ocean economy is high on the Indonesia government agenda and led to the creation of dedicated policies, institutional structures and the adoption of integrated policy tools. Indonesia established a dedicated ocean policy strategy and created a Coordinating Ministry of Maritime Affairs and Investments to streamline ocean governance. The Ministry coordinates the Ministry of Marine Affairs and Fisheries, the Ministry of Energy and Mineral Resources, the Ministry of Transportation, Ministry of Environment and Forestry, Ministry of Public Works and Housing, and the Ministry of Tourism and Creative Economy/Tourism and Creative Economy Agency. A number of ad hoc structures were also created to enhance the country's ocean governance, particularly focused on IUU fishing. These are positive steps to increase coordination and enhance policy coherence on ocean matters across the administration, albeit the governance of the ocean remains somewhat fragmented both horizontally and vertically, reflecting the complex nature of Indonesia's national and local governments (OECD, 2021). Besides the Ministry of Marine Affairs and Fisheries, several other ministries have responsibilities on ocean-related matters explained in the table below.

Table 3.2 Ocean-related Competencies Across Ministries of Indonesia

Ministry/Agency	Competence
Coordinating Ministry for Maritime Affairs and Investment	Inter-ministerial coordination
Indonesia Statistics	Development of ocean accounting framework
Ministry of Cooperatives and Small and Medium Enterprises (SMEs)	Cooperatives and SMEs development in marine/ fishery business
Ministry of Defense	Navy
	Maritime defense policy
Ministry of Energy and Mineral Resources	Offshore oil and gas
	Marine energy development
Ministry of Environment and Forestry	Marine conservation (some marine protected areas)
	Reducing marine pollution
	Mangrove ecosystem data custodian

Ministry/Agency	Competence
Ministry of Finance	Customs and excise from shipping industry
	Fees and taxes
	Subsidies
	Carbon related mechanisms
Ministry of Foreign Affairs	Protect and advance Indonesia's maritime interests
Ministry of Home Affairs	State boundaries (province and region/ municipality)
	Coordination between provincial and municipal governments on marine affairs
Ministry of Law and Human Rights	Drafting of ocean-related legislations
Ministry of Marine Affairs and Fisheries	Fisheries
	Aquaculture
	Fisheries resources surveillance
	Coastal regions and small islands
	Some marine protected areas
	Marine services
	Marine/fisheries product added value
Ministry of National Development Planning (BAPPENAS)	Strategic orientation for investment
	Medium-term and long-term development and planning (RPJMN and RPJPN)
	Low Carbon Development Initiative
Ministry of Tourism and Creative Economy/ Tourism and Creative Economy Agency	Marine tourism
Ministry of Transportation	Shipping
	Navigation
	Ports

Ministry/Agency	Competence
	Sea and Coast Guard
	IMO focal point
Ministry of Industry	Processing Industry
	Ship Building Industry
	Small and medium marine/fishery industry
	Product standardization and certification
Ministry of Trade	Trade diplomacy, including negotiating tariff and non-tariff barriers for export of fishery products
	Trade promotion, especially for export products
	Product standardization and certification
	Consumer protection
National Research and Innovation Agency (BRIN)	Basic ocean research
	Industry applicable R&D
National Standardization Agency	Product and process standardization

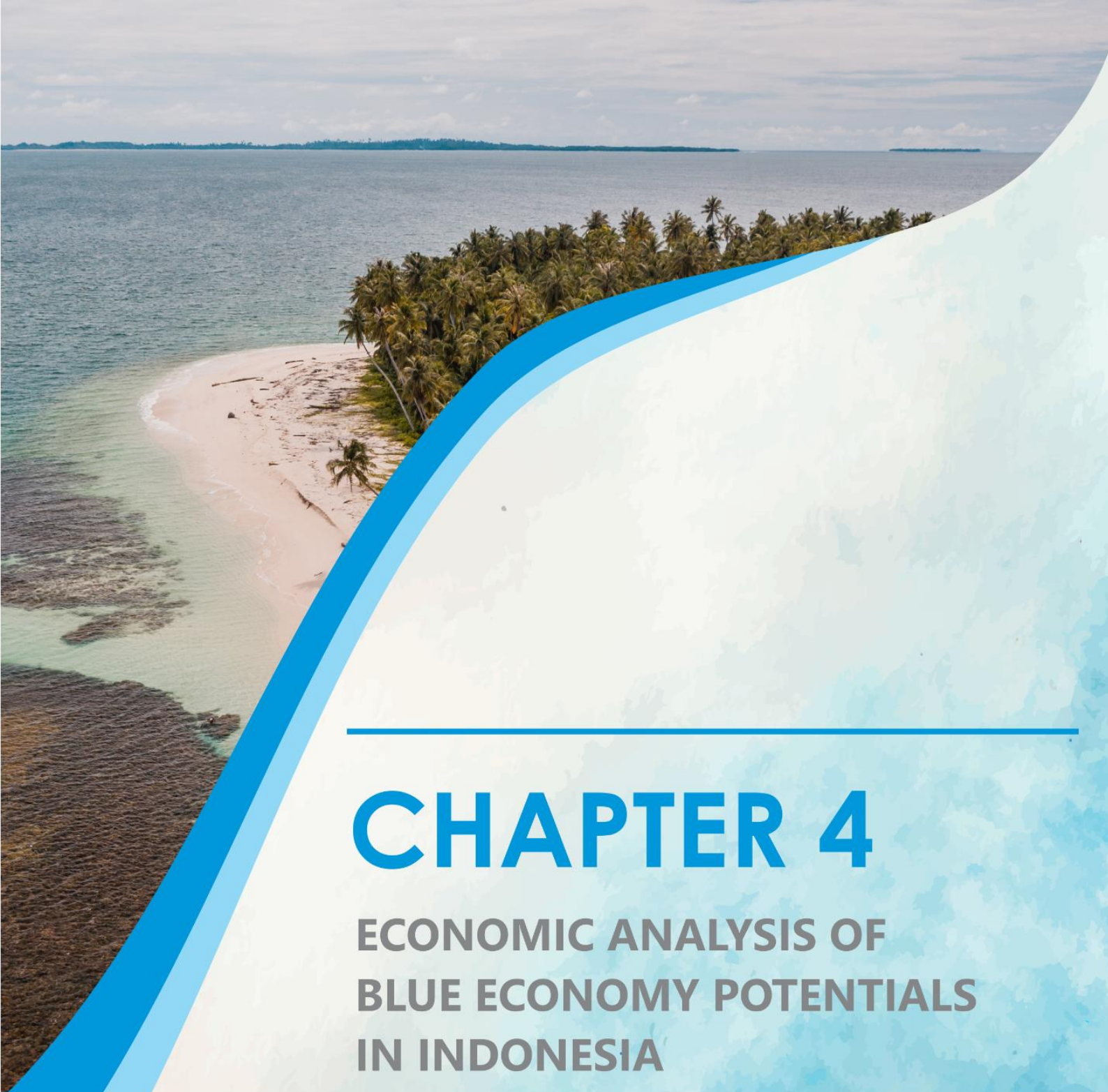
Source: OECD, 2021, Presidential Regulation No.18 of 2020

The Indonesia's blue economy development acknowledges the importance for Indonesia to adopt integrated ocean management, such as Marine Spatial Planning (MSP) and Integrated Coastal management. Two of the most challenging implementations are the collection of good quality marine data conflicts that arise between different users of marine areas. The UNESCO-ICO and EC's guide on marine spatial planning become the reference. The adoption is expected to address some challenges related to coastal and marine space allocation, management and resource utilization among neighboring local governments, as well as the increasing pressure on the marine ecosystem due to competing economic activities among economic actors on different levels.

An initial step was completed in 2014, when municipal governments' authority over the sea was withdrawn and moved to provincial governments to create integrated ocean governance. As a result, central government jurisdiction covers the area beyond 12 nautical miles, while the provincial government is between 0 to 12 nautical miles of the shore. Municipal authorities maintained their competence in coastal management and planning. In 2020, several regulatory changes in ocean sectors because of the Omnibus Law, including a concentration of control with the central government, the transformation of the licensing system, and a shift from criminal to administrative sanctions for fisheries violations. The changes progress the way to achieve an integrated ocean management.

In addition to this, substantial community and stakeholder engagement is crucial to recognize marine users' rights and simultaneously promote social benefits and sustainable economic activity. In particular, recognizing customary laws and the rights of communities in the use of marine resources is of particular importance for Indonesia.

The engagement of different stakeholders, including different government ministries/agencies, needs also to be complemented by sufficient capacity development in coastal and marine management. For the most part, the government must ensure that the regulations related to the blue economy fulfil the people's needs and nature.



CHAPTER 4

ECONOMIC ANALYSIS OF BLUE ECONOMY POTENTIALS IN INDONESIA

"We will pursue our efforts to ensure the conservation, protection and sustainable use of natural resources and will take concrete measures to end overfishing, deliver on our commitment to end illegal, unreported and unregulated fishing, and combat crimes that affect the environment."

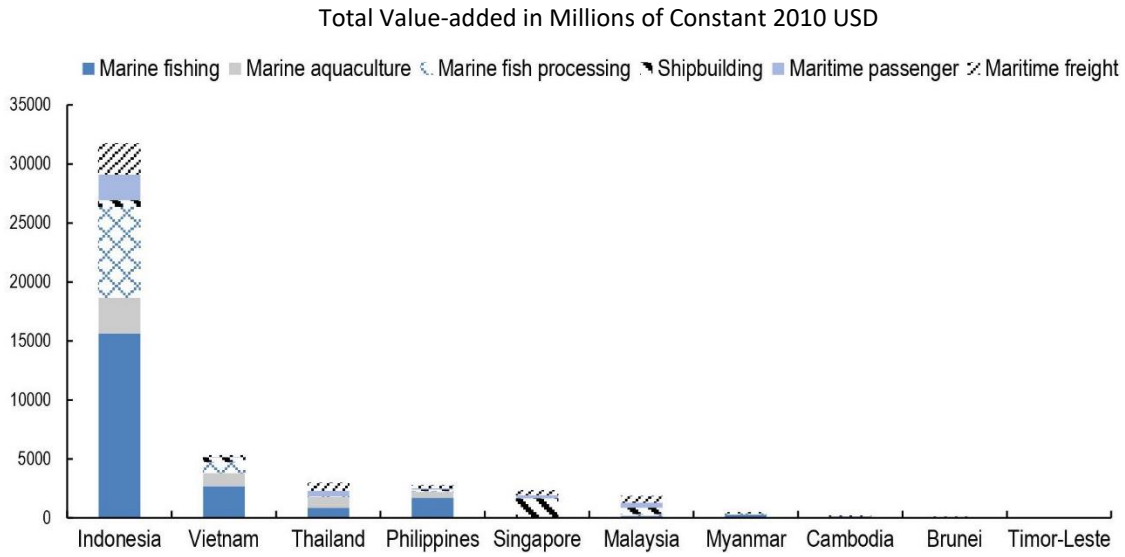
2021 G20 Rome Leaders' Declaration

4.1 Sector Analysis of Blue Economy

Original OECD estimates show that the ocean-based sectors contributed around USD 31.7 billion (constant 2010 prices) to Indonesia's global value added in 2015. The estimates were constructed on an internationally comparable basis and focusing specifically on six ocean-based sectors[1]. Marine fishing, aquaculture and fish processing represented the most important ocean-based sectors, accounting for 83 percent of the total value added from the six sectors in 2015 (OECD, 2021).

In 2015, Indonesia produced 67 percent of the total value added from the six sectors across ASEAN members (OECD, 2021). In particular, 84 percent of the value added generated from marine fish processing in ASEAN countries in 2015 is attributable to Indonesia, as is 73 percent of marine fishing value added, and 54 percent of marine aquaculture value added. Indonesia also generated the largest value added from maritime freight (USD 2.6 billion) and maritime passenger transport (USD 2.2 billion) among ASEAN countries in 2015 (Figure 4.1).

Figure 4.1 Ocean-economy Value Added in ASEAN Countries in 2015



Source: OECD, 2021

The composition of Indonesia's ocean economy differs from that of other ASEAN and East Asia Pacific countries due to its greater reliance on marine fishing, aquaculture and fish processing. In Indonesia, these three sectors account for 83 percent of the value added generated from the six ocean-based sectors measured.

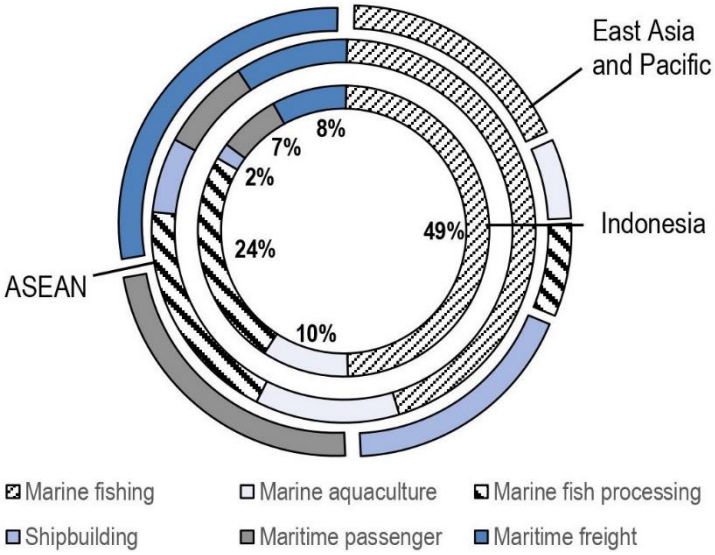
Figure 4.2 shows the shares of value added generated from the six ocean-based sectors, which is 76 percent for ASEAN members and a significantly lower 31 percent in the East Asia Pacific region. Compared to the East Asian region, Indonesia's shipbuilding sector contributed only USD 0.6 billion in value added in 2015 and, relative to GDP, it was surpassed by Malaysia, Singapore and Vietnam. The sector is constrained by poor access to the necessary levels of finance, inadequate supply of appropriately skilled labor and a tax regime that incentivizes the importation of whole ships rather than maritime parts for construction in domestic shipyards. Worldwide, shipbuilding employs approximately 16 percent of the workforce in these six ocean-based sectors, representing the second largest ocean sector in terms of employment. Indonesia stands to benefit from the expansion of its

[1] Marine fishing, marine aquaculture, marine fish processing, shipbuilding, maritime passenger transport, maritime freight.

shipbuilding sector but structural reforms and investment in infrastructure will need to be implemented.

Figure 4.2 Share of Value-added for Six Ocean-based Sectors in 2015

As a Percentage of Total Value-added in Millions of Constant 2010 USD



Source: OECD, 2021

Other ocean-based sectors, such as tourism, are of paramount importance for Indonesia's economy, despite not being included among the OECD six ocean-based sectors dataset. OECD research suggests that the tourism industry in Indonesia currently provides the equivalent of 8.5 percent of GDP in direct and indirect contributions (Ollivaud and Haxton, 2019). As such, tourism is identified as one of the key pillars in National Medium-term Development Plan (RPJMN) 2015-2019 and 2020-2024. Integrating the marine tourism in the Indonesia's blue economy strategy will be key for promoting resilient and inclusive development of Indonesia's overall economy.

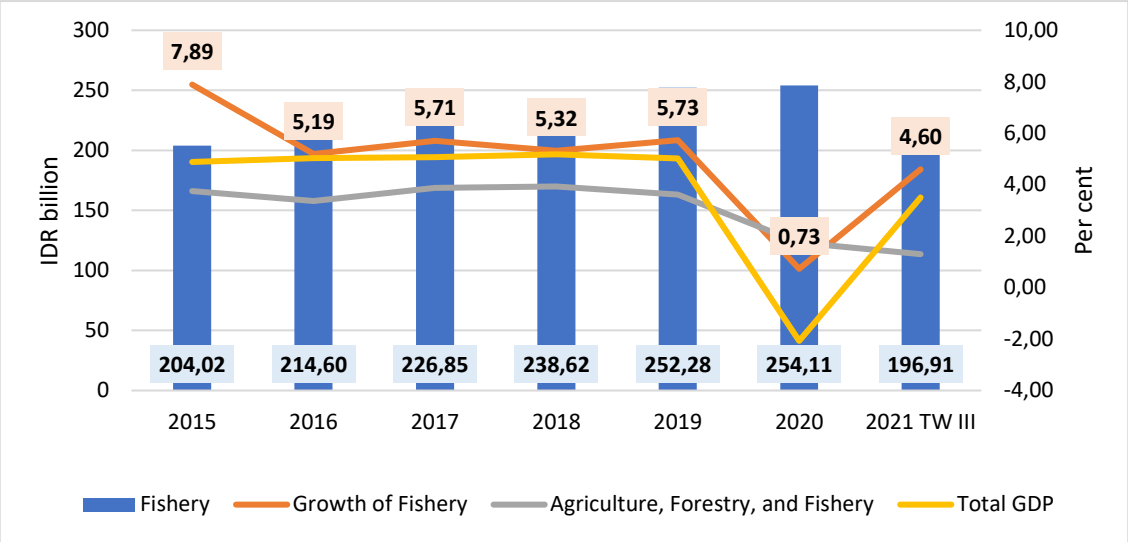
4.1.1 Current (Traditional) Sectors

4.1.1.1 Marine Living

Economic Size

Fishery sector plays a vital role in the Indonesian economy, especially for coastal regions. From 2015 to 2020, GDP of fishery sector on average increased in nominal, but its growth had been stagnant and even declining in 2020 due to the impact from COVID-19 pandemic (Figure 4.3). Nevertheless, the GDP growth in the fishery sector is still higher than total GDP growth on average, and its contribution to national GDP remains constant between 2.5 - 2.8 percent. In terms of employment, the capture fisheries and aquaculture sectors employ approximately 2.7 million and 3.3 million workers, respectively (CEA, 2018).

Figure 4.3 Fishery GDP and Growth



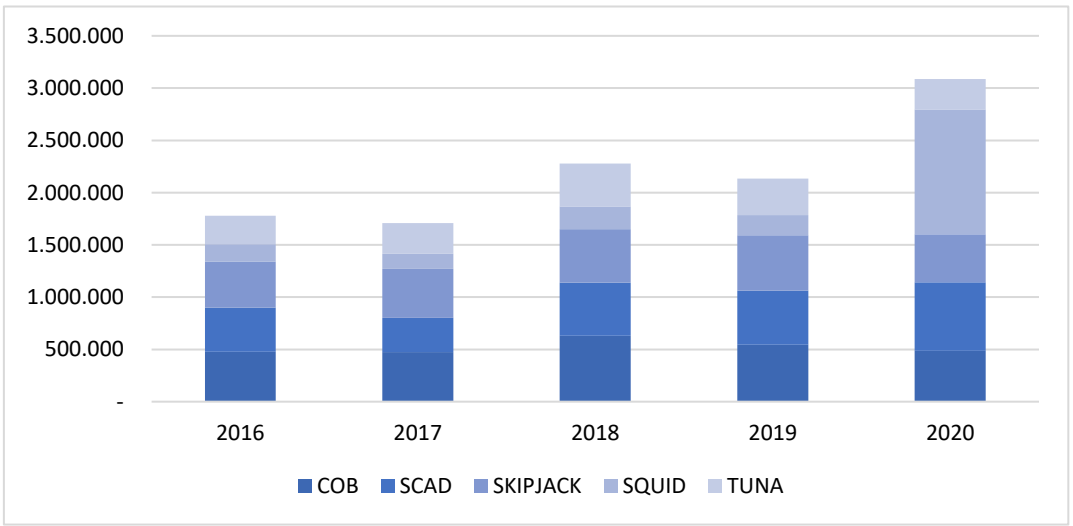
Source: BPS, 2021b

Indonesia has a diversity of fisheries commodities, both capture fisheries, and aquaculture. The top five capture fish are presented in Figure 4.4. The top five Indonesian aquaculture products from 2015 to 2020 are commodities of seaweed, tilapia, catfish, shrimp, and milkfish. The main centers of seaweed are the Provinces of South Sulawesi, East Nusa Tenggara, and Central Sulawesi. The production centers for tilapia are West Java, South Sumatera, and West Sumatera Provinces. The value of fishery exports in 2020 reached USD 5.2 billion with the main commodities of skipjack tuna, shrimp and seaweed.

- ***Capture Fisheries***

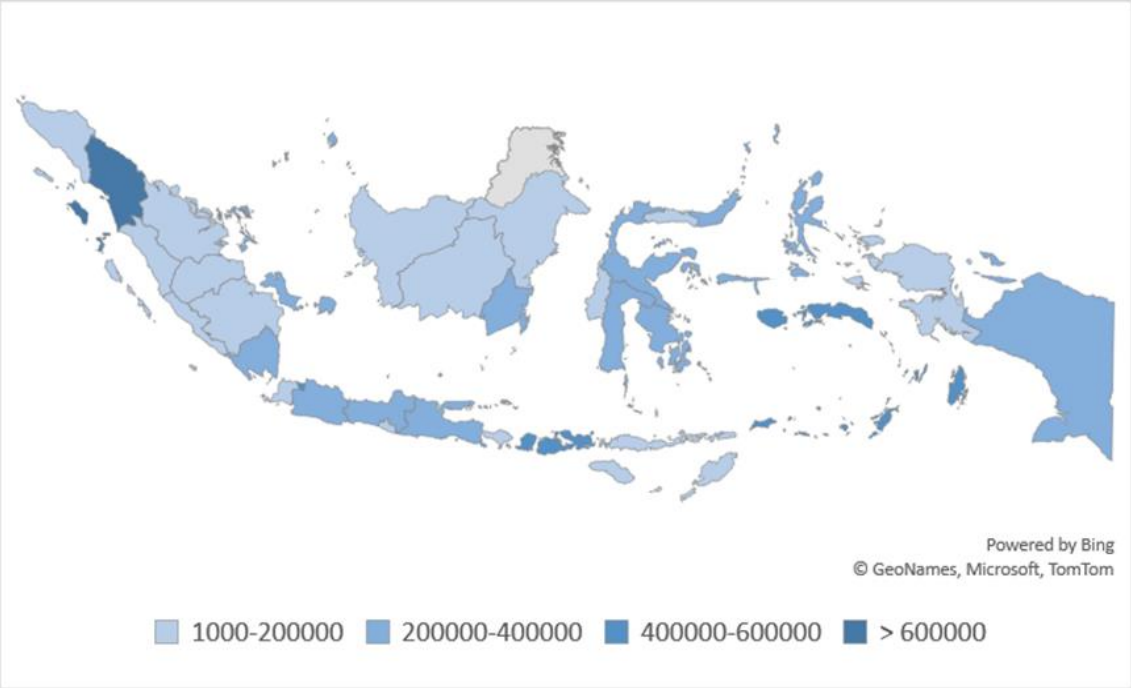
Indonesia's fish production (capture) amounted to 7.7 million tones in 2020 (Figure 4.4), and became a source of national and global food providers. The production involved around 6.2 million fishermen and fish farmers in 2018 with average monthly income of IDR 3.85 million per fisherman (around USD 270).

Figure 4.4 Top Five Capture Fishing Production by Volume (Tones)



Source: KKP, 2021a

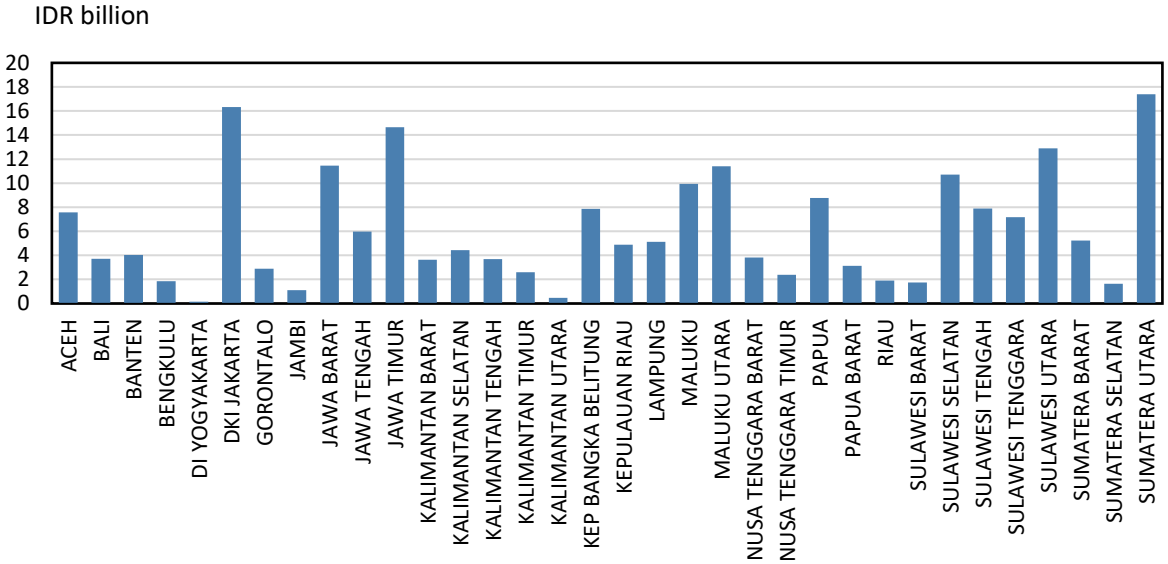
Figure 4.5 Capture Fisheries Production Base by Province in 2020 (Tones)



Source: KKP, 2021a

Many capture fisheries production centers are in the Provinces of North Sumatera, Maluku, West Nusa Tenggara, East Java, and South Sulawesi (Figure 4.5). North Sumatera, Jakarta Special Capital Region, East Java and North Sulawesi Provinces contributed the largest value added in capture fisheries (Figure 4.6).

Figure 4.6 Capture Fisheries Value Added by Province in 2020

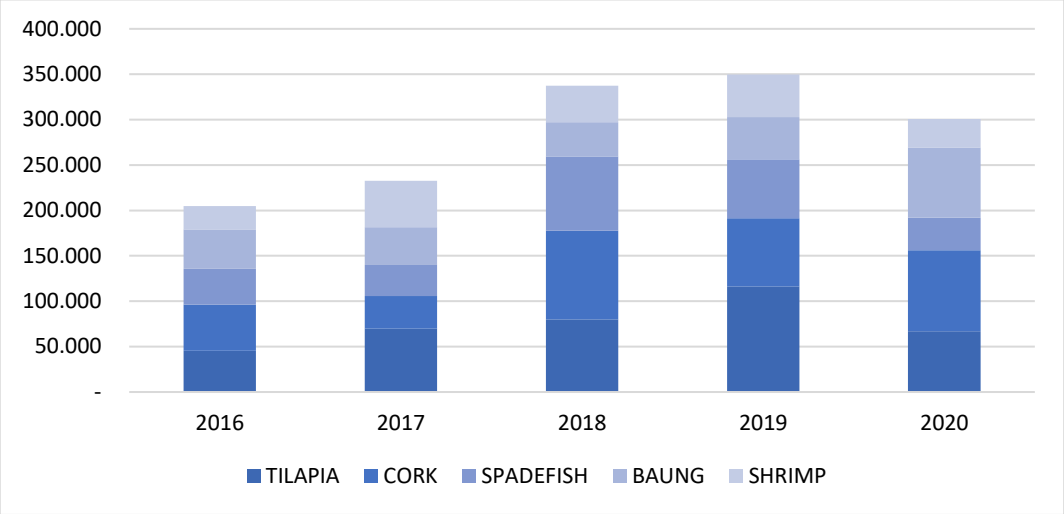


Source: KKP, 2021a

Capture fisheries production is divided into high seas capture fisheries and inland public waters (IPD). For high seas fishery products, the main products are cob, scad/flying fish, skipjack, squid, and tuna commodities. The main centers of cob are Maluku, North Sulawesi and Aceh Provinces.

The main centers of kite are East Java, Maluku, and Central Java Provinces. For IPD capture fisheries, the main products are tilapia, cork, spadefish, fresh river catfish (*baung* fish), and shrimp (Figure 4.7). Cork and fresh river catfish have recorded production growth in the last five years. Tilapia has production centers located in North Sumatra, South Sulawesi, and East Kalimantan Provinces. South Sumatera, South Kalimantan, and North Sumatera Provinces are the main production centers for cork.

Figure 4.7 Top Five IPD Capture Fishing Production by Volume (Tones)

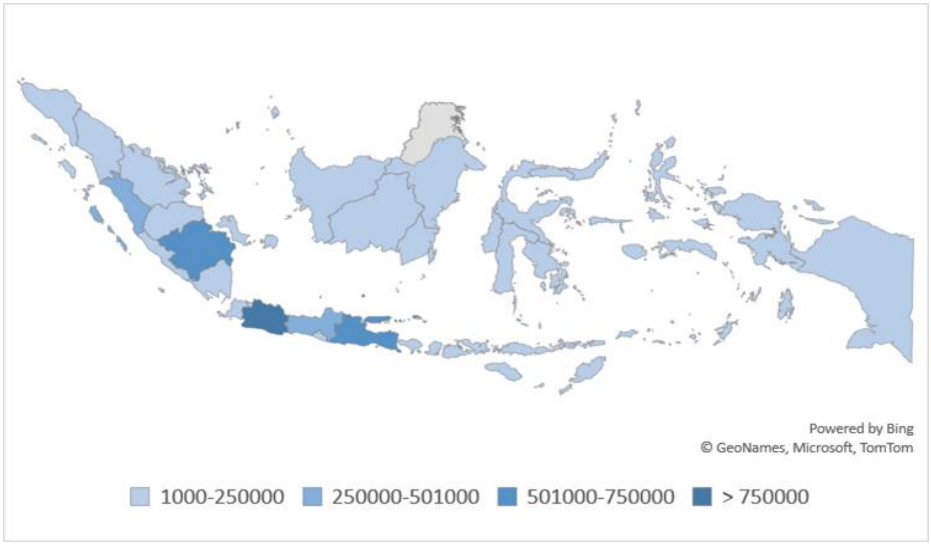


Source: KKP, 2021b

- ***Aquaculture***

Indonesian aquaculture products reach 42 percent of the total produced fishery products (FAO in the OECD, 2021). With the increasing demand for fishery products and the challenges of declining capture fisheries production, aquaculture is one of the potential solutions in the development of fisheries in Indonesia. The development of Indonesian aquaculture has increased by more than 100 percent in the last decade (World Bank, 2021b).

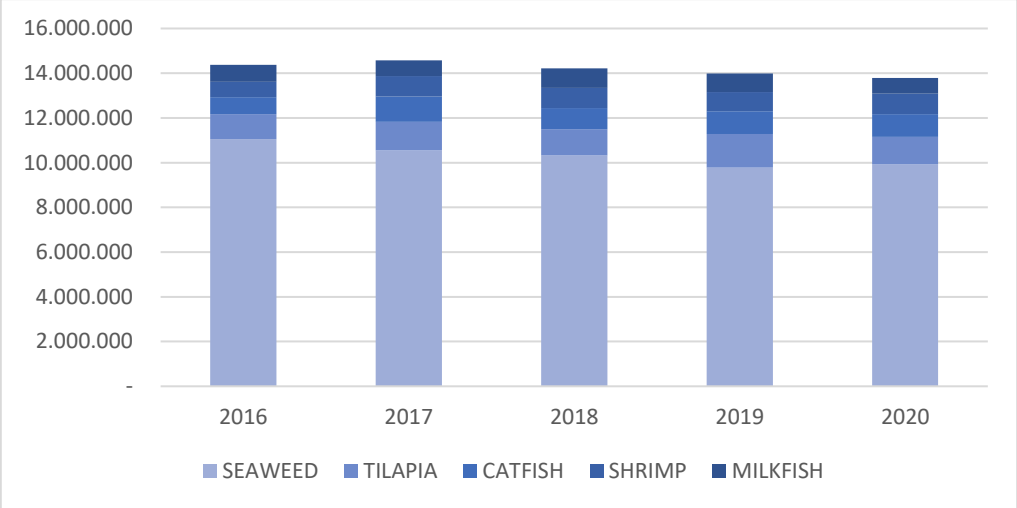
Figure 4.8 Fish Farming Production Base by Province in 2020 (Tones)



Source: KKP, 2021c

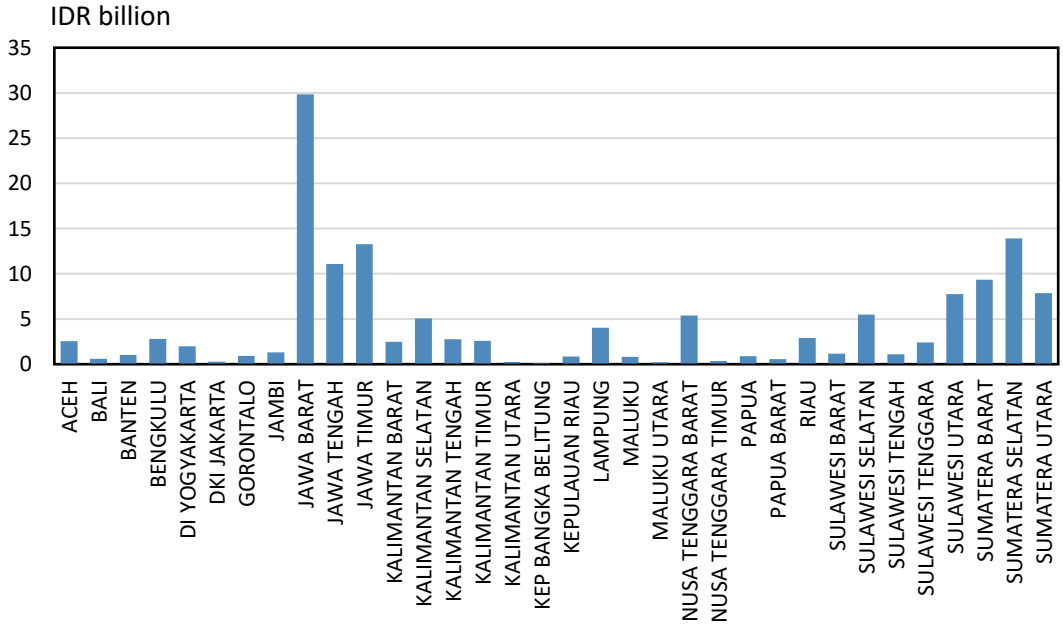
The area of aquaculture land in various waters in Indonesia is 29.2 million hectares and only 4.28 percent has been utilized. The main areas producing aquaculture commodities (exclude seaweed) are West Java, East Java, and South Sumatra Provinces (Figure 4.8). Fish farming production in inland public waters were dominated by five main species, which are seaweed, tilapia, catfish, shrimp and milkfish. The area for marine aquaculture is still limited with the share of 1.15 percent. Beyond domestic demand, for the top 3 fish farming (Figure 4.8), Indonesia can also aim to be amongst the top 3 exporters. West Java Province recorded the highest value added in fish farming in 2020, far more productive as compared to the other fish farming production centers (Figure 4.10). The COVID-19 pandemic, however, disrupted these fish farming production centers as the market slowed down.

Figure 4.9 Top five Aquaculture Production by Volume (Tones)



Source: KKP, 2021c

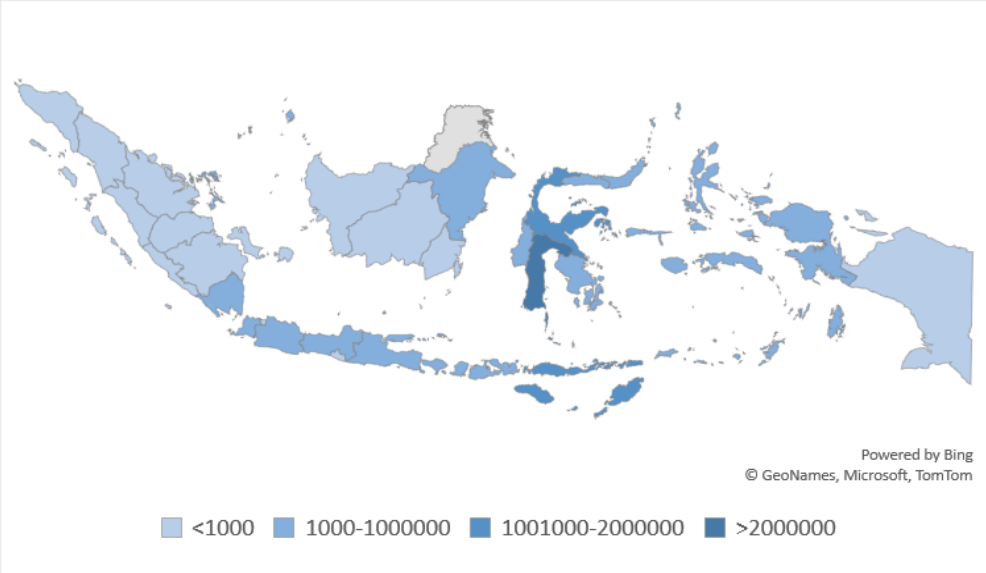
Figure 4.10 Fish Farming Value Added by Province in 2020



Source: KKP, 2021c

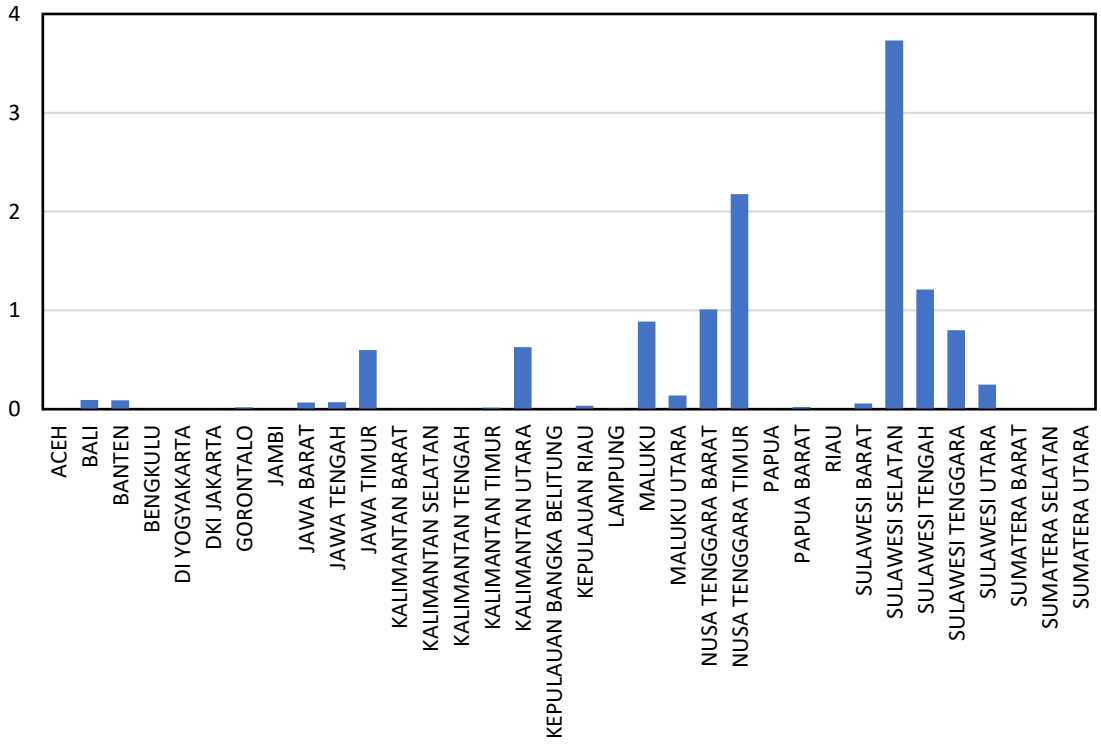
For specific product, South Sulawesi Province became the largest seaweed cultivation center, while the Nusa Tenggara appeared to be the emerging producers in 2020 (Figure 4.11 and 4.12). Indonesian fresh seaweed exports are valued at USD 1,168 per ton. Meanwhile, if the dye content is isolated, the commercial worth increases by nearly 13 times to USD 13,372 per ton. Carrageenan hydrocolloid seaweed accounts for 87 percent of total national output, although only 12 percent of jelly-producing kinds and a tiny number of other types of red seaweed are produced.

Figure 4.11 Seaweed Production Base by Province in 2020



Source: KKP, 2021f

Figure 4.12 Seaweed Value added by Province in 2020 (IDR Billion)



Source: KKP, 2021c

Challenges

Challenges for Indonesia capture fishing is how to manage the diverse coastal and marine ecosystem as the use of ocean resources may undermine the potentials of ocean economy in Indonesia. In 2017, for example, around 38 percent of national capture fisheries were estimated to be overfished, with further 44 percent were fully fished (MMAF Decree No.50 Year 2017) (Figure 4.13).

This could reduce the export earning, government revenues and also the coastal communities' welfare. Even though the foreign fleet ship has been controlled effectively but the domestic fleet ship should also be monitored in a precise manner with good control and registration to create sustainable marine ecosystem management.

Meanwhile the challenges for aquaculture are many its productions have not complied with sustainability standard. Fishpond systems need to reduce carbon emission, as well as apply efficient and clean practices. In future developments, it is necessary to be more environmentally friendly. For seaweed cultivation some challenges still need to be overcome. The quality of genetic material for the seaweed industry also needs improvement considering that the seaweed farming is done clonally using cuttings due to the short season and the reuse of aunts. The impact of climate change and the efficacy of environmental conservation management also influence the quality of seaweed production (Hurtado, Magdugo & Critchley, 2020).

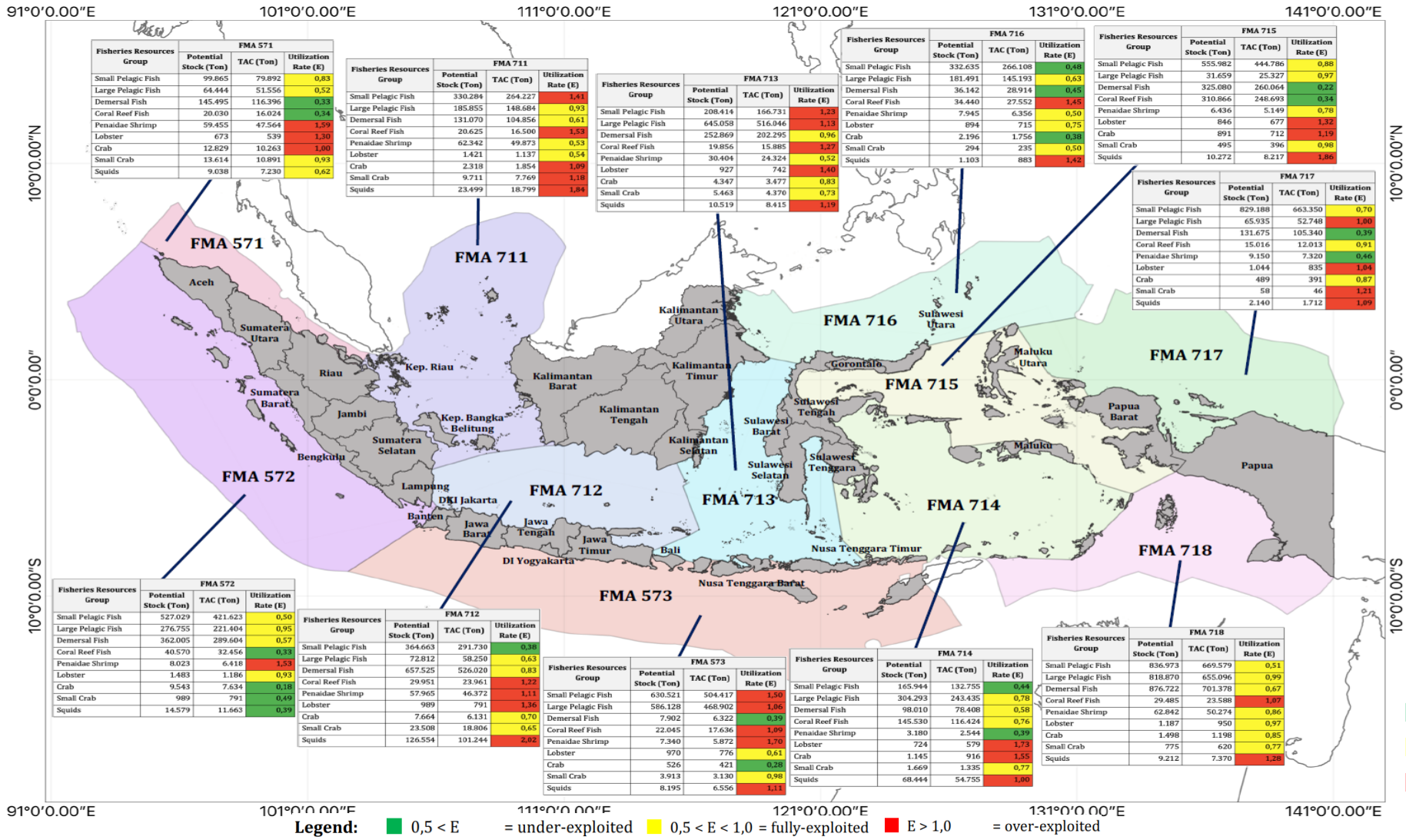
All of those challenges mainly because the business process of marine and fisheries in Indonesia majority operate near shore, and this region is the most vulnerable from overfishing/ overexploitation and ecosystem degradation. In the future, optimal harvesting and fisheries strategies would be a vital role in order to increase economic, social, and environmental sustainability. This needs to be complemented by good monitoring, surveillance and control by all aspect of stakeholders.

Trend and Drivers for Economic Transformation

Overexploitation of fisheries could decrease fish stocks and addition by uncertain situation generated by climate changes. Environmental degradation could make it worse. Meanwhile on aquaculture, the majority of Indonesia use traditional production techniques as three quarters from all aquaculture practices and about 80 percent of the designated area for aquaculture was not properly used (OECD, 2021). Improving fishing strategies could bring significant benefits from fishing to Indonesia and estimated to earn USD 3 billion annually (OECD, 2021).

New approaches to addressing IUU fishing in Indonesia have had notable success with introduction of new regulation. During 2014-2018 Indonesia has been sinking 318 fishing vessels which reduce 25 percent of total fishing effort driven by large scale ships (>100GT) (OECD, 2021). This strategy is complemented by the establishment of fisheries management authorities to decentralize and improve the fisheries management. With this strategy, the government succeeds to start a number of instruments including fees and charges on fisheries for licenses, to ensure the sustainability of resource use and taken step to adopt better marine spatial planning. Eleven Fishery Management Areas (WPP) were created. Each has set catch quotas, issues licenses and monitor fish stocks. Even though there are still limitations in monitoring fish stocks and quotas, but what WPP has done is in the right track to reduce, control and evaluate overfishing.

Figure 4.13 Exploitation Status of Fisheries within Indonesian FMA



Fisheries Resources Group	FMA 571 Potential Stock (Ton)	TAC (Ton)	Utilization Rate (E)
Small Pelagic Fish	99.865	79.892	0,83
Large Pelagic Fish	64.444	51.556	0,52
Demersal Fish	145.495	116.396	0,33
Coral Reef Fish	20.030	16.024	0,34
Penaidae Shrimp	59.455	47.564	1,59
Lobster	673	539	1,30
Crab	12.829	10.263	1,00
Small Crab	13.614	10.891	0,93
Squids	9.038	7.230	0,62

Fisheries Resources Group	FMA 711 Potential Stock (Ton)	TAC (Ton)	Utilization Rate (E)
Small Pelagic Fish	330.284	264.227	1,41
Large Pelagic Fish	185.855	148.684	0,93
Demersal Fish	131.070	104.856	0,61
Coral Reef Fish	20.625	16.500	1,53
Penaidae Shrimp	62.342	49.873	0,53
Lobster	1.421	1.137	0,54
Crab	2.318	1.854	1,09
Small Crab	9.711	7.769	1,18
Squids	23.499	18.799	1,84

Fisheries Resources Group	FMA 713 Potential Stock (Ton)	TAC (Ton)	Utilization Rate (E)
Small Pelagic Fish	208.414	166.731	1,23
Large Pelagic Fish	645.058	516.046	1,13
Demersal Fish	252.869	202.295	0,96
Coral Reef Fish	19.856	15.885	1,27
Penaidae Shrimp	30.404	24.324	0,52
Lobster	927	742	1,40
Crab	4.347	3.477	0,83
Small Crab	5.463	4.370	0,73
Squids	10.519	8.415	1,19

Fisheries Resources Group	FMA 716 Potential Stock (Ton)	TAC (Ton)	Utilization Rate (E)
Small Pelagic Fish	332.635	266.108	0,48
Large Pelagic Fish	181.491	145.193	0,63
Demersal Fish	36.142	28.914	0,45
Coral Reef Fish	34.440	27.552	1,45
Penaidae Shrimp	7.945	6.356	0,50
Lobster	894	715	0,75
Crab	2.196	1.756	0,38
Small Crab	294	235	0,50
Squids	1.103	883	1,42

Fisheries Resources Group	FMA 715 Potential Stock (Ton)	TAC (Ton)	Utilization Rate (E)
Small Pelagic Fish	555.982	444.786	0,88
Large Pelagic Fish	31.659	25.327	0,97
Demersal Fish	325.080	260.064	0,22
Coral Reef Fish	310.866	248.693	0,34
Penaidae Shrimp	6.436	5.149	0,78
Lobster	846	677	1,32
Crab	891	712	1,19
Small Crab	495	396	0,98
Squids	10.272	8.217	1,86

Fisheries Resources Group	FMA 717 Potential Stock (Ton)	TAC (Ton)	Utilization Rate (E)
Small Pelagic Fish	829.188	663.350	0,70
Large Pelagic Fish	65.935	52.748	1,00
Demersal Fish	131.675	105.340	0,39
Coral Reef Fish	15.016	12.013	0,91
Penaidae Shrimp	9.150	7.320	0,46
Lobster	1.044	835	1,04
Crab	489	391	0,87
Small Crab	58	46	1,21
Squids	2.140	1.712	1,09

Fisheries Resources Group	FMA 572 Potential Stock (Ton)	TAC (Ton)	Utilization Rate (E)
Small Pelagic Fish	527.029	421.623	0,50
Large Pelagic Fish	276.755	221.404	0,95
Demersal Fish	362.005	289.604	0,57
Coral Reef Fish	40.570	32.456	0,33
Penaidae Shrimp	8.023	6.418	1,53
Lobster	1.483	1.186	0,93
Crab	9.543	7.634	0,18
Small Crab	989	791	0,49
Squids	14.579	11.663	0,39

Fisheries Resources Group	FMA 712 Potential Stock (Ton)	TAC (Ton)	Utilization Rate (E)
Small Pelagic Fish	364.663	291.730	0,38
Large Pelagic Fish	72.812	58.250	0,63
Demersal Fish	657.525	526.020	0,83
Coral Reef Fish	29.951	23.961	1,22
Penaidae Shrimp	57.965	46.372	1,11
Lobster	989	791	1,36
Crab	7.664	6.131	0,70
Small Crab	23.508	18.806	0,65
Squids	126.554	101.244	2,02

Fisheries Resources Group	FMA 573 Potential Stock (Ton)	TAC (Ton)	Utilization Rate (E)
Small Pelagic Fish	630.521	504.417	1,50
Large Pelagic Fish	586.128	468.902	1,06
Demersal Fish	7.902	6.322	0,39
Coral Reef Fish	22.045	17.636	1,09
Penaidae Shrimp	7.340	5.872	1,70
Lobster	970	776	0,61
Crab	526	421	0,28
Small Crab	3.913	3.130	0,98
Squids	8.195	6.556	1,11

Fisheries Resources Group	FMA 714 Potential Stock (Ton)	TAC (Ton)	Utilization Rate (E)
Small Pelagic Fish	165.944	132.755	0,44
Large Pelagic Fish	304.293	243.435	0,78
Demersal Fish	98.010	78.408	0,58
Coral Reef Fish	145.530	116.424	0,76
Penaidae Shrimp	3.180	2.544	0,39
Lobster	724	579	1,73
Crab	1.145	916	1,55
Small Crab	1.669	1.335	0,77
Squids	68.444	54.755	1,00

Fisheries Resources Group	FMA 718 Potential Stock (Ton)	TAC (Ton)	Utilization Rate (E)
Small Pelagic Fish	836.973	669.579	0,51
Large Pelagic Fish	818.870	655.096	0,99
Demersal Fish	876.722	701.378	0,67
Coral Reef Fish	29.485	23.588	1,07
Penaidae Shrimp	62.842	50.274	0,86
Lobster	1.187	950	0,97
Crab	1.498	1.198	0,85
Small Crab	775	620	0,77
Squids	9.212	7.370	1,28

Source: KKP, 2017

Marine aquaculture potentially becomes the future of fisheries sector, but the expansion of aquaculture model in Indonesia needs to shift from high volume low value added model to one that increase the value added of product as its core. It is important for aquaculture practice not to diminishing the carrying capacity of mangrove and coral reefs, and instead to increase the effectiveness of monitoring, control and surveillance using integrated streamline regulations and bureaucracy to support business development and harness the benefits of improved maritime connectivity.

Future developments of marine living sector towards economic transformation may use marine geological databases for spatial and non-spatial data, including zoning for more efficient fisheries management, improved monitoring of catch data including by small and medium enterprises (SMEs). In addition, acceleration is required to map large geographic and oceanic zoning. Lack of marine geospatial knowledge has led to inadequate information about dynamic effect of climate change to marine ecosystem. A more detailed map scale is essential for detection and observation at smaller scales, precise grid composition of the seafloor, detailed knowledge of the entire marine ecosystem, identification of natural resources, as well as protection and monitoring of marine life. It is an important method for government in improving evidence-based policy for marine-living sector.

4.1.1.2 Marine Non-living

- ***Marine Manufacturing and Construction***

Economic Size

Marine structures include offshore platforms, submarine cables and pipelines, tourism vehicles, cargo ports, main ports, reclamation and sand mining. One type of marine structure built offshore is the offshore oil and gas platform (AMLP), which is a structure or building built offshore to support the process of exploration or exploitation of oil and gas. For each oil and gas platform that has passed the production period, the Cooperation Contract Contractor (KKKS) is required to carry out decommissioning and restoring the former mining site (abandoned site restoration). This AMLP disassembly requires large and technical cost.

Currently there are more than 600 AMLP scattered in Indonesian waters such as in the North Sea of Java, Sumatra, Natuna, and East Java. Most of these AMLPs were built around the 1970s to early 1990s. Some AMLPs are (or have) entered the end of their production life. In the decommissioning road map compiled by Special Task Force for Upstream Oil and Gas Business Activities of Republic of Indonesia (SKK Migas), there are around 102 post-production AMLPs that are proposed to be dismantled or reused for other sectors within the next seven years. Most of these AMLPs are located in the Java Sea area.

Challenges

Manufacturing and construction face a difficult time post-pandemic. Most cited challenges are disrupted supply chains, operational restrictions, and productivity. Manufacturing and construction is typically more volatile compared to the overall economy. Decline in economy growth results in less demand of new products and new facilities. The pandemic also give impact for a shock to supply. Some protocols reduce productivity and the supply chain have also been interrupted, further suspending production and distribution. Stagnant productivity, and low levels of digitization and profitability have also dogged the industries for years.

Trend and Drivers for Economic Transformation

In the marine-construction sector, highly specialized contractors become the top player for dredging, land reclamation, and offshore energy construction. Players will specialize in the future marine-construction industry ecosystem. Investment in research and development will play a significant benefit as a way of increasing the effectiveness and efficiency of operations in the industries. To improve its margins and level of differentiation, companies need to specialize in target niches and segments in which they can build a competitive advantage. Companies need to weigh the efficiency and effectiveness that enables them to deal with potential risks.

In the future, the marine manufacturing and construction will transition to a more standardized, consolidated, and integrated process in both construction and manufacturing. Construction and manufacturing process are expected to shift and industrialized setup by moving from a project to a product-based approach. Innovation, the use of digital technology, and control in value-chain will increase the importance of in-house expertise.

- ***Oil and Gas***

Economic Size

Indonesia is one of the global leaders in the late 20th century in energy sector. Nevertheless, the fall of oil and natural-gas production by 20 percent from the year of 2010 to 2019 had made Indonesia to become a net importer of oil, and probably become a net importer of natural-gas in the future (McKinsey, 2020). COVID-19 pandemic has caused a drop in the demand, but it may recover by 2022. In addition, Indonesia is still struggling in the development of renewable energy, with for only 2 percent of the combined potential of geothermal, solar, wind, hydro, and biomass sources, and only 12 percent of electricity from the renewable energy (McKinsey, 2020).

On the other hand, energy demand continues to increase, along with economic and population growth. Most of Indonesia's total energy needs come from commercial energy, and rely on the use of conventional energy sources such as oil and gas. The level of utilization of new and renewable energy is still very low when compared to the use of conventional energy, making the demand for oil and gas still very high. The total final energy consumption in 2018 was 875 million barrels of oil equivalent, in which the share of consumption was still dominated by fuel oil (Badan Riset dan Sumber Daya Manusia Kementerian Kelautan dan Perikanan, 2021).

Challenges

The availability of conventional energy derived from fossil energy faces the challenge of depleting reserves. This condition, together with environmental issues, prompts the shift from conventional energy to new and renewable energy, including from marine-based energy sources. The estimated potential for new and renewable marine energy reaches 49 GW (Ministry of Energy and Mineral Resources, 2019), but its utilization is still relatively low.

Much of the world seems to have huge concerns about climate change, and many countries seem to have reached a consensus on the pressing need for decarbonization. Many countries have expanded carbon-pricing initiatives, and there is renewed interest in clean-energy solutions such as hydrogen for industrial applications. Indonesia needs to be able to revitalize its energy sector by embracing these trends, and to benefit from better response and adaptation.

Trend and Drivers for Economic Transformation

The current climate provides an opportunity to reform Indonesia's energy policies. Revitalizing oil and gas sector in Indonesia post-pandemic becomes a strategic move and requires significant investment. This could make a significant impact for economy and social sector. Low oil prices globally have reduced the pressure for energy subsidies. Oil production in Indonesia has dropped significantly, while the production of natural gas from existing basins has also dropped in production. Boosting the domestic upstream industry could help Indonesia to decrease import of petroleum products.

Adopting new technologies in these sectors can help Indonesia support the lowest-income households if global oil prices rise. Digitalization, could also become drivers for economic transformation in oil and gas sector. Modern technology such as IoT and automation can give significant benefits for companies that invested heavily in digital technologies. Indonesian local companies have also the potential to use digital technologies, in some cases capturing significant impact in production increase and cutting production cost.

4.1.1.3 Marine-based Industry

Industry (manufacturing) sector in the blue economy can be developed through two sources, which are marine living and marine non-living products. The scope focuses on developing and strengthening the upstream and downstream value chains.

- ***Marine-based food processing industry***

Economic Size

The fishery product-based processing industry has long developed in Indonesia, with industry players consisting micro-, small- and medium-scale enterprises (MSMEs) and large industries. The majority of processing industries are located in the western part of Indonesia, while raw materials are supplied from the central and eastern regions.

Major processed fish products consist of fresh tuna, frozen tuna, canned tuna, shrimp, and wood fish with the raw materials mostly skipjack tuna (Boer, et al 2020). Other sources for the food processing industry come from seaweed and algae that can be processed and applied as food products such as frozen food, deserts, candies, fruit juices, etc. Indonesian seaweed products are ranked second for the global market (HS 121221), and second for seaweed and algae unfit for human consumption. The two products are considered quite competitive for export according to a revealed comparative advantage (RCA) analysis by the Australia-Indonesia Center (2021).

In 2017, most of the fish processing and tuna canning in Indonesia are dominated by MSMEs (98.2 percent). This condition leads to the low labor absorption (Boer, et al 2020). The growth of fish processing units is relatively low in Indonesia, which is only 0.5 percent for MSMEs and 2 percent for large industries. Such low growth may relate to the fact that the economic margin for processed fish products is often higher in simple processing (freezing, fresh, and sashimi) than further processed products (Hidayat, et al 2020). In 2019, the value-added for large and medium marine-based processing industry is IDR 29.96 trillion (BPS, 2021a). Fewer fishers are also engaged in fish processing activities due to more limited market for processed products as compared to fresh and simple processed products. In 2018, over 1 million workers are involved in the processing and marketing of fisheries products (CEA, 2018). Poor infrastructures and limited

markets are also identified as the major problems to develop value-added of fishery products.

Challenges

With the dominant proportion of MSMEs, the capacity of marine-based food processing units is in general still low. Main challenges faced include lack technical skills, as well as low quality assurance of products and raw materials. Some improvement in technical and vocational education and trainings is needed, including for the application of appropriate aquaculture techniques. Technical knowledge and capability of the MSMEs in applying production standard, particularly related to food safety, are crucial for allowing them to expand the market for their products. At the same time, the requirement to get feasibility certification (SKP) at the unit of the shipping industry is important to ensure product quality preservation during product shipment.

Another challenge faced by the fishery processing industries is sustainable supply of raw materials and dynamic changes of consumer preferences. From 2010 to 2018, the average demand for fish processing was 3 million tones of seawater fish and 115,000 tones of freshwater fish. Currently, there is still a shortage of raw materials, and they are often met by imports even, although the supply is subject to international trade and the environment policy (Sitanggang in Boer, 2020).

Trend and Drivers for Economic Transformation

Strengthening the marine-based processing industries for economic transformation can be done by establishing or facilitating investment for marine-based processing industries in regions close to the fish production center. The advancement of technology also offers an alternative solution through the use of satellite data for identifying fish stock availability. However, this coverage of satellite data model is still limited as it monitors not on the weight/quantity of the fish stock and covers only shallow waters (Australia-Indonesia Centre, 2021).

Participation in GVC for the marine-based processing industries may also become one of the solutions for securing a sustainable enterprise. This can be at the intermediate value chains or at the processing of final goods. The effort requires sufficient capital, capability in technology mastery, and good management capacity. Setting up a partnership or joint venture involving local industries and foreign investment could also be an opportunity to not only sustain the processing enterprise, but also expand the downstream marine-based food processing industry and export. The later and in general, for market expansion, also requires supports in the aspects of quality port infrastructure and services—particularly outside Java, reliable electricity supply/electrification for cold storage and processing, low rent seeking practices and cross-border trade efficiency (Sitompul, 2018).

To improve participation in GVC, Indonesia has developed National Fish Traceability and Logistic System (STELINA) with the hope that the system can improve product value to global market and ensure that fish products are obtained sustainably. Furthermore, product traceability will facilitate the process of product certification as one of the requirements for exporting fishery products. Nevertheless, data availability, quality, and integration still face some challenges in the implementation.

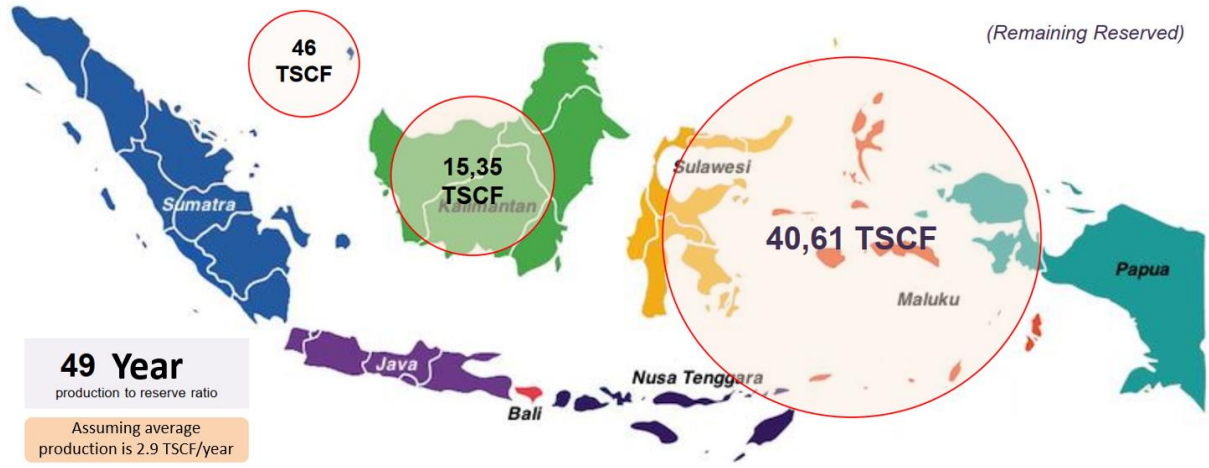
- ***Marine-based chemicals Industry***

Economic Size

Sediment of microorganisms, dead plants, and animals on the seafloor provide the source of petroleum and natural gas. Petrochemical industry uses hydrocarbon compounds from oil and natural gas as fundamental raw materials. Petrochemical products are classified into four categories based on their production and use processes: (i) basic products such as synthetic CO and H2 gas, ethylene, propylene, butadiene; (ii) intermediate products such as ammonia, methanol, carbon black, urea, ethyl alcohol, ethyl chloride; (iii) final products such as urea, carbon black, formaldehyde, acetylene, polyester, nylon, poly urethane, LAB-sulfonate; and (iv) finished products such as plastics for electronic and telecommunication products, plastics for households, plastic equipment for the car and aircraft industry, polyester and nylon threads for clothing and socks, car tires made from a mixture of rubber and carbon black, and soap detergent powder.

The petrochemical industry is a sub-sector of the petrochemical, chemical, and rubber goods industry. From 2009 to 2013, the petrochemical industry grew at a 4.6 percent annual rate. In 2013, this sub-sector generated 12.21 percent of the non-oil and gas industry sector's total GDP. Largest petrochemicals industry is located in Cilegon. Based on study from the Ministry of Industry and Sucofindo, oil and gas have 7,534.90 MMSTB and 142.72 TSCF reserves, respectively. It is located in Sulawesi, Maluku, Papua, Kalimantan, and Sumatra (Figure 4.13).

Figure 4.14 Indonesia's Natural Gas Supply



Source: Ministry of Industry and Sucofindo, 2020

Challenges

Demand for intermediate products in Indonesia will continue to increase until 2020, including ethylene (1,849 thousand tones), propylene (1,025 thousand tones), butadiene (135 thousand tones), polyethylene (1,777 thousand tones) and polypropylene (1,962 thousand tones). The increase in demand for these products is projected to continue to grow by 20-50 percent, especially for ethylene and propylene products. However, the Indonesian petrochemical industry has not been able to meet all domestic needs, so that petrochemical products are one of the contributors to the trade balance deficit.

Trend and Drivers for Economic Transformation

The marine-based chemical industry can be strengthened to support economic transformation by implementing the following strategies: (i) business integration and localization to increase industry agility in more efficient planning and operational processes, facilitate integrated technology applications, and distribution optimization; (ii) digital exploration of energy sources and underwater mining; (iii) application of digital ecosystems and automation to the withdrawal of energy sources and operating processes, for examples, the adoption of process system engineering (refineries), smart chemical plants, even simple programmable logic controllers (PLCs); (iv) development of downstream specialties products to increase value added, and achieve efficiency and chemical output of commodities; and (v) promotion of waste processing as a new-end market opportunity and an alternative source of feedstock chemical industry.

- ***Salt***

Economic Size

The use of salt is used in three fields, namely food, industry and preservatives. The salt manufacturing industry is a subsector of the chemical, pharmaceutical, and traditional medicine industries, with a GDP of IDR 296,710 billion, accounting for 2 percent of GDP's National (BPS, 2021a). The salt manufacturing industry is included in the seasoning and other cooking products industry with a value added of IDR 58 trillion. In 2019, the salt manufacturing industry employs 53,981 workers (BPS, 2021b).

Challenges

Indonesia salt industry is still unable to meet domestic needs. In 2020, 66 percent of national demand was fulfilled by imports.[2] Consumption salt has a NaCl content of 87 percent by dry weight and an impurities content of 2 percent and a maximum water content of 7 percent. This salt is widely used for food products; while industrial salt has a NaCl content of about 97.5 percent with a sulfate, magnesium and calcium content of 2 percent. The demand for this type of salt comes from the petroleum, textile and leather tanning industries, Chlor Alkali Plant (CAP) industrial salt as part of basic chemical processes, and the manufacture of soda and chlorine and even pharmaceutical salt.

Trend and Drivers for Economic Transformation

The government continues to prioritize improving the quality of domestically produced salt, including through improving production methods and applying technology both in the field and in the salt processing industry. The Integrated Industrial Salt Program is one of the National Strategic Project (PSN) aiming at increasing the industrial salt production (Presidential Regulation 109 Year 2020). This project consists of three major parts, namely the People's Salt Processing Plant *(Pabrik Pengolahan Garam Rakyat)*, Integrated Bittern Production, and the PLTU Salt Factory.

The later is very potential. The desalination and the usage of a reverse osmosis (RO) system in Electric Steam Power Plant (PLTU) converts seawater to freshwater, resulting in waste water in the form of salt water. Based on the study of Prihatno et al. (2019), waste water from PLTUs in Java has a salt content of 6° Be. It only takes 5 days to attain a salt concentration of 27° Be from

[2] In 2020, Indonesia import about 2.9 million tones salt out of the total national demand (4.4 million tones).

the waste water. As much as 500 kilos of salt crystals with a 95 percent NaCl content were produced from 15 liters of wastewater with a plot of 1 meter x 1 meter and a water height of 5 cm. Indonesia has 11 PLTUs in Java and 26 PLTUs elsewhere in the country. If each steam power plant has three reverse osmosis desalination units that operate for 24 hours, the output of wastewater is the raw material for making salt.

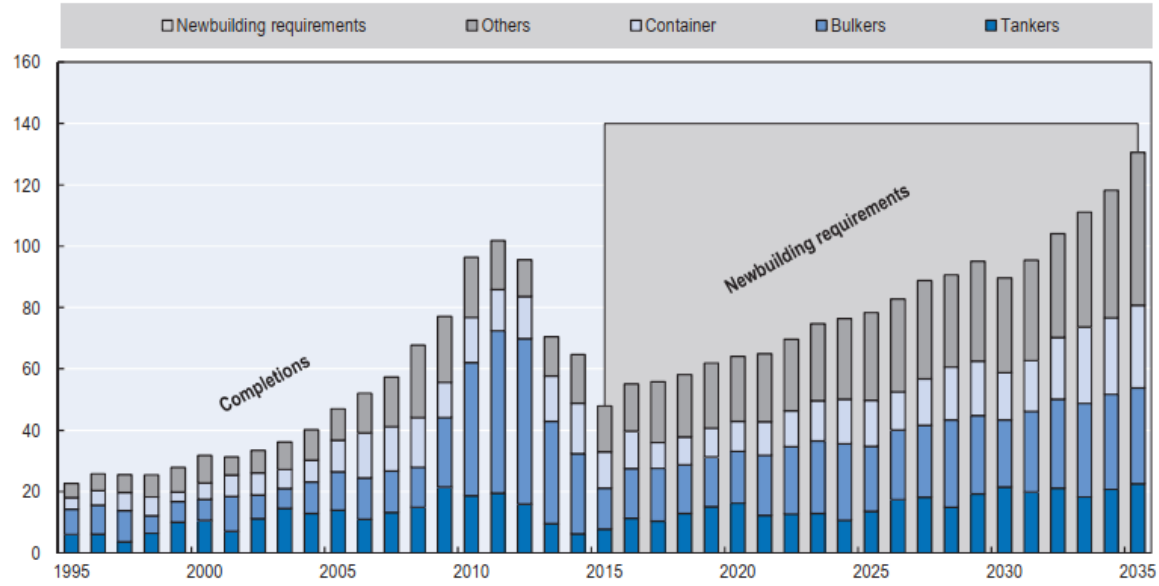
- ***Shipbuilding Industry***

Economic Size

The global shipbuilding industry growth is influenced by a range of factors such as underlying global trade expansion, energy consumption and prices, vessel age profiles, ship retirement/scrapping and replacement, changes in cargo types, and trade patterns. Based on previous OECD work on shipbuilding and data from SEA Europe and IHS Global Insights, total new building vessel requirements are expected to reach around 1,230 million gross tonnage (GT) during the next 20 years (Figure 4.14).

Tankers are likely to account for around 420 million GT. Bulkers could make up about 550 million GT and containers are expected to reach a total of roughly 264 million GT. Future vessel requirements are not expected to return to the 2011 peak level of completions until 2035. As a consequence, global future vessel new building requirements in 2030 are likely to be around 70 million GT, compared to 67.7 million GT vessel. Conditioned by the low vessel requirements due to overcapacity in the industry, the global value added in the business-as-usual scenario for shipbuilding and repair is estimated to contribute around USD 103 billion to the global economy, assuming a continuous trend to more high-value ships. Within this scenario, employment in shipbuilding will grow by only around 24 percentage points, resulting in around 2.3 million full-time equivalent jobs.

Figure 4.15 Past Vessel Completions (1995-2014) and Future New Building Requirements (2015-35)



Source: OECD, 2016b

Indonesia has 250 shipbuilding enterprises, with the majority located in Sumatera (26 percent), Kalimantan (25 percent), and Java (37 percent). The total capacity of the Indonesian shipbuilding industry is 0,9 million deadweight (DWT) tonnage, with barely 35 percent utilization. Based on

Statistics of Manufacturing Indonesia in 2019, the shipbuilding industry involved 27,601 workers. The Ministry of Industry is developing a roadmap for shipyard industries, with aim to having a national shipyard capable of building a variety of ships with a maximum capacity of 200.000 DWT by 2025, with local ship component businesses providing thought and competitiveness.

Challenges

Indonesia's shipbuilding industry sector only contributes 0,034 percent to the national GDP, and almost negligible to the world market. Based on data from the Indonesia National Ship-owners Association (INSA), the number of ships with the Indonesian flag was 14,300 ships in 2014 and continues to increase. The growth is fluctuated because the majority of the country's shipping fleet is imported or produced by foreign shipbuilders. This practice is related to lower prices offered by foreign shipbuilders than those offered by Indonesian shipbuilders. Indonesia ship producers actually offer benefits in terms of low labor costs, but they have scarcity of experts and a poor rate of production.

In terms of technology, Indonesia's research and development of ship technology is still in its early stages, but it has a competitive edge over other Southeast Asian countries. Transfer of technology program is needed, and this can be developed through joint production partnership with foreign producers. Strategic Sealift Vessel is one of example, in which the imported materials were assembled using local resources for design and technology.

Trend and Drivers for Economic Transformation

The shipbuilding industry may be strengthened by implementing the following strategies. First, the utility can be improved through collaborative operation using complementary capacity among different shipbuilding enterprises. This will lead to an optimal production and profit. Second, the industry needs to have better access to financial assistance from the bank, as well as policy assistance from the government. The shipbuilding industry is a capital intensive business, and financial help will secure their operations and give the industry a better chance of survival. Finally, knowledge pool and technological capability in the shipbuilding industry needs to be improved in order to response to client demands of new products.

4.1.1.4 Tourism

Economic Size

The global tourism industry, of which marine and coastal tourism is a major component, currently accounts for approximately 5 percent of global GDP (UNWTO, 2011) and is expected to continue to grow. Tourism, which is the second largest ocean-based industry after oil and gas, accounts for 26 percent of total value added in the global ocean economy (OECD, 2016b). Based on these growth projections, value added from marine and coastal tourism would double between 2010 and 2030 and employment would increase by 22 percent (OECD, 2016b).

In Indonesia, the number of foreign tourist arrivals had grown from approximately 5 million in 2000 to 16 million in 2019 (World Bank, 2020d). China was the country's main international source market (16 percent of tourists), followed by Singapore (13.2 percent), Malaysia (10.6 percent) and Australia (9.7 percent) (OECD, 2020c). In 2017, the direct contribution of the tourism sector to Indonesia's GDP was estimated at 4.1 percent, while the indirect contribution – which also includes downstream revenues - can be even higher (OECD, 2020c). In the same year, it also provided 12.7 million jobs, representing 10.5 percent of total employment, significantly higher than the OECD average (6.9 percent) (OECD, 2020c).

Challenges

The attractiveness of Indonesia's marine and coastal tourism resides in the wealth of its marine biodiversity, which appeals to tourists from all over the world. Its coral reef area was estimated at 50.875 km^2, representing approximately 18 percent of the global coral reefs (Wilkinson, 2008). The country is also home to a number of world-renowned marine biodiversity hotspots, including the Coral Triangle, the Bird's Head Seascape and the Sunda Banda Seascape. The Coral Triangle site alone, which is shared by six countries but whose area is predominantly in Indonesian territory, contains 76 percent of the world's coral reef species and 37 percent of the world's coral reef fish species (WWF, 2020). This richness in biological diversity generates significant economic value by attracting tourists and contributing to enhance the external image of Indonesia as a prestigious touristic site.

However, this wealth and diversity in natural capital is increasingly threatened by tourism-induced environmental degradation. According to the WEF Travel and Tourism Competitiveness ranking, Indonesia sits 17th worldwide in terms of the richness of its natural resources but 135th out of 140 countries in terms of the environmental sustainability of its tourism sector. This indicator captures the change in forest cover, the scarce prevalence of wastewater treatment, the high number of threatened species, and other measures that reflect the overall level of unsustainability of the sector (WEF, 2019). In many destinations, including Nusa Penida (Bali), unsustainable tourism itself has been shown to be responsible for the degradation of coral reefs (Tito and Ampou, 2020).

Table 4.1 The Priority Tourism Destinations

Destination	Focus of Intervention	Marine/Terrestrial
Borobudur	2015-2019, 2020-2024	Terrestrial
Mandalika	2015-2019, 2020-2024	Marine
Lake Toba	2015-2019, 2020-2024	Terrestrial
Labuan Bajo	2015-2019, 2020-2024	Marine
Morotai	2015-2019, 2020-2024	Marine
Mount Bromo-Semeru-Tengger	2015-2019, 2020-2024	Terrestrial
Tanjung Kelayang (expanded to Bangka Belitung Island in 2020-2024)	2015-2019, 2020-2024	Terrestrial and Marine
Tanjung Lesung	2015-2019	Marine
Thousand Islands	2015-2019	Marine
Wakatobi National Park	2015-2019, 2020-2024	Marine
Manado-Likupang	2020-2024	Terrestrial and Marine
Raja Ampat	2020-2024	Marine

Source: 2015-2019 National Medium Term Development Plan and 2020-2024 National Medium Term Development Plan.

Trend and Drivers for Economic Transformation

Tourism has become one of the developments focused by the Indonesian government, as tourism is expanding globally. One of the key actions by Indonesian government was the acceleration of 10 priority tourism destination development (Table 4.1) in the 2015-2019 (often referring to "10 new Balis") and 2020-2024 National Medium Term Development Plans, in order to replicate the success of Bali as Indonesia's most famous international tourist destinations and aiming to geographically diversify the tourism industry in the country. The reason was most of the tourism industry only focused

on two major destinations for marine tourism, which are Bali and Lombok together accounted for approximately 50 percent of all foreign arrivals.

Figure 4.16 10 Priority Tourism Destinations in National Medium-term Development Plan 2020-2024

Source: Presidential Regulation No.18 of 2020

Existing condition of the tourism industry in Indonesia, coastal and marine tourism, was the second largest contributor representing the tourism category in nature-based tourism (35 percent), after eco-tourism (45 percent) (Ollivaud and Haxton, 2019). Of the priority tourism destination, seven include marine and coastal locations which require a special focus on environmental sustainability and the conservation of natural capital.

Due to COVID-19 pandemic, the tourism industry was significantly affected. The recovery plan has been designed and this could be the chance to build back bluer, particularly in response to the increasing trend of environmental awareness and sustainable tourism practices. This could be the opportunity to set ocean-based sectors, especially coastal and marine tourism on a sustainable footing; making them into catalysts for long-term and inclusive sustainable development and enhancing systemic resilience. The tourism industry can contribute to protect marine natural capital.

When built upon broad stakeholder engagement and sustainable development principles, marine tourism in Indonesia can raise awareness of environmental values, and help finance the protection and management of protected and sensitive areas. The development of marine tourism in Indonesia is also expected to play an important role in demonstrating the economic value of environmental conservation and maintaining the authenticity of a destination, primarily through the level of activity that stimulates in the local, regional, and national economy (OECD, forthcoming).

4.1.1.5 Trade, transportation, and logistics

Economic Size

Globally, marine transport provides the principal mode of facilitating shipping various types of goods and passengers. In 2018, over 95 percent of Indonesia's global exports, in terms of value, was transported by sea. This number is even higher if we use the trade in volume terms, in which only 0.03 percent of Indonesian export was sent by other than maritime transports. These numbers are

predictable as Indonesia's comparative advantages are still natural resources and bulky products that can only be shipped via ocean transports, such as crude palm oil (CPOs) products (accounted for 13.4 percent of non-oil and gas export in 2020), coal (11.1 percent), various steel products (7.0 percent), rubbers (3.6 percent), and many other commodities including agricultural and fisheries products. Meanwhile, ocean passenger transportation activities had also increased. Compared to 2018, the number of ship passengers in 2019 for embarked and debarked passengers increased by 10.71 percent and 11.37 percent respectively (BPS, 2020a).

Transportation sectors also have significant contributions for economic growth. Transportation and storage sector contributed around USD 63.4 billion to the Indonesian economy, accounting for 5.57 percent of its GDP in 2019. Interestingly, even though Indonesia is an archipelagic country, sea transport only contributes to 0.32 percent of Indonesia's GDP in 2019, while the largest shares are land transport (2.47 percent) and air transport (1.63 percent). However, in 2020, due to the pandemic, sea transport economic growth contraction was relatively smaller, that was 4.57 percent, compared to the whole transportation sector that was contracted by 15.04 percent. Meanwhile, the number of people working in the transportation sector in 2020 was 5.42 million workers (BPS, 2020b).

In terms of value added, Indonesia's maritime shipping contributed 1.3 percent of ocean economic activities in 2013 (Ebarvia, 2016). Based on OECD gross value added (GVA) data, Indonesia also generated the largest value added from maritime freight (USD 2.6 billion, or 8.0 percent of constant 2010 USD) and maritime passenger transport (USD 2.2 billion, or 7.0 percent) compared to ASEAN countries in 2015.

There are three types of ports in Indonesia: commercial, non-commercial and private. The commercial ports are managed by Indonesia's state-owned enterprises (SOEs), named Pelindo I – IV, which play a key role in advancing the maritime industry in Indonesia. Non-commercial ports are under the responsibility of the Ministry of Transportation. Meanwhile, private ports serve companies' needs in various industries such as mining, oil and gas, fisheries, forestry, chemicals, basic metal, etc. and have limited capacity to accommodate third-party cargo. The total throughput of Indonesia's container port system increased from around 10 million TEU in 2010 to 12.85 million TEU in 2018 (UNCTAD, 2019).

Challenges

As an archipelagic country, transporting goods between islands is challenging, let alone to export markets. Having coastal areas is typically regarded as an advantage, since it makes trading easier, while being a landlocked country is a disadvantage, due to connectivity limitations (Limao and Venables, 2001). However, having thousands of islands that are connected mainly through the ocean costs Indonesia a lot. Indonesia is still struggling to integrate its domestic economy. Even though Indonesia has more than 1,000 seaports, the inter-linkages between them are relatively weak (Hill, Resosudarmo and Vidyattama, 2008). Imbalance of economic and trade activities between the west part and the east part of Indonesia add other connectivity and efficiency issues in transporting goods.

In 2018, Indonesia had about 157 seaports that are internationally connected. This includes commercial ports that are managed by state-owned enterprises and private ports. However, many exporters from various areas in Indonesia often need to send their products to Java Island before sending it to destination countries due to poor logistics infrastructure or geographical constraints (Basri and Rahardja, 2016). The condition would increase additional costs for exporters before accessing foreign markets. As the result, Indonesia's logistics costs are higher compared to its neighboring countries (World Bank, 2016a). Meanwhile, Indonesia's integration into the global liner shipping network has been relatively low (Tongzon and Suryanta, 2021). This can be seen in

Indonesia's Liner Shipping Connectivity Index (LSCI) that has also been lower compared to ASEAN countries (UNCTAD, 2020). Indonesia also ranked 46 out of 160 countries in the World Bank's Logistics Performance Index 2018 (World Bank, 2018a). its ranking improved in 2018 compared to 2016, but it is still lower than Singapore (7), Thailand (32), Vietnam (39), and Malaysia (41). It indicates that Indonesia's logistics performance remains inefficient to some extent.

Lockdown policies implemented by Indonesia's key trading partners during COVID-19 pandemic have significantly affected export logistics flows in Indonesia. The pandemic has disrupted global trade routes, slowing ships to anchor and cargo handling at export destination countries' seaports. For these reasons, a number of containers are in shortage and the capacity of shipping for shipment is limited. These lead to a great number of products in Indonesia's factories that are stalled for export or pending shipments, lowering Indonesia's exports.

The supply shortage in container and shipped space and a decrease of shipment frequencies have significantly increased the cost of freight. Indonesian Logistics Transportation Society Forum notes that freight cost increases more than double from USD 800 per TEUS in 2019 to USD 1,800 per TEUS in 2021 due to the negative effects of COVID-19 on export logistics. Indonesian Textile Association (API) also confirmed this shortage and a reduction in shipment frequencies raised the freight cost of textile products to export from USD 1,800 per container to USD 6,000 per container (shipment from Indonesia to the US).

Trend and Drivers for Economic Transformation

The performance of export logistics affects export flows. An improvement of seaports raises Indonesia's exports by 13.3 percent (Shepherd and Wilson, 2009). A one-point increase in the seaport quality index promotes Indonesia's trade flows by about 5.2 percent (Suryanta, 2020). These confirm that the port infrastructure improvement determines the success of Indonesia export. Sound policies and regulations are critical to improve maritime transport and logistics. As various players are involved in maritime transport and logistics, these policies and regulations should be non-discriminatory and less restrictive as well as be implemented transparently and consistently in order to ensure the sector is efficient (Tongzon and Suryanta, 2021). The quality of the institution is crucial to the success of improving logistics performance.

As increasing export performance is one of Indonesia's strategies to achieve higher economic growth, Indonesia's maritime transportation and logistics should also improve. The future growth of Indonesia's trade demand high performed seaborne logistics and supportive regulations and policies.

The international regulations also play important roles. Greenhouse gas emissions from shipping and ports contribute to global warming. Air pollution from ships damages the marine environment and human health. The International Maritime Organization (IMO) has asked for the implementation of green economy principles in the International Convention for the Prevention of Pollution for Ships (MARPOL). Indonesia is also being asked to reduce maritime ships emissions. Further, the blue economy concept has also become one important consideration to obtain green financing from international funders.

4.1.2 Emerging and Future Sectors: Potentials and Development

4.1.2.1 Renewable Energy

Economic Size

Energy is available in many forms in the coastal and marine environment. Beyond hydrocarbon deposits under the seafloor, the ocean provides several renewable forms of energy including waves, tides, currents, thermal gradients, wind and biomass. As global energy demand continues to climb and industry searches for alternatives to traditional fossil fuels, exploitable marine-based renewable sources hold the potential to exceed all current global energy needs.

In 2018, the total primary energy production consisting of oil, gas, coal and renewable energy was 411.6 MTOE. Around 64 percent or 261.4 MTOE from the total production especially coal and LNG was exported. Besides that, Indonesia also imported energy especially crude oil and petroleum products of 43.2 MTOE and small volume of high rank coal to meet industrial sector's need. The total final energy consumption (without traditional biomass) in 2018 was around 114 MTOE derived from 40 percent transportation, 36 percent industry, 16 percent household, 6 percent commercial sector and 2 percent other sectors (National Energy Council, 2019).

Throughout 2019, Indonesia added 385 MW of renewables, giving a total of 10,169 MW of renewables or an increase of 3 percent year-on-year. Some of the new projects that came in 2019 are geothermal (PLTP) Muara Laboh (85 MW), PLTP Sorik Marapi Unit I (42.3 MW), PLTP Lumut Balai Unit 1 (55 MW), solar (PLTS) Likupang (15 MW), PLTS Lombok (15 MW), and wind (PLTB) Jeneponto (72 MW). In terms of generation, renewable only contributed to 12.2 percent of installed capacity mix in 2019. The renewable generation mix has been stagnant since 2011, ranging around 11 percent to 13 percent of electricity mix with hydropower and geothermal have been the main contributors to the mix (IESR, 2019).

Challenges

Indonesia's current challenge is contributions of marine and wind energy remain limited with their combined share in total renewable energy use at below 3 percent. Investment in renewable energy is one of the factors causing the low contribution of renewable energy in Indonesia. A lack of investment in renewable energy signals lack of investor's confidence in this sector. Investors were discouraged by poor incentives provided by existing regulations and political situation due to election and government transition. By September 2019, investments only reached USD 1.17 billion or 65 percent of 2019 target at USD 1.8 billion. The largest contribution of investments in geothermal projects (USD 0.52 billion) also exhibits that investments in other types of renewables are greatly lacking. Overall, this level of investment is not on track with the level of investment required to meet 23 percent renewable energy mix target in 2025 (National Energy Council, 2019).

The demand and potential for renewable energy in Indonesia are increasing simultaneously, due in large part to the fact that Indonesia is amongst the fastest-growing energy consumers globally. It comes as no surprise with robust economic developments, steady trends in population growth and increased urbanization throughout the last decade. Final energy demand by type energy shows the electricity demand in 2050 will be more dominant respectively. The high electricity demand is influenced by the increasing use of electronic appliances especially in household as well as the substitution of generator in industry and commercial sector to on-grid transmission.

Trend and Drivers for Economic Transformation

Marine Renewable Energy (MRE) includes both offshore wind energy and ocean energy. Offshore wind energy is currently the only commercial deployment of a marine renewable energy with wide-scale adoption. Offshore wind energy is the most developed form of marine-based renewable energy, with capacity expected to reach at least 40 GW per year globally by 2020 (European Commission, 2021). Marine-based energy supply is experiencing a growth and development period. A large number of development and demonstration projects are under way throughout Europe to advance new technology related to wind power, marine current power and wave power. Ocean energy that comes from currents, waves, tides and energy from differences in sea temperature can be used as alternative energy to generate electricity, and is a renewable energy because it comes from sustainable natural processes. For example, The Government of Sweden considers that there is a need to continue investments in renewable energy area to achieve the goal of increasing the share of renewable electricity production.

During the last decade, the wind energy sector saw a strong increase in offshore wind technologies due to higher capacity factors achievable, much larger sites availability and a remarkable cost reduction, supported by important technological advances, such as in wind turbine reliability. Offshore wind energy (production and transmission) in EU, for example, contributed 0.2 percent of the jobs, 0.8 percent of the GVA and 1.4 percent of the profits to the total EU blue economy in 2018 (European Commission, 2021). The sector is still relatively small but is in expansion. Some activities related to offshore wind energy include production of electricity, transmission of electricity, and construction of utility projects for electricity and telecommunications.

The declining fossil energy production especially crude oil and the global commitment in reducing greenhouse gas emission has encouraged the government of Indonesia to increase the role of new and renewable energy continuously to maintain energy security and independence, including from marine renewable energy. As stated in Government Regulation No. 79 Year 2014 on National Energy Policy, new and renewable energy mix target is at least 23 percent by 2025 and 31 percent by 2050 (IRENA, 2017).

It is estimated that the total potential of marine renewable energy in Indonesia is up to 60,000 MW (National Energy Council, 2014). Based on estimates released by the Ministry of Energy and Mineral Resources (ESDM) in 2009 and the Directorate General of New Renewable Energy and Energy Conservation, ESDM (2014), the potential for marine energy in Indonesia reaches 49 GW. As of today, only the potential of ocean currents has been measured. The total potential (from 10 locations) of tidal energy has been estimated at 18 GW (Ministry of Energy and Mineral Resources, 2016), suggesting that marine renewable energy has a significant potential in bridging the gaps of providing economically viable, socially acceptable, and environmentally friendly energy to support the socio-economic development in Indonesia's coastal villages.

There are several opportunities for developing renewable energy in Indonesia. First, the government can enhance collaboration to help shape policy in a rapidly evolving industry. Second, the provision greenhouse gas emission regulations and responses to consumer preference can drive the creation of new markets for low- to no-emission energy production. Lastly, leveraging investment from multipurpose infrastructure can result in multiple benefits, for example, wave turbines can act as flood barriers; and existing seawalls can enhance tidal energy production.

The Government Regulation No. 79 Year 2014 on National Energy Policy also outlines a target to develop a wind power and marine energy plant pilot project in order to prepare the stage of

commercialization. One pilot project on wind power plant (PLTB) was developed at Sidrap in Sidenreng Rappang Regency in South Sulawesi Province. The capacity is 70 MW. The PLTB can supply electricity to 70,000 households with the assumption. The challenge of this pilot is reliability as the electricity production follows the pattern of two seasons in Indonesia with the characteristics of the low wind season during the rainy season and the big wind season during the dry season. Nevertheless, the second pilot has already been on schedule to be developed in Jeneponto Regency, South Sulawesi, to expand the electricity service to an additional of 60,000 households.

Indonesia has also developed plants for wave energy in Yogyakarta, tidal current energy in East Lombok and ocean thermal energy conversion (OTEC) in Bali. In addition, energy sourced from ocean currents has also been found in several locations in Indonesia with maximum practical resources (Table 4.2).

Table 4.2 Ocean Current Energy Potential

Maximum Practical Resources (Kw)	Location
0- 200.000	Riau, Sugi (Riau), Lampa (Natuna), Lembeh, Lirung (Talaud), Mansuar (Raja Ampat), Molo, Larantuka, Boleng
200.000 - 400.000	Selat Sunda, selat Lombok, selat Pantar
> 400.000	Alas

Source: Ministry of Energy and Mineral Resources, 2020

4.1.2.2 Bioeconomy and Biotechnology

The blue bioeconomy and biotechnology sector include the non-traditionally exploited groups of marine organisms and their commercial biomass applications.

- ***Bioeconomy***

Economic Size

Macroalgae or seaweeds are an important biological resource, providing a variety of ecosystem services and socio-economic value. Their production is the fastest growing sector in global marine aquaculture, generating an excess of USD 13 billion annually, having significant potential for innovation, particularly on the development of valuable products (e.g., functional foods, cosmeceuticals, nutraceuticals and pharmaceuticals), and expected to gain further traction given the increasing perception of algae as healthy and sustainable foodstuffs, particularly in developing markets of western cultures (Moreira et al, 2021).

Though seaweed is harvested around the world, eight countries in Asia produce a staggering 99 percent. China and Indonesia are, by far, the most significant producers. According to the Food and Agriculture Organization, China's holds a 47 percent share of the total production of 30.05 million tones, while Indonesia's share is 38 percent (Hasnawati and Eugene, 2020). Seaweed is the most significant contributor to Indonesia's total aquaculture production. It is also a growing economic driver. Up to 80 percent of seaweed exports are in the form of low value-add dried raw materials sent to China, South Korea and Vietnam (Hasnawati and Eugene, 2020).

Challenges

Despite the promising potential, there are a number of challenges to cultivating and processing seaweed. For instance, processing seaweed for products, such as food, cosmetics, as well as spices, can produce a large amount of waste. Processing of gracilaria and cottonii seaweed can produce 8,174,150 cubic meters of liquid waste and 62,506 tones of solid waste per year (Rahman and Fadhli, 2021). It is, hence, suggested to balance between the processing of seaweed and the environment sustainability. The large amount of waste generated while processing seaweed can be recycled for other uses. For instance, liquid waste can be used as liquid fertilizer, while solid waste can be used as a raw material in ceramics, particle boards, fertilizers, and even light bricks

Another challenge is related to the limited management capacity of some seaweed factories in eastern part, mostly local government owned factories. No processor operates at full capacity. Some use as little as 30 percent to 40 percent of their productive capacity. Low capacity is most likely due to a lack of access to seaweed or a lack of market access (CBI, 2019).

Trend and Drivers for Economic Transformation

Algae and invertebrates are important resources that potentially strengthen the bio-based sectors and support the development of economic activities in coastal areas. Although some of these biomass sources have been traditionally been used as food, feed or fertilizers in the past, new commercial applications are under development. The extraction of high-value bioactive compounds has high market potential. Some potential sub-sectors in the development of bioeconomy include:

1. Innovation (no. of patents – governance);
2. Farm management (environmental); and
3. Marine genetic resources (e.g. application in pharmaceuticals – environmental).

Besides their commercial benefits, algae and invertebrates have the potential to contribute to the sustainability of the food systems and releases pressure off of overexploited marine resources. They can also provide environmentally sound solutions by removing nutrients in excess from the water.

The algae biorefinery (or algae biofactory) is currently being explored as an approach to increase the environmental sustainability, by optimizing resources and minimizing waste, and economic feasibility, by maximizing profits, of existing conventional industrial processes. Several European scale projects have been researching ways to optimize processes and upscale production with the aim of facilitating the widespread implementation of an algae biorefinery in Europe and boost the algae sector.

Algae biomass related sector, is the most developed of the emerging sectors of the Blue Bioeconomy. In this context, the term algae biomass will include microalgae, macroalgae (seaweeds) and cyanobacteria (Spirulina). A 2016 report from the World Bank estimates that the annual global seaweed production could reach 500 million dry tones by 2050 if the market can increase its harvest 14 percent per year. Reaching 500 million would boost the world's food supply by 10 percent - from the current level - create 50 million direct jobs in the process and, as a biofuel, replace about 1.5 percent of the fossil fuels used to run vehicles (World Bank, 2016b).

Table 4.3 Main Research Projects on the Use of Algae Biorefineries in Europe

Project name	Main achievements	Expected impact on the algae sector in Europe
Valuemag. Valuable products from algae using new magnetic cultivation and extraction techniques	Development of technological solutions for: · microalgae production; · metabolites extraction; · biomass harvesting, use and transformation; · scale-up of processing systems.	Demonstration of the feasibility and potential profitability of the applied innovative project solutions for cost reduction, added-value creation and sustainability.
MULTI-STR3AM. A sustainable multi-strain, multi-method, multi-product microalgae biorefinery integrating industrial side streams to create high value products for food, feed and fragrance	· Definition of the main processes of the Biorefinery; · Start of the implementation of the production systems; · Refining systems	The project reduces costs, increases scale and boosts sustainability creating a roadmap for economically viable industrial-scale microalgae cultivation
SPIRALG. Making the best of Spirulina biomass from sustainably produced biomass to valuable phycocyanin and co-products (ongoing)	· Optimization of biomass production volumes; · Extraction and stabilization of byproducts and rich fractions of byproducts; · Assessment of CO2 emissions, energy and water costs	Demonstration of pilot production, at economical cost to address simultaneously different value markets from the same biomass, generating a new complete value chain on spirulina with potential for similar developments on other algal sources
PROMAC. (Energy-efficient Processing of Macroalgae in blue-green value chains)	· Examination of variations in raw material composition and quality; · Development of primary processes to improve raw material properties; · Establishment of fractionation and extraction methods to enrich beneficial proteins or remove unwanted anti-nutrients · Evaluation of the nutritional and health value of processed ingredients to different animal groups.	Expansion of knowledge on preservation and protein extraction processes and life cycle management studies addressing the impact of the production systems regarding raw materials and energy

Source: European Commission, 2021

Algae biomass is widely used in Asia as food and is increasingly popular in western diets for human consumption or food applications. Algae biomass has also been traditionally used in feed and fertilizers and more recently as a source of high added-value products for cosmetics,

pharmaceuticals and nutraceuticals. The use of algae biomass for bioremediation, biofuel production and biopolymers (e.g. bioplastics) is currently under prospection and development

There are several opportunities for developing bioeconomy, such as the potential at national and global markets to expand downstream product. The trend of a healthier lifestyle can promote the demand for high fiber from seaweed. Seaweed based-businesses can also be diversified to response to market changes. This can be supported through the improvement in the upstream chain through the application of a low cost cultivation system with shorter harvest time.

- ***Biotechnology***

Economic Size

In Indonesia, the potential for sustainable aquaculture production is estimated to be around 100 million tones per year (Rahman and Fadhli, 2021). However, the potential for sustainable production is limited by the carrying capacity of the micro (pond) and macro (area) environments, so marine biotechnology can multiply the productivity of aquaculture businesses in this condition. Biotechnology industry products derived from marine and fishery raw materials are high-value biological resources, and their development could be one of Indonesia's future pillars in the development of a sustainable blue economy.

Some biotechnology products that are sourced from marine natural resources, for instance:

- Carrageenan, which is a seaweed extract in the form of sulfated polysaccharides which has hydrocolloid (gel) properties, widely used in food and industrial products. The use of carrageenan in food products is as a stabilizer, emulsifier, gelling and thickening agent.
- Chitosan, which is a chitin derivative product obtained by deacetylation of chitin, has special properties and is biocompatible and biodegradable that other polymers do not have. The raw material for this component is shrimp shells or chopped, either wet or fresh, or shells that have been preserved by drying or preserving with NaOH solution.

The potential for marine biotechnology to contribute to key societal challenges such as sustainable food security, sustainable energy security, environmental health, human health and wellbeing, and the greening of industrial products and processes is a powerful driver for the sector. This is supported by recent scientific and technological advances, particularly post-genomic technology, which has increased the knowledge and understanding of marine resources. As a result of bioprospecting efforts, the inventory of marine natural products and genes of commercial interest has also grown rapidly in recent years.

Challenges

Although many developing countries have extensive and valuable marine resources such as corals, sponges, and fish, the potential of marine bio-resources remains largely untapped to date (OECD, 2020b). The bioprospecting divide between developed and developing countries is widening, with ten developed countries accounting for more than 98 percent of patents associated with a gene of marine origin (Blasiak et al., 2018).

The COVID-19 pandemic could have long-term consequences for ocean-based industries in general. However, they have the potential to accelerate development in specific emerging ocean-based sectors, such as marine biotechnologies for medical applications. For example, the test used to diagnose the novel coronavirus COVID-19 as well as other pandemics such as HIV/AIDS and

SARS was created with the assistance of an enzyme isolated from a microbe found in marine hydrothermal vents.

Indonesia should consider exploring and potentially engaging in these activities in a sustainable manner. Linking with existing knowledge and innovation networks to form partnerships and base any future activities on scientific evidence may become an important first step in avoiding irreversible damage to fragile ecosystems.

The marine biotechnology industry in Indonesia has yet to develop due to numerous challenges. To begin, marine biotechnology research and development generally takes 5–10 years and is relatively expensive in order to produce pharmaceutical products, cosmetics, bioenergy, superior species, microbes for bioremediation, and other products. Second, the innovation ecosystem has not been realized, particularly in the marine biotechnology industry, due to a lack of human resources for researchers and engineers. Third, infrastructure and facilities for research and development, budget incentives and disincentives, and political-economic policies are still inadequate (Dahuri, 2021).

Trend and Drivers for Economic Transformation

The marine environment provides a new frontier of biological resources for the development of a wide range of products, from pharmaceuticals and chemicals to personal care items, as well as applications such as environmental biotechnology, bioprocessing, and bioremediation. Marine species are important ingredients in biofuel, cosmetics, dietary supplements, pain relievers, and even cancer, asthma, and arthritis treatments, and scientists have discovered useful properties in krill, sponges, soft corals, worms, and deep sea bacteria that could lead to a variety of new innovations.

Many countries are developing strategies to foster marine biotechnology for future pharmaceutical drug development and cosmetic products for health and well-being, as well as for food production, biofuel, and so on (OECD, 2017). Marine bio-resources research is already critical in many industries, such as the pharmaceutical industry for the development of new antibiotic generations. Marine genetic resources could be at the heart of new pandemic-fighting solutions. A growing number of developing countries have already incorporated this marine bio-resources dimension into their respective ocean economy strategies.

Biotechnology industrial products sourced from marine and fishery raw materials are high-value biological resources. Some marine and fishery biota have the potential to be developed as a product of the biotechnology industry, which has a higher economic value, when compared to the value of the raw materials. The most important things to consider are to improve the quality of genetic material for the seaweed industry; and that environmental conservation affects both locally and globally (Hurtado, Magdugo & Critchley, 2020).

The key drivers for the market are new applications of marine-derived enzymes in the cosmetics industry and use of marine algae and micro algae in biofuel production. Marine natural resources that have the potential to be developed in the sector of marine and fisheries biotechnology derivative products, including seaweed, cultured fish, cultured shrimp, and sea cucumbers. The impact from these key drivers can be further expanded through bioeconomy, including through improving the quality of policy in facilitating a rapidly evolving industry**,** as well as granting the rights for sampling in new areas based on good environmental track record..

- ***Marine Conservation***

Marine conservation is at the heart of a sustainable ocean economy and the social and economic benefits derived from it (OECD, 2021). As the largest archipelago in the world and one of 17 "mega diverse" countries, Indonesia's natural-resource-based production comprises a significant portion of its economy – one-fifth of value added in 2017 (CBD, 2020; OECD, 2018b). Indonesia has the largest area of mangroves in the world, accounting for 22.6 percent of the global total (Giri et al., 2011). The country's coral reefs alone account for 18 percent of the world's total (UNEP-WCMC, 2014). Indonesians depend on ocean biodiversity for both food and livelihoods but the rate at which these resources are used combined with impacts from the changing climate mean that biodiversity is being lost at a rate higher than can be replenished. These changes impact most ocean-based industries, making marine conservation a cross-cutting topic for ensuring sustainability within these sectors. An estimated 40 million Indonesians living in rural areas depend on biodiversity for survival and wetland ecosystems in Indonesia's small islands provide key ecosystem services for local communities, especially fishers (CBD, 2020). As mentioned above, much of Indonesia's tourism also relies on the country's marine and terrestrial biodiversity.

Key Trends in Marine Conservation

Indonesia has increased its coverage of conservation areas substantially, but still falls short compared to its peers and with respect to targets set under the Convention on Biological Diversity (CBD) to which it is party (OECD, 2021). Indonesia fulfilled its commitment to establish 10 million hectares of marine protected areas (MPAs) in 2010, which has more than doubled to 22.7 million hectares in 2018 (Marine Conservation Institute, 2020; Rahman and Haryati, 2019). However, MPAs comprised only 2.8 percent of Indonesia's EEZ in 2020 which is significantly lower than the 17.1 percent average across G20 countries[3] and some way short of the 10 percent stipulated under Aichi target 11 (OECD, 2020d).

Alarming trends in marine biodiversity loss have been recorded both regionally and nationally. Southeast Asia is expected to lose one-third of its mangroves between 2000 and 2050 under a "business as usual" scenario, resulting in losses estimated at USD 2.2 billion annually in 2050 (Brander and Eppink, 2012).

The cost of losses in reef-related fisheries in the region is estimated at USD 5.6 billion (annual value in 2050), with Indonesia bearing amongst the highest of these losses (Brander and Eppink, 2012). Coastal development is a major threat to the country's mangroves, which risk being converted into settlements, roads, ports and other infrastructure. Illegal logging is also a significant threat to maintaining the health of these carbon sinks and natural coastal barriers. In 2006, an estimated 23 percent of Indonesia's mangroves were damaged, 48 percent slightly damaged and only 27 percent remain in good condition (CBD, 2020). Based on the 2019 data from 1153 reefs, there are about 390 reefs (33.82%) categorized poor, 431 reefs (37.38%) categorized fair, 258 reefs (22.38%) categorized good and 74 reefs (6.42%) categorized excellent (LIPI, 2020) due to a myriad of reasons such as inappropriate fishing methods, mining, sedimentation, boats and tourism activities (World Bank, 2019). Unsustainable use of marine ecosystems results in economic costs from lower coastal protection, reduced reproduction in fishery nurseries, and other reductions in ecosystem services.

[3] Data are not available for Turkey or the EU and are not included in the average.

4.1.2.3 Research and Education

- ***Research***

Economic Size

Marine and coastal scientific research is clearly important in providing critical information for the development of marine and coastal policy and management interventions. As the complexity of the relationships between the environment, resources, and the economic and social well-being of human populations is fully recognized, and as changes and long-term threats are discovered, the need of scientific research is becoming more apparent. Ocean research capabilities have been steadily improving in recent years, despite technological limitations as well as their vastness and complexity. The coastal states have also recognized the value of marine scientific research for economic and industrial development, as it is impossible to effectively prevent marine pollution without a better understanding of the marine environment. Recognizing the critical nature of marine scientific research and the preservation of the marine and coastal environment, Indonesia has increased its focus on these two sectors over the last few decades.

Indonesia has strong fishery research and monitoring capacity, and a variety of data sources are already available, including industry logbooks, onboard observers, vessel monitoring systems, and MMAF's port sampling efforts. These are being pursued by MMAF, including an app-based real-time self-reporting data collection system for both large and small vessels through the e-logbook program. These data and analytics requirements would be met by a larger-scale rollout coordinated with data integration efforts (World Bank, 2021b).

Indonesia has begun prioritizing marine and coastal development and is now confronted with the difficulties inherent in the transition from issue analysis and planning to implementation. Through maritime-based research, new needs are likely to bring about change and improvement in Indonesia's marine and coastal governance. Marine debris research is still a developing field in Indonesia. Studies on marine plastic debris have primarily focused on the western, particularly the densely populated islands of Java and Bali. Around 80 percent of the research focused on the ecosystem of coastal areas, with the remaining 20 percent focusing on the water column (Noir P.H (2019). The majority of them were concerned with environmental issues and natural resource management. Only a few studies dealt with health, socioeconomics, engineering, or policy. It was particularly difficult to find research on the impact of plastic debris on humans. However, there have been no publications that thoroughly discuss microplastics accumulation in marine organisms. This type of research will necessitate the use of a specialized laboratory to study nano-debris.

Human resource researchers' support is also growing, and it is almost universal across the archipelago. In the 108 Faculties of Fisheries and Marine Sciences, there are over 1,000 lecturers and more than 500 marine researchers from various disciplines working in various marine research institutions (Syahailatua, 2020).

Challenges

Countries can grow the blue economy by reorienting their research and development objectives. In order to accelerate solutions to maritime challenges, it is necessary to institutionalize methods for reviewing targets and indicators, tying research and careers to sustainable development goals, and supporting innovative ecosystems. In the interests of current and future generations, ocean future-proofing is required for future-proof marine education. To make this happen, highly

structured national policies are required. To deal with disruptive technologies and their potential use in the sustainable development of marine resources, universities will need to continue to update facilities and innovative capacities.

Technological limitations, as well as their vastness and complexity, are the reasons ocean research capabilities have been steadily improving in recent years. Real-time observations, remote sensing, satellite imagery, geographical information systems, seagoing vessels, buoys, underwater drones, in situ water quality analysis, and laboratory analysis of water samples collected using various types of samplers are just a few of the methods being used to investigate this massive ecosystem. Robotics has uncovered a wealth of information about the hard-to-reach seabed environment and marine extremophiles. Core samples can now be taken from exact locations in the deep oceans by research vessels.

Technological innovations that help move aquaculture to the offshore and enable it to be carried out under submerged cages, improve the production efficiency of integrated multi-trophic aquaculture, and introduce automation in hatchery operations for fish and other aquaculture animals, as well as sea ranching, will all contribute to the blue growth that is gaining traction. For the health and integrity of the ocean ecosystem, disruptive technologies will present new challenges. Marine biologists and fisheries scientists must continue to be mobilized in order to investigate the technological implications for the oceans' long-term sustainability.

In Indonesia, almost all marine research is conducted independently by various research institutions and universities. Marine researchers and experts are also scattered throughout the country. As a result, much research overlaps, resulting in scientific reports or publications that offer no new insights or innovations. The use of marine human resources with little experience in ocean waters aggravates the situation. Marine human resources currently have more research experience in shallow seas and coastal areas. On the other hand, the Indonesian sea has a deep sea area that accounts for 95 percent of the total area of marine waters, with an average depth of 3000 meters. In other words, marine research programs, particularly in the deep sea zone, are critical for Indonesia. As a result, increasing researcher capacity must be prioritized, as deep sea research will be a priority in the future (Syahailatua, 2020).

Trend and Drivers for Economic Transformation

Research and Innovation is a central driver not only for developing a sustainable blue economy but also for green recovery from the COVID-19 crisis. It is an enabler for the twin green and digital transitions and is ideally placed to set the direction, address synergies and trade-offs. A forward-looking, mission-oriented and impact-focused research and innovation agenda is a critical lever to drive the transition towards a sustainable blue economy. The objectives of research in the blue economy include: (i) improving integrated knowledge about reciprocal impact of climate change on marine ecosystems and biological resources to effectively manage response, mitigation and resilience capacities; (ii) de-risking major investments and boosting blue innovations on land and at sea to develop new bio-based marine value chains and open up to new markets; (iii) developing smart and connected territories between land and sea; and (iv) strengthening the international research and innovation cooperation around seas and oceans and to promote a globally sustainable blue economy. Some examples of research activities that encourage blue economy are (i) research and experimental development on biotechnology; (ii) other research and experimental development on natural sciences and engineering; and (iii) other professional, scientific and technical activities.

As a key step in building Indonesia's national research and development capacity, the government issued Law No. 11 Year 2019 on the National System of Science and Technology (the Sisnas Iptek Law). This Law amended Law No. 18 Year 2002 to address deficiencies that prevented the 2002 law from being an optimum framework for contributions from science and technology towards national development (KSI, 2020). By issuing Law No. 11 Year 2019, the Government of Indonesia was signaling more attention to, and commitment for, the growth of the research and innovation during the next phase of Indonesia's development. This is further strengthened through the establishment of the National Research and Innovation Agency (BRIN) in 2021.

Marine research innovation through the Coral Reef Rehabilitation and Management Program – Coral Triangle Initiative (COREMAP-CTI) is one of the solutions for marine research strategies. COREMAP-CTI has produced products and infrastructure to support collaborative marine research in Indonesia. COREMAP-CTI is a program funded by the World Bank. There are 4 things that COREMAP-CTI does, which are (i) monitoring coastal ecosystems which include coral reefs, sea grass beds and mangroves; (ii) strengthening institutional capacity; (iii) conducting research components that support the achievement of coastal ecosystem management targets; and (4) increasing the effectiveness of national water conservation areas (Darilaut, 2021).

Currently, the Government of Indonesia is focusing on developing marine research to support deeper mapping of marine areas. One of the targets to be pursued is to develop marine technology, which until now has not been owned by Indonesia. The step to pursue this target is to focus on developing marine research in various sectors. The Indonesian Institute of Sciences (LIPI) is now pursuing the moment of 2035 as the year of national marine research revival. LIPI held a marine research foresight program and a demand driven research grant (DDRG) program to realize the goal. Both programs are fully supported by the Coral Reef Rehabilitation and Management Program – Coral Triangle Initiative (COREMAP-CTI) (Research and Development Agency of the Ministry of Home Affairs, 2021).

- ***Education***

Economic Size

In many countries, including in Indonesia, the maritime sector is not well-known in the field of education, so it receives little attention. The lack of literature on marine education and the fact that many researchers have not focused on this area demonstrate the gap (Umuhire and Fang, 2016). Furthermore, marine education is the most uncommon field of study and is extremely difficult to come by because marine research methodologies are difficult to implement since early education (Hapidin, Nurjannah, and Hartati, 2018). According to Gandha and Pranata (2015), the existing curriculum still focuses on teachers and textbooks without direct interaction with the learning object, resulting in the underdevelopment of Indonesian children's awareness of Indonesian nature, particularly in the maritime sector. It should be taken seriously because when these children grow up and become teachers, they will lack the necessary connection to the sea to effectively teach about marine life in the classroom (Dromgool et al., 2017). In coastal areas, teachers' knowledge of the curriculum is also still limited. According to Fletcher et al. (2009), a lack of information about marine affairs contributes to a lack of public knowledge and awareness.

In Indonesia, marine education is not explicitly mentioned in the 2013 curriculum. However, there are several topics that allow teachers to develop it as marine learning, such as life sciences or biology. Marine education is implemented at the tertiary level by organizing the Marine Education Study Program at several universities. Marine education is not the name of the subject, but as one

of the four learning issues, which must be included in science learning. The other three learning issues are gender equality education, human rights education, and environmental education (Universitas Sebelas Maret, 2020).

Challenges

Marine education is critical in helping student develop the knowledge, skills, and attitudes necessary to preserve the environment in the future, particularly coastal ecosystems. Throughout this time period, the marine concept has been limited and marginalized in the curriculum, owing to the public's lack of knowledge about the seabed's principles and inability to make sound judgments (McPherson et al., 2018). Increasing public awareness of the importance of ocean conservation through education would be ideal if educational experts also taught about ocean literacy. Ocean literacy is a strategy not only for increasing public awareness of the oceans, but also for encouraging all communities and stakeholders to act more responsibly and intelligently in relation to the oceans and their resources (Tsai and Chang, 2019). Irawan (2018) discovered that in order for maritime education to be successful, students must be taught to have a strong understanding of the ocean. Increasing concern for ocean protection begins with a paradigm shift from seeing it as an effort to protect the earth to seeing it as an effort to protect human life because it is human nature that will be threatened if environmental damage occurs.

Trend and Drivers for Economic Transformation

The green transition and recovery certainly cannot be achieved without skilled people. That is why literacy, competences and opportunities are outmost important. Nevertheless, there are concerns in knowledge and skills development in blue economy, such as related to the lack of: (i) communication and cooperation between education and industry; (ii) attractiveness and awareness of career opportunities in the blue economy; and (iii) ocean literacy culture. On the other hand, the demand trends regarding skills in the blue economy can be optimized as a pulling factor. For example, the growing demand of the marine-based industry (e.g. shipbuilding) in the digital domain, green technologies and soft skills can trigger the provision of relevant and specialized education and training. The demand in digital skills, including a special digital literacy and data literacy in the marine-based sector, will also likely to appeal to younger generations and female applicants. With the fast-paced introduction of new technologies in the blue economy sector, there is also urgent need for a continuous evaluation of skills by companies operating in the sector and for upskilling or reskilling their employees in order to ensure they are up to date with the new market demands and dynamics. This will contribute to closing the gap of adapting to disruptive technology implementation and the new market.

One modality that can become the reference for improving the vocational education and training in marine-based sector, is the “Skills for Prosperity” program. This Program was launched in November 5, 2019 by the United Kingdom launched to support the Government of Indonesia's priority of strengthening the maritime sector. This four-year program, which will run until 2023, aims to improve the skills and competencies of the maritime workforce in order to increase the productivity of the industry, including its seaports. This will be accomplished by modernizing the curricula, standards, and qualifications of marine vocational education in the fields of maritime logistics, seafaring, shipbuilding, and coastal communities' maritime economies. This program involves many stakeholders, including central and local governments, social partners, educational institutions, and other relevant interests, in order to close the gap between the needs of industry and the supply of labor in this sector, with the goal of delivering long-term results. This program

will improve the quality of four maritime polytechnics in Semarang, Surabaya, Batam and Manado (ILO, 2019a).

4.1.3 Environment and Resource Management

Indonesia has great potential in its marine sector, ranking as the second largest fishing country in the world after China with an average harvest of 6.1 million tones of marine fish every year. Marine capture and aquaculture employ about 7 million Indonesians. In 2018, this sector contributed more than USD 26.9 billion to the national economy (approximately 2.6 percent of GDP). In 2018, the fisheries sector contributed to export revenues of around USD 4.8 billion, supplying about 3 percent of the global market for seafood exports (BPS, 2019).

Various risks, however, pose a threat to the growth of Indonesian capture fisheries' social and economic value. Fisheries, as natural assets, necessitate adequate management in order to generate sustainable economic benefits. Overfishing has threatened long-term profits by diminishing fish stocks and yields, as well as the benefits — food, jobs, and income — that accrue through generations. In many countries, for example, global catch fisheries production has tended to stagnate and now tends to decline, with sub-optimal economic returns (FAO 2018; Pauly and Zeller 2016; World Bank, 2017). According to the analysis, improved capture fisheries management can boost the value of production by more than USD 3 billion per year in the long run, compared to a scenario in which existing practices are maintained and fish are caught. For Indonesia, despite the fact that Indonesia's annual harvest is slowly increasing, management strategies to achieve the highest long-term returns have yet to be applied.

The quality and extent of Indonesia's coastal ecosystems is likewise deteriorating. Almost one-third of Indonesia's reefs are in poor condition (LIPI, 2020). Climate change, which is producing more severe coral bleaching, is one of the factors driving this damage. Destructive fishing practices, agricultural and urban runoff, and marine plastic pollution are among the other factors. According to estimates, up to 40% of Indonesia's original sea grass cover may have been lost (Unsworth et al, 2018).

Mangroves have also experienced significant losses, with around 1.82 million of the country's 3.31 million hectares are currently in degraded condition (Ministry of Environment and Forestry, 2019). Coastal development is responsible for mangrove loss, with aquaculture clearing accounting for nearly half of it (concentrated in Kalimantan and Sulawesi) and oil palm clearing accounting for a further 16% (concentrated in Sumatra) (Richardson et al., 2018). Ecosystem degradation lowers the value of ocean ecosystem services for fisheries, tourism, and commercial shipping, as well as obstructing another important economic function that is community protection.

Marine plastic debris imposes substantial risk on Indonesia’s blue economy development, on fisheries, seafood quality and safety, shipping, and marine tourism development goals. Impacts on the fisheries sector are manifested through lost income from reduced and contaminated catches, damage to fishing gear, and associated lost time (Trucost, 2016). Recent estimates of plastic debris damage to the Indonesia ocean economy exceed USD 450 million per year (APEC, 2020). One component of this damage comes from abandoned, lost, discarded fishing gear (ALDFG), which has long lasting impacts with “ghost” gear continuing to ensnare fish for years following their loss or improper disposal, compromising yields, and damaging ecosystems.

Marine debris also has an impact on navigation for recreational, freight, and fishing vessels. Larger pieces of debris cause damage by obstructing cooling systems or becoming entangled in propellers (Hall, 2000), with the most serious consequences for small boats with outboard engines that are widely used in Indonesia's small-scale coastal fisheries (McIlgorm Campbell and Rule, 2009).

Tourism is 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, Bali declared a "garbage emergency" in 2017 as popular beaches such as Jimbaran, Kuta, and Seminyak became overwhelmed by plastic waste. At the peak of the subsequent cleanup workers were removing as much as 100 tones of waste per day (Oliphant, 2017). A study by the Making Oceans Plastic Free Initiative estimated that plastic bag pollution causes revenue losses of USD 140 million annually to Indonesia's tourism sector, with USD 55 million from Bali alone (Making Oceans Plastic Free Initiative, 2017).

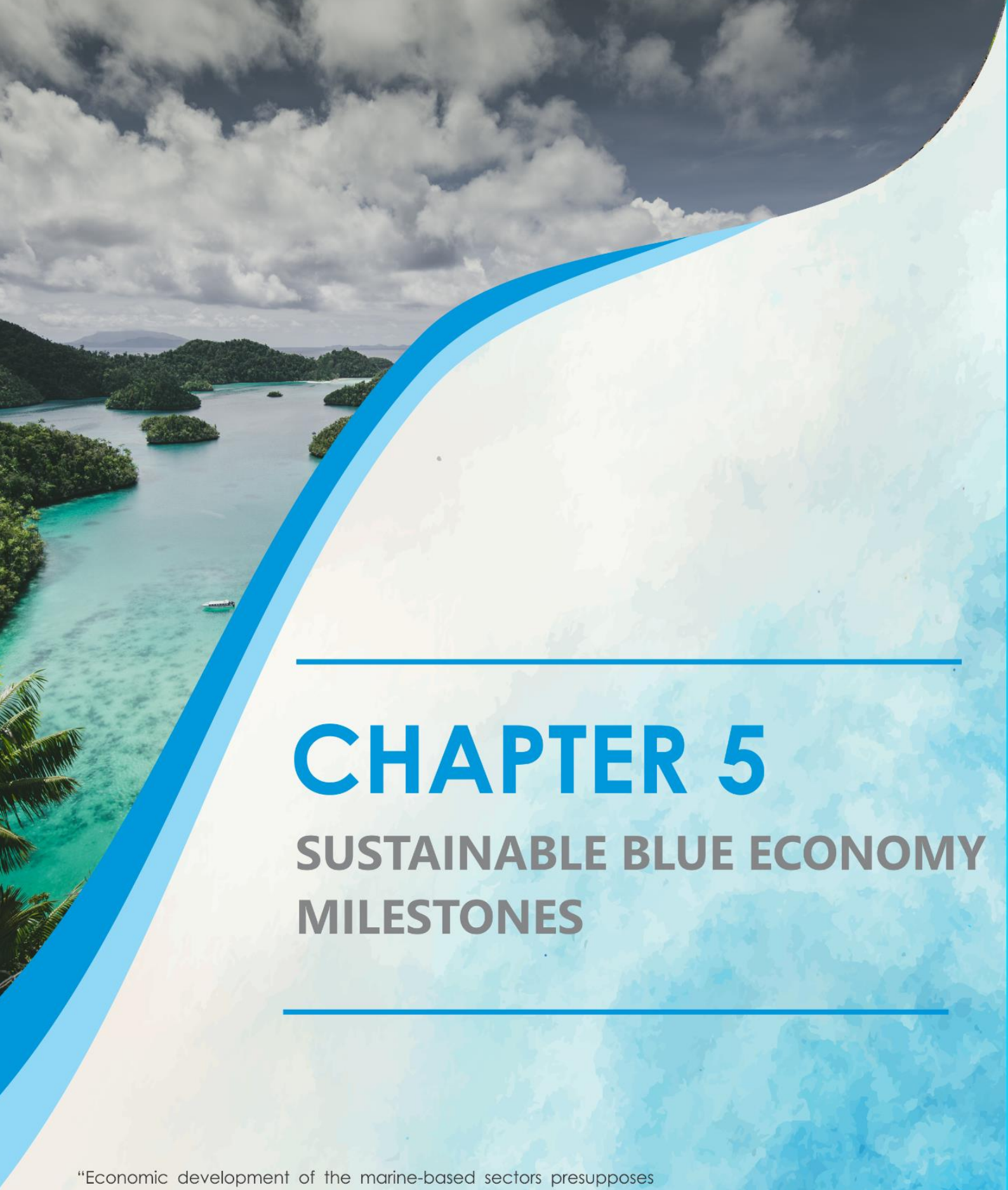
In line with the strategy, national and provincial governments have been working to enhance protection of coastal and marine ecosystems. A step of fundamental importance has been the introduction of spatial plans, a system for resolving land use conflicts and balancing environmental and economic considerations by delineating zones for specific uses. National and provincial governments 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 Regional Spatial Plan (RTRW). Indonesian Government has similarly made substantial progress in expanding Marine Protected Areas (MPAs) to over 28 million hectares (meeting its Aichi target of 20 million hectares), to reach 30 million hectares by 2030. Also no less commendable is its target for mangrove restoration with around 600.000 hectares restored by 2025. While mangrove restoration is laudable, greater emphasis could be placed on reducing mangrove loss in the first place.

4.1.3.1 Circular Economy to Support Blue Economy

To support implementation of blue economy, Indonesia needs to move forward towards to circular economy. A fully circular economy is one where waste is minimized and resources are kept in use in a perpetual flow by ensuring that unavoidable waste or residues are recycled or recovered. A circular economy aims to maintain the value of products, materials and resources for as long as possible by returning them into the product cycle at the end of their use, while minimizing the generation of waste. The fewer products being discarded, the less materials being extracted, the better for the environment.

Shifting from linear economy to circular economy can achieve more by using less. More than just waste management, it is resource management. In linear economy, after product being consumed, then being collected and goes to the landfill. While circular economy, after product being consumed and being collected, it will recycle and process into a new product.

A circular economy comprises two cycles: a biological cycle, in which residues are returned to nature after use, and a technical cycle, where product, components or materials are designed and marketed to minimize wastage. Such a circular system aims at maximizing the use of pure, non-toxic materials and products designed to be easily maintained, reused, repaired or refurbished to extend their useful life, and later to be easily disassembled and recycled into new products, with minimization of wastage at all stages of the extraction-production-consumption cycle.



CHAPTER 5

SUSTAINABLE BLUE ECONOMY MILESTONES

"Economic development of the marine-based sectors presupposes environmentally, economically, and socially sustainable growth and rest on three equal pillars: a healthy and resilient marine environment, competitive marine-based industries and attractive coastal areas."

Joint Statement on Cooperation in the Field of Blue Economy Between Sweden and Indonesia

Indonesia's identity and prosperity are inextricably linked to the oceans. With over 17,500 islands, 108,000 kilometers of coastline, and three-quarters of its land area covered by water, maritime sectors have developed into a source of prosperity for the Indonesian people. According to government estimates for 2021, the maritime economy's potential worth is USD 1,334 billion, or around IDR 19,371 trillion. The number will likely increase significantly in the future, as Indonesia has a plethora of maritime potentials that may be maximized to boost the economy and stimulate qualitative growth.

To accomplish this, Indonesia must effectively manage and utilize its oceans and all of their associated resources. The 1957 Djuanda Declaration laid the groundwork for Indonesia to become the world's largest archipelagic state, administer its maritime sovereignty, and accelerate ocean-based economic activity for the benefit of the population. Indonesia's economic transformation should take advantage of the country's maritime assets. Indonesia can use the blue economy concept to promote competitive, innovative, and sustainable maritime sectors that may help enhance employment, productivity, and value contributed to the economy by including conservation into spatial planning and adhering to sustainable maritime principles.

5.1 Blue Economy Roadmap

This document serves as a framework for Indonesia's route toward a blue economy. The roadmap document will also be in line with the national medium term development plan 2020-2024, in which the blue economy principles have been internalized, and cover the future aspirations on how Indonesia can further advance blue economy. It establishes a vision and direction for Indonesia's ocean and maritime sectors management. Indonesia should now shape subsequent initiatives by developing a roadmap for implementing this blue economy framework. It will become the policy framework for Indonesia's maritime sectors' social, environmental, and economic sustainability.

The Indonesian Minister for National Development Planning visited Sweden from 23 to 26 October 2021 and met with the Minister for Environment and Climate, the Deputy Prime Minister, and the Minister for Infrastructure. He also spoke with a variety of players, ranging from government agencies and research institutions to private enterprises, who may be able to assist in growing the Indonesian blue economy and developing the Road Map for the Indonesian Blue Economy. Further conversation on how to realize prospective cooperation in the sector of Blue Economy will take place during the Sweden-Indonesia Sustainability Partnership Week, which will take place from 22-26 November 2021.

Figure 5.1 Joint Statement on Cooperation in the Field of Blue Economy Between Sweden and Indonesia

JOINT STATEMENT

ON COOPERATION IN THE FIELD OF BLUE ECONOMY

BETWEEN

SWEDEN AND INDONESIA

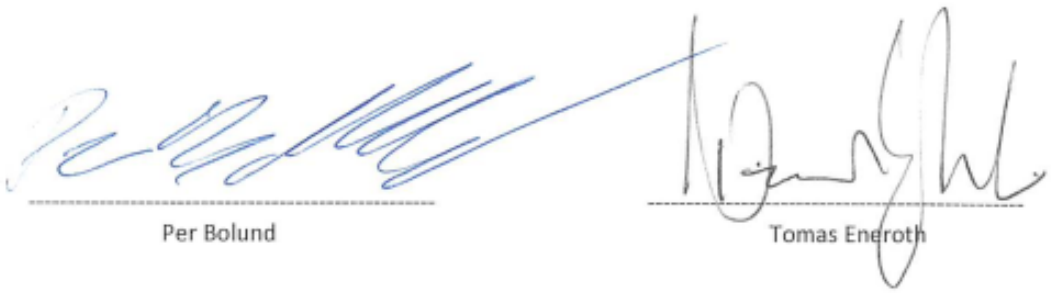
Ahead of the 2021 Climate Change Conference (COP26), signatories of this statement agree that achieving an inclusive and sustainable blue economy is critical for green, inclusive, and sustainable economic recovery as well as improving livelihoods, ensuring food security, maintaining biodiversity and carbon sequestration among other things, and that it plays a key role in the realization of the 2030 Agenda. Economic development of the marine-based sectors presupposes environmentally, economically, and socially sustainable growth and rests on three equal pillars: a healthy and resilient marine environment, competitive marine-based industries, and attractive coastal areas. Other potentials should also be taken into consideration. Conditions must be in place to safeguard the ecosystem services that are needed for the continued development of the blue economy, and life on this planet. The blue economy holds substantial market opportunities to be utilized, provided the development of marine-based industries progresses in a sustainable way. The international meeting *Stockholm+50: a healthy planet for the prosperity of all – our responsibility, our opportunity*, will provide an occasion to accelerate implementation for sustainable development, including a sustainable recovery.

Work towards realization of the 2030 Agenda needs to take place at all levels: at national level, in the multilateral sphere and in the bilateral exchange between countries. Sweden and Indonesia share many of the opportunities and challenges related to the blue economy and within the marine areas. Sweden has recently developed its own maritime strategy while Indonesia is developing its Road Map for the Blue Economy, as a part of Indonesia's effort to accelerate economic transformation towards a more inclusive and sustainable development. Bilateral exchange of expertise in the maritime field within both the public and the private sector therefore shows promise. Possibilities for how Swedish actors could support the development of Indonesia's Road Map should be explored, and how Sweden in turn may learn from Indonesia.

The Indonesian Minister for National Development Planning, H.E. Suharso Monoarfa, visited Sweden from 23 to 26 October 2021. He met with H.E. Per Bolund, Minister for Environment and Climate, and Deputy Prime Minister, as well as with H.E. Tomas Eneroth, Minister for Infrastructure. During his visit to Sweden, Minister Monoarfa also met with a number of actors, ranging from government agencies

and research institutions to private companies, that might support and provide solutions to grow the Indonesian blue economy and to the development of the Road Map for Blue Economy in Indonesia. Further discussions on how potential collaborations in the field of Blue Economy can be concretized, will be held during the Sweden Indonesia Sustainability Partnership Week, which will take place between 22 and 26 November, 2021.

Stockholm, 25 October 2021



Per Bolund

Tomas Eneroth

Suharso Monoarfa

5.2 Other Milestones

The framework of Indonesian blue economy will also become the basis for further discussion and collaboration in this following events.

1. Blue Economy in G20 Summit: Development WG & Sweden-Indonesia Joint Event on Summit
2. Blue Economy in ASEAN Summit 2023
3. Blue Economy in European Meetings 2023

Figure 5.2 Sweden-Indonesia Blue Economy Cooperation Milestones

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APPENDIX

Appendix 1. Targets and Indicators of Goal 14 SDGs in Indonesia

Targets	Indicators		Notes
14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution	14.1.1	(a) Index of coastal eutrophication and (b) plastic debris density	Global indicators to be developed
	14.1.1.(a)	Percentage of reduced waste thrown into the sea	National indicators as proxies for global indicators
14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans	14.2.1*	Application of an ecosystem-based approach in the management of ocean areas	National indicators in line with global indicators
	14.2.1.(a)	The sustainable management of 11 State Fisheries Management Areas of the Republic of Indonesia (WPPNRI)	National indicators in addition to global indicators
14.3 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels	14.3.1*	Average marine acidity (pH) measured at agreed suite of representative sampling stations	Global indicators to be developed

Targets	Indicators		Notes
14.4 By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics	14.4.1*	Proportion of fish stocks within biologically sustainable levels	National indicators in line with global indicators
14.5 By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information	14.5.1*	Total area of marine protected areas	National indicators in line with global indicators
14.6 By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization (WTO) fisheries subsidies negotiation	14.6.1	The degree of implementation of international instruments aiming to combat illegal, unreported and unregulated (IUU) fishing	Global indicators to be developed
	14.6.1.(a)	Percentage of business compliance	National indicators as proxies for global indicators
14.7 By 2030, increase the economic benefits to Small Island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism	14.7.1	Sustainable fisheries as a percentage of GDP	Global indicators to be developed

Targets	Indicators		Notes
14.a Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries	14.a.1	Proportion of total research budget allocated to research in the field of marine technology	Global indicators to be developed
14.b Provide access for small-scale artisanal fishers to marine resources and markets	14.b.1*	Degree of application of a legal/regulatory/ policy/institutional framework which recognizes and protects access rights for small-scale fisheries	National indicators in line with global indicators
	14.b.1.(a)	Number of provinces with increased access to financing for fishing businesses	National indicators in addition to global indicators
	14.b.1.(b)	Number of fishermen protected	National indicators in addition to global indicators

Targets	Indicators		Notes
14.c Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in UNCLOS, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of The Future We Want	14.c.1*	Availability of policy and institutional frameworks, ocean-related instruments that implement international law, as reflected in the implementation of UNCLOS (the United Nations Convention on the Law of the Sea)	National indicators in line with global indicators

Source: Bappenas, 2020

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