Climateworks CENTRE

Turning the tide:

Advancing Indonesia's blue economy through ocean-based mitigation actions

REPORT

NOVEMBER 2025

ACKNOWLEDGEMENT OF COUNTRY

We acknowledge and pay respect to the Traditional Custodians and Elders – past and present – of the lands and waters of the people of the Kulin nation on which the Climateworks Centre office is located, and all of the Elders of lands across which Climateworks operates nationally. We acknowledge that sovereignty was never ceded and that this was and always will be Aboriginal land. More information.

ACKNOWLEDGEMENTS

Climateworks Centre gratefully acknowledges the guidance and thoughtful input provided by the Indonesia Stakeholder Steering Group (ISSG) members Professor Dr Luky Adrianto (IPB University), Dr Arifin Rudiyanto (Kementerian PPN/BAPPENAS), Dr Mahawan Karuniasa (University of Indonesia) and Dr Abdul Halim (Environmental Defense Fund), which helped shape the initial direction of this report. We also extend our appreciation to Akhmad Nurhijayat and Irianies Gozali for their support throughout the research process, as well as to Blue Praxis for strengthening the analytical foundation of this work through their contribution on ocean accounting and data integration.

This report was developed under the Southeast Asia Framework for Ocean Action in Mitigation (SEAFOAM), Climateworks Centre's major initiative dedicated to ocean-based climate action and aligned with our strategic goal for nature: land and ocean-based solutions for climate and biodiversity. We gratefully acknowledge the contributions of the SEAFOAM team – Etwin Sabarini, Brurce Mecca, Carolina Contreras and Wiraditma Prananta – the Climateworks Indonesia team – Junita Silalahi, Ferty Hutajulu and Anisa Muchlisa – for their coordination, analysis and commitment, and the Communications team for editorial, design and publishing support.

We also thank government representatives, non-governmental organisations, academic institutions, corporate partners and individual experts whose insights and engagement informed this publication. Climateworks Centre looks forward to continued collaboration in advancing action toward a sustainable and resilient blue future for Indonesia and Southeast Asia.

This work could not have been achieved without valuable support from our philanthropic funders Philanthropy Asia Alliance, Quantedge Advancement Initiative, TPC (Tsao Pao Chee) and NO.17 Foundation, UBS Optimus Foundation, Dalio Philanthropies, and Mr Phillip Wang and Mrs Gail Lien-Wang, whose commitment is essential to raising awareness and advancing solutions for ocean mitigation in the region.

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ABOUT US

Climateworks Centre bridges the gap between research and climate action, operating as an independent not-for-profit within Monash University. Climateworks develops specialist knowledge to accelerate emissions reduction, in line with the global 1.5°C temperature goal, across Australia, Southeast Asia and the Pacific.

Climateworks Centre, 2025, *Turning the tide: Advancing Indonesia's blue economy through ocean-based mitigation actions*.

ISBN: 978-1-7637231-8-4

Glossary

ASEAN	Association of Southeast Asian Nations
ABEF	ASEAN Blue Economy Framework
COP	Conference of the Parties
GHG	Greenhouse gas
IMF	International Monetary Fund
LULUCF	Land Use, Land-use Change and Forestry
MSP	Marine Spatial Planning
MPA	Marine Protected Area
MRV	Measurement, reporting and verification
NbS	Nature-based Solutions
NDC	Nationally determined contribution
OTEC	Ocean thermal energy conversion
REDD+	Reducing Emissions from Deforestation and Forest Degradation
TKBI	Taksonomi Keuangan Berkelanjutan Indonesia
UNFCCC	United Nations Framework Convention on Climate Change

Preface

Indonesia's ocean is central to its economic and climate future. As the world's largest archipelagic nation, its prosperity is inseparable from the health of its seas. The blue economy – spanning fisheries, shipping, tourism, marine industries and ecosystem conservation – is not merely a peripheral sector, but the backbone of Indonesia's sustainable economic growth. It offers a powerful way to generate prosperity while strengthening resilience in the face of climate change. In this critical decade, viewing the ocean as a foundation for regeneration, innovation and inclusive development will determine whether Indonesia can truly harness its maritime identity to achieve its climate and development ambitions.

Turning the tide: Advancing Indonesia's blue economy through ocean-based mitigation actions provides a timely and strategic foundation for policymakers, researchers and practitioners to integrate ocean-based solutions into Indonesia's climate agenda. It outlines practical ways to align governance, finance and regional cooperation – three essential levers for turning ambition into measurable progress. I recommend this report as a cornerstone reference for decision-makers seeking to harmonise Indonesia's blue economy potential with its climate action targets.

This publication marks not an end but a beginning. The recommendations presented here on governance reform, sustainable blue finance and regional collaboration serve as entry points for deeper research and policy dialogue, especially in the context of ocean and climate policy, in supporting a regenerative and sustainable blue economy for Indonesia.

The journey toward a sustainable blue economy will require steadfast collaboration across government, academia, civil society and the private sector. As Indonesia advances its leadership in linking ocean stewardship with climate action, this report will inspire continued dialogue, evidence-based policymaking and concrete steps toward a more resilient maritime nation.

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Southeast Asia Framework for Ocean Action in Mitigation (SEAFOAM)

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Executive summary

Indonesia's ocean is central to its climate and economic future. As the world's largest archipelagic nation, home to 17 per cent of global blue-carbon ecosystems, Indonesia has an unparalleled opportunity to align its blue economy ambitions with its climate goals. With over 17,000 islands and three-quarters of its territory composed of marine areas, the country relies on the health of its ocean for its prosperity and resilience.

Indonesia's blue economy is valued at over US$1.3 trillion, covering fisheries, tourism, maritime transport and renewable energy. Realising this potential requires treating the ocean as more than an extractive economic sector – a foundation for sustainable growth and climate resilience.

Building on Climateworks Centre's 2023 *Sea of Opportunity* report, which explored why Indonesia's ocean matters for climate mitigation actions, this report focuses on how to operationalise that potential by linking it to the blue economy. It outlines the concrete steps needed – through governance, finance and regional cooperation – to translate ambition into measurable progress.

Healthy marine ecosystems and decarbonised maritime industries generate a double dividend: not only reducing emissions but also strengthening livelihoods, contributing to Indonesia's high ambition for economic growth.

Protecting mangroves, seagrasses and coral reefs provides vital value to ecosystems, while decarbonising ports, vessels and offshore industries enhances competitiveness and creates skilled employment.

The case for integrating the ocean into Indonesia's climate strategy is clear, but the challenge lies in execution. Practitioners, policy-makers and blue carbon stakeholders highlight that barriers are not conceptual but operational: fragmented governance, uneven data, uncertain science and weak coordination. These barriers, however, are fixable. Strengthening Marine Spatial Planning (MSP), improving data systems and building institutional coherence will help Indonesia move from policy ambition to measurable results.

One central operational gap lies in finance. Despite strong ambition, pathways to translate ocean-based opportunities into investable projects remain limited. Embedding blue-economy sectors within a sustainable finance taxonomy, or Taksonomi Keuangan Berkelanjutan Indonesia (TKBI), can signal policy clarity to banks and investors, aligning financial flows with national priorities. The taxonomy will provide clear guidance for investors on sustainable, regenerative and science-backed economic activities in sectors such as fisheries, tourism, conservation and maritime industries. Linking finance with governance tools such as MSP, ocean accounting and data transparency will also help ensure integrity and scalability.

Indonesia's climate mitigation strategy is increasingly aligned with blue economy priorities, showing the ocean's critical role in contributing to national emissions-reduction goals and sustainable development. Areas of high alignment include maritime decarbonisation, blue-carbon conservation and marine renewables, and show where Indonesia can leverage the blue economy for its climate commitments while supporting sustainable growth and livelihoods.

As the largest economy of the Association of Southeast Asian Nations (ASEAN), Indonesia can play a powerful role in shaping regional ocean–climate action through its leadership on the blue economy.

The ASEAN Blue Economy Framework offers a regional platform for collective ocean–climate action. By advancing blue-carbon conservation and offshore renewable energy cooperation, Indonesia can help ASEAN effectively align economic development with climate goals. Coordinated MSP and cross-border energy infrastructure would not only strengthen regional security and food systems but also anchor Southeast Asia's path to net zero emissions by 2050.

This report identifies three pillars essential to realising Indonesia's ocean–climate ambition:

1. **GOVERNANCE:**
   Strengthen national frameworks and MSP to align policy, science and livelihoods.
2. **FINANCE:**
   Mobilise sustainable blue finance through TKBI integration, sectoral prioritisation and data-driven investment frameworks.
3. **REGIONAL COOPERATION:**
   Scale Indonesia's leadership within ASEAN through shared data systems, harmonised measurement, reporting and verification (MRV) standards and collaborative blue-energy initiatives.

Analytical framework: Turning Indonesia's ocean–climate ambition into action

Challenge	Knowledge base (input)	Actions		Output	Outcome
Uncertain science Fragmented governance Suboptimal finance and investment	Science and technical capacity Data and accounting systems Local knowledge Finance and market insights	**GOVERNANCE** + Commitment to low-carbon blue economy + MSP alignment with the nationally determined contribution (NDC) **FINANCE** + Inclusion of blue economy in the financial system + Ocean data-investment linkages	**REGIONAL COOPERATION** + ASEAN-wide blue ecosystem and green shipping for climate actions + ASEAN-wide renewable energy and energy efficiency cooperation	Integrated ocean governance Unified ocean and climate data Mobilised finance for blue economy ASEAN-wide alignment on blue economy and climate targets	Emissions reduction Ecosystem resilience Sustainable economic growth

Taken together, these pillars create a clear, actionable roadmap for Indonesia to convert its vast ocean potential into meaningful climate outcomes. Delivering on them will allow the country to move from vision to implementation, turning its maritime domain into a cornerstone of sustainable prosperity and global leadership in ocean-based climate action.

Chapter 1: Indonesia's ocean on the frontlines of change

Indonesia, the world's largest archipelagic nation, sits at the nexus of ocean and climate action. The country, with more than 17,000 islands and three-quarters of its territory as marine areas, has a future inseparable from the fate of its ocean.

Yet this future is subject to converging pressures: intensifying climate vulnerability, marine ecosystem degradation and the need to drive economic growth differently in an increasingly uncertain world.

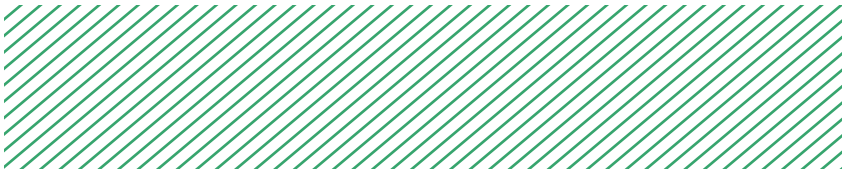
The ocean is no longer a mere backdrop for Indonesia's economic development – it represents both a threat and a powerful pathway to a sustainable future.

Indonesia's potential to lead ocean-based climate action

As home to around 17 per cent of the world's blue carbon ecosystems, Indonesia can play a pivotal role in climate mitigation (Alongi et al. 2016). Its blue carbon ecosystems include mangrove, seagrass and other coastal ecosystems, along with maritime industries and infrastructures, and offer substantial opportunities for climate mitigation and adaptation (Ayostina et al. 2022; Climateworks Centre 2023; Sidik et al. 2023) – yet this potential remains largely untapped.

Indonesia's ocean economy is not an environmental or sectoral issue – it is an opportunity for climate actions on multiple fronts. Indonesia has articulated the why of the blue economy – this has become one of the top national priorities in its 2025–2029 mid-term development vision and Blue Economy Roadmap 2045 (Ministry of National Development Planning 2023). But the how is missing: the systematic integration of ocean-based mitigation into Indonesia's broader climate strategy. By connecting the blue economy to national climate policy, Indonesia stands to significantly expand its climate leadership globally. Indonesia's 2025 second nationally determined contribution (NDC) identifies five priority sectors to achieve greenhouse gas (GHG) emissions reduction targets of up to 43.2 per cent (conditionally) by 2030 (Republic of Indonesia 2025). Only one of these, forestry and other land use (FOLU), addresses the ocean's mitigation potential by accounting for some of Indonesia's mangroves. Meanwhile, seagrass meadows will later be part of ocean mitigation actions supported by the expansion of marine protected areas through the use of Marine Spatial Planning (MSP). Climateworks' previous findings suggest that maritime decarbonisation, offshore renewables and integrating blue carbon ecosystems like mangroves and seagrass could contribute an additional emissions mitigation of 51–105 million tonnes of carbon dioxide equivalent ($MtCO_2e$) per year by 2030 (Climateworks Centre 2023).

Indonesia is also well positioned to harness its financial systems as catalysts for ocean–climate action. To date, ocean finance literacy is still a challenge among financiers and investors – not only in Indonesia but also globally (Sumallia et al. 2023). For Indonesia, embedding blue-economy sectors within the Taksonomi Keuangan Berkelanjutan Indonesia (TKBI), the national sustainable-finance framework, would help to align investment flows with policy priorities from the outset.



The double dividend of a sustainable ocean economy

Beyond climate mitigation, integrating the blue economy into Indonesia's national climate policy offers a powerful double dividend: a pathway to environmental sustainability as well as economic growth. As one example, protecting mangroves and seagrass can lead to disaster risk reduction, habitats for marine biodiversity, and food and job security for millions of Indonesian coastal communities that directly depend on healthy marine ecosystems (Duarte et al. 2013; Murdiyarso et al. 2015; Howard et al. 2017). Connecting the blue economy with climate targets can also strengthen the scientific and policy foundations for more ambitious and targeted ocean-based contributions to Indonesia's NDC.

As Indonesia works toward a low-carbon and climate-resilient economy, aligning the blue economy and climate agendas becomes both an environmental and strategic imperative for sustainable prosperity. Prior to October 2025, Indonesia's second NDC was predicted to incorporate ocean and marine ecosystems (Salsabila and Wong 2024). While it does include a commitment to further integrate the ocean ecosystem into the national emissions reduction architecture, it is time to move beyond acknowledgment to real integration. This means embedding ocean-based solutions in the NDC that are informed by science, grounded in local knowledge and responsive to Indonesia's diverse social contexts at both national and regional levels.

FIGURE 1: Analytical framework: Turning Indonesia's ocean–climate ambition into action

Indonesia's pathway from ambition to action begins with resolving fragmented governance, limited data and suboptimal finance. Strengthened science, data and market insights form the knowledge base to drive governance reform, financial innovation and regional leadership – aiming to integrate ocean governance, mobilise blue finance and drive ASEAN-wide alignment to deliver climate, ecological and economic growth.

Challenge	Knowledge base (input)	Actions		Output	Outcome
Uncertain science Fragmented governance Suboptimal finance and investment	Science and technical capacity Data and accounting systems Local knowledge Finance and market insights	**GOVERNANCE** + Commitment to low-carbon blue economy + MSP alignment with the NDC **FINANCE** + Inclusion of blue economy in the financial system + Ocean data-investment linkages	**REGIONAL COOPERATION** + ASEAN-wide blue ecosystem and green shipping for climate actions + ASEAN-wide renewable energy and energy efficiency cooperation	Integrated ocean governance Unified ocean and climate data Mobilised finance for blue economy ASEAN-wide alignment on blue economy and climate targets	Emissions reduction Ecosystem resilience Sustainable economic growth

BOX 1

Key ocean sectors for integration in the NDC

+ Blue carbon ecosystems: These ecosystems – mangroves, seagrasses and coral reefs – do much more than sequester carbon. They act as natural infrastructure, buffering coasts against extreme weather, sustaining fisheries that provide food and livelihoods for millions, and preserving biodiversity critical for long-term ocean health. Their protection creates a foundation for resilient coastal economies while contributing to climate mitigation.
+ Maritime decarbonisation: Transitioning ports and vessels towards cleaner fuels and hybrid technologies benefits economic efficiency, reduces dependency on fossil fuels and positions Indonesia's shipping industry competitively in global trade. While curbing a significant source of GHG emissions, it can create high-quality jobs in shipbuilding, retrofitting and port logistics.
+ Offshore renewables: Wind, tidal and other ocean-based energy can power coastal communities and industrial zones with clean, reliable electricity. When carefully planned, offshore renewables avoid conflict with blue carbon ecosystems and can support conservation objectives. Their deployment makes energy more accessible, reduces pressure on land-based power generation and drives sustainable development in coastal regions.

Source: Climateworks Centre 2023

Chapter 2: Aligning climate action with blue prosperity

2.1. The ocean is key to climate actions and sustainable economic growth

As Indonesia transitions into an upper-middle-income country, it faces the critical challenge of avoiding the middle-income trap. This is when a country's economic growth stalls after reaching middle-income levels, making it hard to become a high-income economy. To overcome this hurdle, Indonesia aims for sustained annual growth of 5.7 per cent or higher up to 8 per cent, in line with its medium- to long-term vision for development (Ministry of National Development Planning 2019). But recent figures indicate growth of only 5.05 per cent in 2023 and 5.03 per cent in 2024 (Statistics Indonesia 2025), while projections from the World Bank and International Monetary Fund (IMF) suggest a further slowdown to just 4.8–4.9 per cent in 2025 (World Bank 2025; IMF 2025).

Indonesia's vast ocean resources are a powerful pathway to high growth while meeting global climate and biodiversity goals. The country, as the world's largest archipelagic nation with more than 17,500 islands and a coastline stretching over 108,000 kilometres, is estimated to have a blue economy valued at US$1.334 trillion (Ministry of National Development Planning 2021; Can and Dartanto 2023). Managed sustainably, key sectors like fisheries, aquaculture, transportation, tourism, industry, marine services and renewable energy could significantly advance national economic growth (Can and Dartanto 2023).

The Indonesian government has recognised the importance of the blue economy, with the Ministry of National Development and Planning developing the Indonesia Blue Economy Roadmap in 2023. This roadmap is a strategic framework to guide the country's transition to a sustainable maritime economy, while also aiming to meet Indonesia's national and international commitments – including Sustainable Development Goals (SDGs), climate targets, biodiversity and ecosystem conservation, and socio-economic benefits.

2.2.

Alignment between the blue economy and climate targets can unlock significant investment returns

Indonesia's blue economy ambitions and climate mitigation objectives are deeply aligned, offering a powerful double dividend: new sources of economic prosperity and measurable emissions reductions. Figure 2 shows the potential for ocean-based actions to directly reduce emissions when there is high alignment between Indonesia's NDC mitigation sectors and the blue economy. This includes initiatives such as port electrification, mangrove-linked aquaculture, ocean-based renewable energy, bio-restoration and carbon sequestration biotech. Even when there is medium alignment, there is still substantial potential to create enabling conditions of change through research, education and circular-economy innovation.

This alignment is also strategic geopolitically.

As Southeast Asia's largest maritime nation, Indonesia is uniquely positioned to demonstrate that ocean-based industries can transition towards sustainability without sacrificing competitiveness.

A robust Indonesian blue economy can not only help meet national NDC targets but also build Indonesia's credibility and influence on the regional and global stage – supporting the ASEAN Blue Economy Framework, adopted during its 2023 chairmanship. In practice, this means setting standards for ecosystem-based management, marine decarbonisation and offshore renewables that neighbouring countries can adapt and scale to reinforce regional security, safeguard sustainable food sources and advance low-carbon growth trajectories.

FIGURE 2: Alignment between Indonesia's NDC mitigation sectors and blue economy

High Medium Low

Blue economy sector:	NDC SECTOR: ENERGY	FOLU	AGRICULTURE	IPPU	WASTE
Maritime trade, transport and logistics	Port electrification and efficient shipping reduce fuel use and emissions			Cleaner fuels and logistics efficiency cut process emissions	Cleaner port operations and ship discharge recovery
Fisheries and aquaculture	Electrified vessels and energy-efficient cold chains	Mangrove-linked aquaculture reduces land-use pressure	Climate-smart aquaculture and feed-to-harvest efficiency		Processing waste management reduces waste discharge to surrounding water
Tourism	Renewable, low disturbance power generation for coastal tourism	Nature-based tourism supports restoration	Eco-tourism supports the circularity of local food systems (e.g. traditional fishing farms) with tourism activities		Waste management in tourism hubs
Marine conservation and ecosystem services	Coastal restoration supports local energy resilience by protecting critical coastal energy infrastructure	Blue-carbon ecosystem protection (mangroves, seagrass)	Ecosystem management supports coastal farming	Expansion of marine protected areas against sea mining; reducing the environmental impact of sea mining	Management of marine litter and pollution supports ecosystem quality
Marine-based industry	Efficiency upgrades and clean energy in shipyards can reduce cost and pollution			Low-carbon materials and manufacturing	Industrial wastewater treatment
Marine renewables	Offshore wind, tidal, ocean thermal energy conversion (OTEC) technologies displace fossil fuels			Renewable marine-based energy supply for industry	

CONTINUED

Blue economy sector:	NDC SECTOR: ENERGY	FOLU	AGRICULTURE	IPPU	WASTE
Research and development (R&D) and education	R&D in clean-energy tech	Ecosystem (marine) valuation research	R&D on nutrient recycling	Circularity R&D; industrial decarbonisation R&D	Circular economy innovation
Biotechnology and bio-economy	Marine biofuels and biomass energy	Bio-restoration and carbon sequestration biotech	Bio-feed and circular nutrient systems	Bioplastic and bio-material substitution	Waste-to-energy and bio-composting technology

This heatmap illustrates the degree of alignment between Indonesia's NDC mitigation sectors and eight blue-economy sectors. High-alignment areas show where ocean-based actions directly reduce emissions: for example, maritime decarbonisation under the energy and Industrial Processes and Product Use (IPPU) sectors or blue-carbon protection under FOLU. Medium-alignment areas indicate enabling roles such as research, education or circular-economy innovation. The matrix underscores the strategic potential for policy coherence: embedding blue-economy actions within NDC implementation strengthens Indonesia's mitigation targets while advancing sustainable ocean development.

To realise these opportunities, mobilising targeted and well-governed finance is essential. Even established sectors such as fisheries, tourism and maritime industries that already contribute significantly to Indonesia's marine GDP – alongside emerging sectors such as ecosystem conservation – can deliver the greatest climate and economic returns when financing is directed toward low-carbon technologies and sustainable practices.

2.3. Unlocking opportunities for a low-carbon blue economy

Three key sectors illustrate how Indonesia can align its blue economy ambitions with its climate goals to maximise both economic prosperity and climate mitigation.

Blue carbon potential in Indonesia

Indonesia's blue-carbon ecosystems – particularly mangroves and seagrass – are a powerful source of carbon sequestration, absorbing millions of tonnes of carbon dioxide (CO_2) annually in both biomass and soil. But when they are degraded, they shift from being carbon sinks to substantial sources of emissions, including CO_2, methane and nitrous oxide.

Over the past decade, nature-based solutions (NbS) like these have gained recognition as essential tools for achieving Paris-aligned climate goals. Strengthening blue-carbon ecosystem protection and restoration delivers significant climate mitigation while enhancing adaptation and resilience. Blue carbon ecosystems can also bring important co-benefits

such as biodiversity conservation, sustainable livelihoods and support for emerging sectors like sustainable fisheries, making them central to Indonesia's blue economy strategy.

To maximise these benefits, strategic prioritisation of mangrove and seagrass areas is essential, as outlined in the 2023 Climateworks report *Sea of Opportunity*. Projects focused on protecting and restoring these ecosystems are already widely distributed across Indonesia, but further investment in high-quality data and mapping is urgently needed to guide effective action.

According to the Climateworks 2023 report, mangrove areas prioritised for restoration and avoided deforestation – due to a large extent and high degradation risk – could be located in Kalimantan and Papua.

FIGURE 3: Percentage of mangroves within a protected area by province (Climateworks Centre 2023)

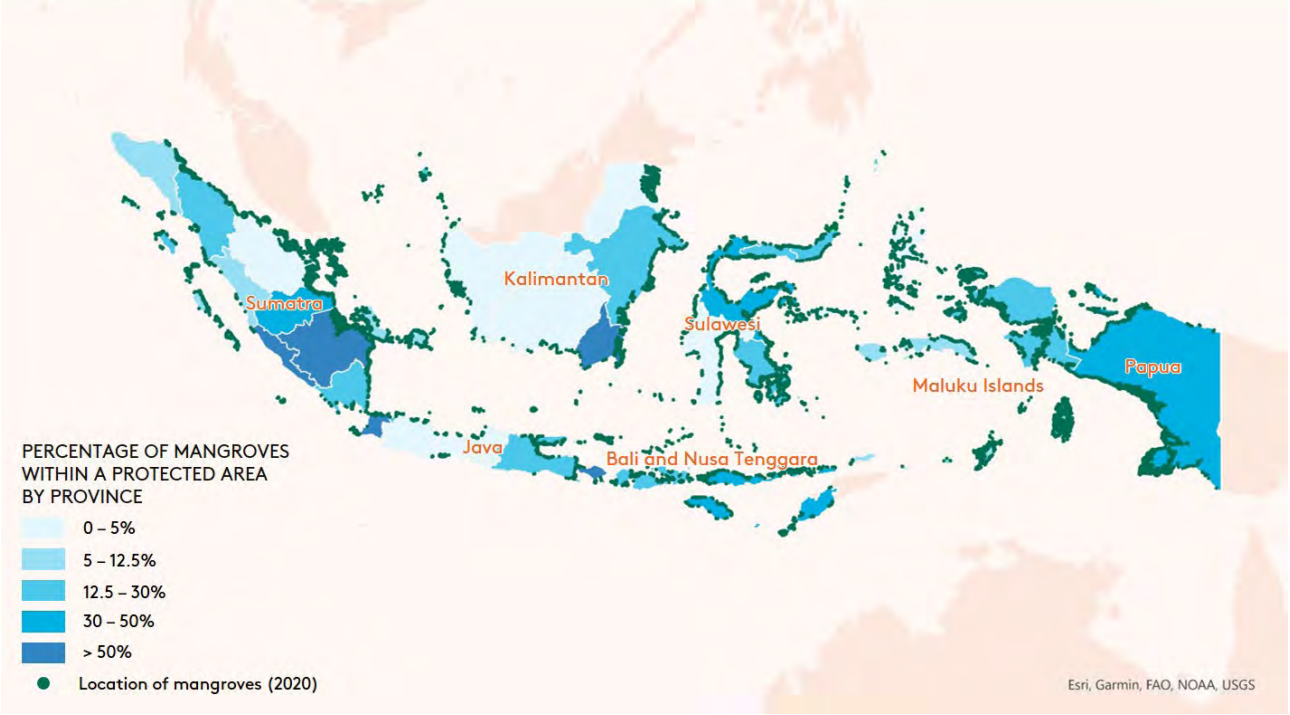
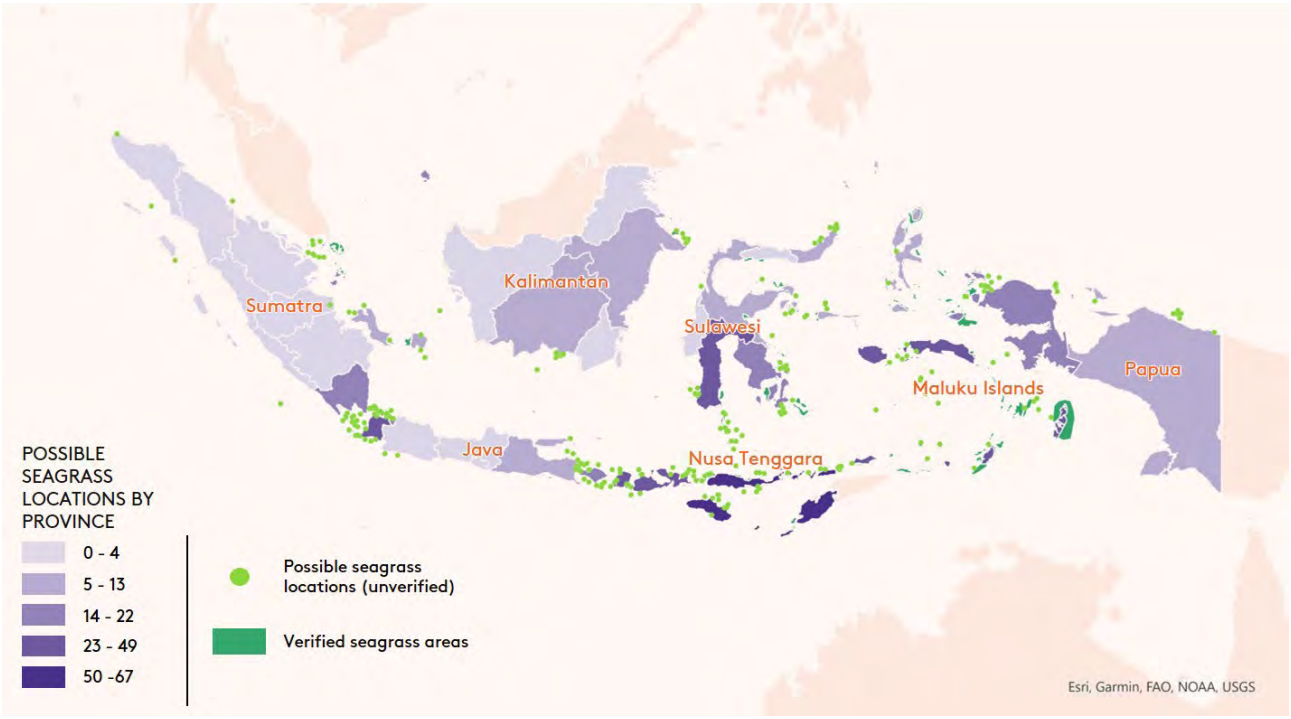


Figure 3 illustrates the percentage of mangrove ecosystems that are currently part of protected areas across Indonesian provinces. This map shows the current state of play of marine protected areas (MPAs) and mangrove protection, providing a closer look into the provinces where there is potential for MPA expansion, as well as provinces with existing MPAs that may require better policy implementation and monitoring.

Seagrass areas prioritised for protection due to ecological value and vulnerability have been identified in the provinces of:

+ Bangka Belitung Islands
+ Maluku
+ North Maluku
+ Southeast Sulawesi
+ South Sulawesi
+ West Papua

FIGURE 4: Possible seagrass location by province (Source: Climateworks Centre 2023)



Indonesia's potential to accelerate green shipping

Indonesia's shipping and port sectors are among the most emissions-intensive areas of its blue economy. Maritime transport, both domestic and international, contributes roughly 5 per cent of national transport emissions – but if low-carbon pathways are adopted, emissions could be cut by 2.1–2.8 $MtCO_2e$ per year by 2030, and up to 8 $MtCO_2e$ per year by 2050 (Climateworks Centre 2023).

Decarbonisation in this sector can be achieved through a mix of electrification, efficiency improvements and fuel switching. Electrification of high-traffic passenger routes, particularly in eastern Indonesia, could cut emissions by 0.38–0.51 $MtCO_2e$ annually by 2030, while reducing noise and improving air quality for coastal communities. Similarly, transitioning domestic cargo fleets to alternative fuels and modernising port operations through measures such as 'cold-ironing' – allowing ships to shut down their engines at port by connecting to shore-side electrical power – green-port standards and improved routing could yield large-scale efficiency gains and new industrial opportunities (Abhold et al. 2022; BPS 2022; Arof et al. 2021).

As with blue-carbon ecosystems, maritime decarbonisation generates co-benefits beyond mitigation: new employment in shipbuilding and logistics, more competitive ports and reduced dependence on fossil-fuel imports. The International Maritime Organisation (IMO) aims to cut GHG by 20–30 per cent by 2030 and reach net zero by 2050; by aligning its domestic and international shipping targets with this trajectory, Indonesia could establish itself as a green shipping hub for Southeast Asia, linking trade decarbonisation with its broader net zero and industrial-policy agendas.

BOX 2

The maritime industry could mitigate up to 2.8 MtCO2e per year by 2030

Although maritime transport is included in Indonesia's NDC, the sector remains poorly understood due to limited transparency in emissions inventory reporting that creates an unclear scope of included activities.

Quantifying emissions from domestic maritime passenger transport is challenging, given the diversity of vessel types and sizes, as well as the dual-purpose nature of vessels serving remote areas, which transport both goods and passengers. In 2018, passenger ferries emitted approximately 625 kilotonnes of carbon dioxide equivalent ($ktCO_2e$), while mixed-purpose ferries contributed around 770 $ktCO_2e$, together accounting for about 0.9 per cent of Indonesia's transport emissions in 2019 (Abhold et al. 2022).

According to a 2023 Climateworks Centre report, aligning emissions reductions from these vessels with IRENA's decarbonisation pathways could lead to annual reductions of 0.38–0.51 $MtCO_2e$ by 2030 and 1.0–1.5 $MtCO_2e$ by 2050 (Climateworks Centre 2023). Overall, the domestic maritime transport and shipping sector could mitigate 2.1–2.8 $MtCO_2e$ per year by 2030 (Climateworks Centre 2023), representing a meaningful opportunity for decarbonisation that remains largely untapped.

Offshore renewables could support energy security and mitigate up to 600 $MtCO_2e$ per year

Indonesia's ocean territory holds vast, untapped renewable-energy potential. This large renewable potential is especially critical given Indonesia's rapidly growing energy demand, driven by demographic and economic shifts. Over the past 30 years, Indonesia's population has grown by over 50 per cent, accompanied by a 237 per cent increase in energy demand. While population growth is projected to slow, electricity consumption is expected to increase annually by 4.9 per cent through to 2030, in line with Indonesia's aim of becoming the world's fifth-largest economy by 2045.

Given these growing needs and significant ocean-based potential, Climateworks' findings suggest that by combining four offshore energy technologies – wave, tidal, offshore wind and ocean thermal energy conversion (OTEC) – Indonesia could mitigate 0.83 $MtCO_2e$ per year by 2030, with a rapid acceleration to over 600 $MtCO_2e$ per year by 2050 if scaled nationally (Climateworks Centre 2023).

Among these, offshore wind offers the most immediate opportunity – particularly off West Java, South Sulawesi, Maluku and Papua, where average wind speeds exceed 6–8 metres per second (m/s) (IEA 2022; Langer et al. 2022). Meanwhile, tidal-energy pilot sites in Southeast Sulawesi could supply up to 0.38 $MtCO_2e$ annually without harming nearby seagrass beds (Ribal et al. 2017). Wave-energy projects near Java and Sumatra could deliver small-island electrification benefits, while OTEC systems in Maluku and North Sulawesi could provide continuous baseload power, enhancing energy security in these remote regions.

Offshore renewables bring multiple dividends: they can expand clean-energy access, reduce fossil-fuel imports and create skilled jobs in

coastal provinces. Careful MSP can ensure installations avoid sensitive blue-carbon ecosystems and complement fisheries and conservation areas. Prioritising research, feasibility studies and pilot projects would allow Indonesia to embed ocean energy firmly within its renewable-energy mix and strengthen its implementation in the national NDC.

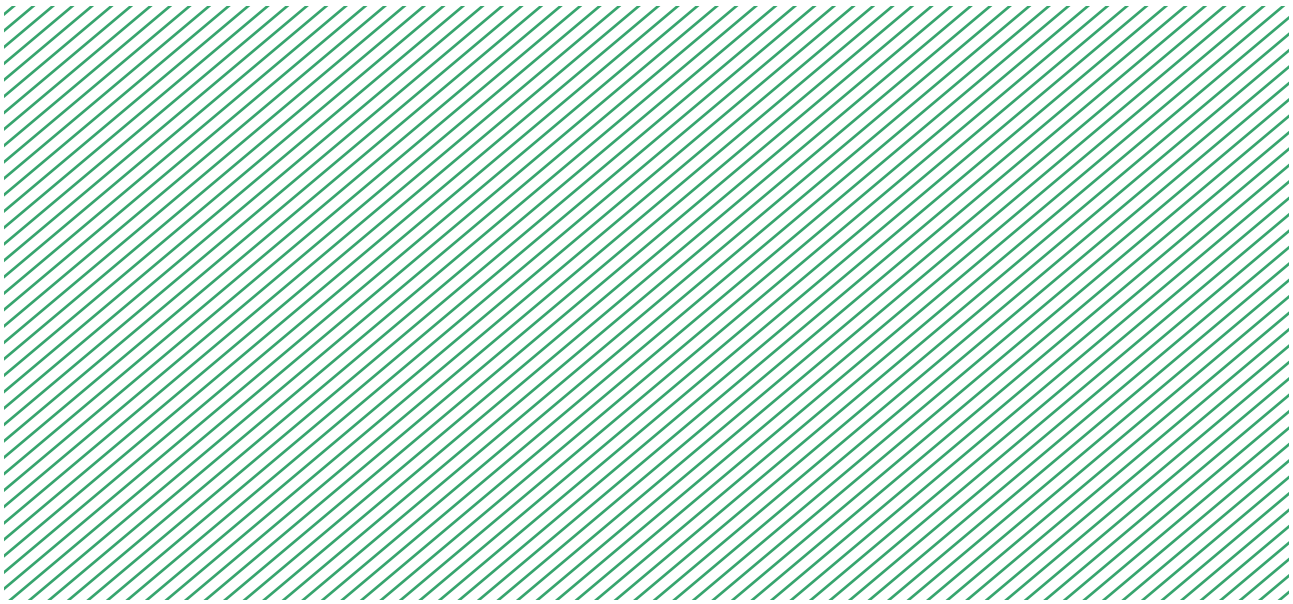
2.4.

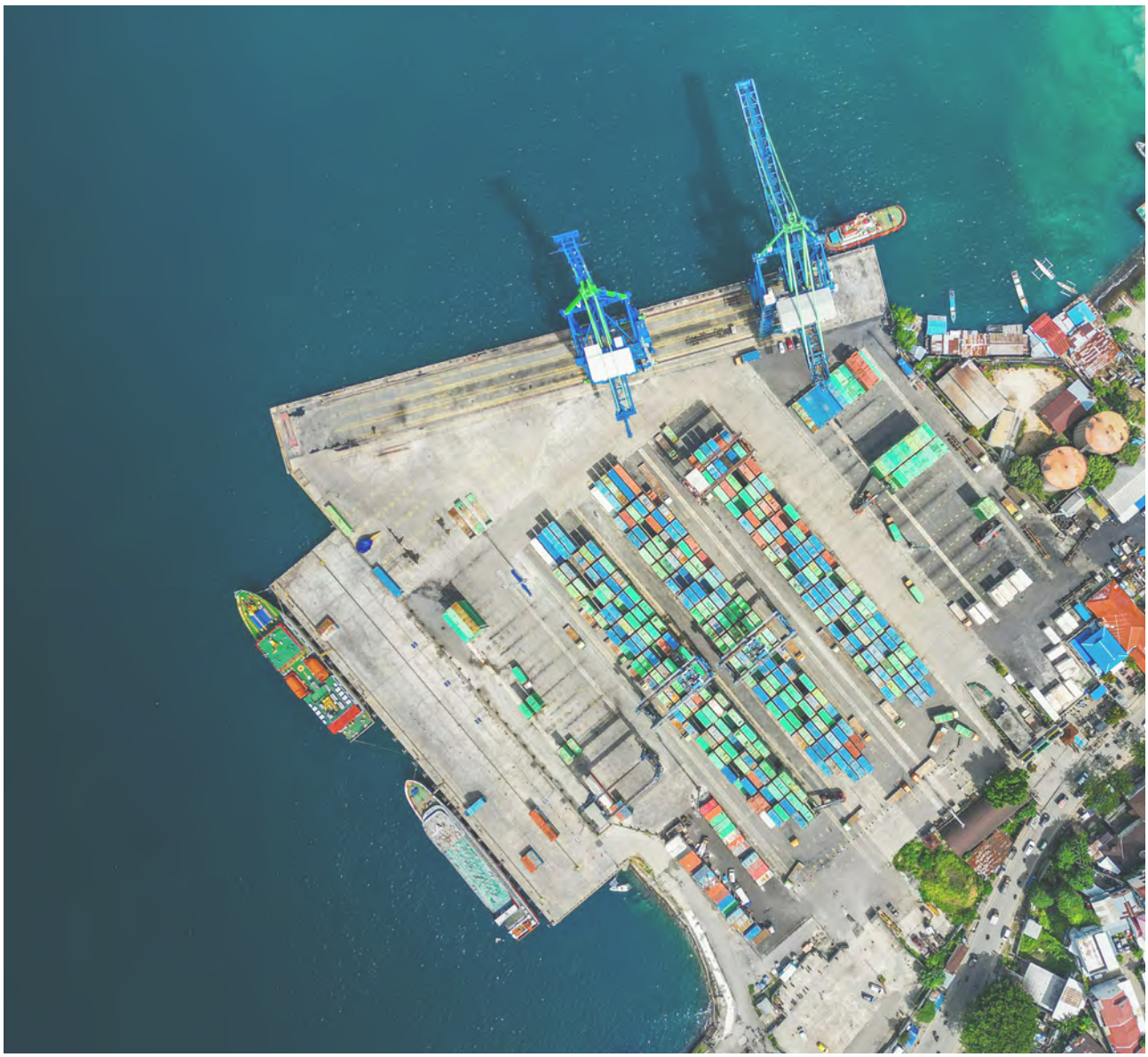
Marine Spatial Planning as the anchor of Indonesia's ocean–climate leadership

Further enhancing MSP provides the foundation for turning ocean-based opportunities into coordinated, effective action across industry, sustainable livelihoods, biodiversity and climate goals. Integrating MSP within national and provincial development strategies ensures that ocean-based solutions – such as sustainable fisheries, renewable energy projects and protected areas – are grounded in scientific evidence, supported by innovative and participatory management practices (e.g. community-based conservation strategies or innovation partnerships between the private sector and coastal communities), and clearly aligned with climate goals.

Indonesia's leadership in ocean–climate governance will depend on building this integrated framework, connecting healthy blue ecosystems, sustainable livelihoods and decarbonised industries to a coherent national agenda. Beyond emissions-reduction outcomes, this approach positions Indonesia as a regional champion for adaptive, low-carbon ocean governance where integrated ocean goals are essential (Vinata et al. 2024). Thus, connecting the national climate agenda with pragmatic strategies for implementation at the local and provincial level can provide a realistic context for coordinated and adaptive ocean governance, reinforcing Indonesia's leadership in ocean-based climate action and responding to the local context and priorities.

This leadership can start with Indonesia's blue-carbon ecosystems and the way science and local knowledge can help guide robust and relevant policy implementation. By building coordinated partnerships, implementing verified carbon accounting, and further recognising the potential of local communities and their participation in ecosystems' management, Indonesia can demonstrate how blue carbon-based solutions deliver both emissions reduction and socio-economic resilience. Indonesia can pave the way in transforming large-scale blue-carbon potential into measurable and meaningful NDC outcomes.





Chapter 3: Navigating the gaps: Operational barriers to ocean–climate action

Indonesia's ocean strategy is no longer held back by ideas – it is held back by implementation.

The systems and processes that translate ambition into practice – governance, data, science and coordination – are fragmented and uneven. But these are fixable gaps in a system already in motion. Understanding and addressing these gaps is the key to transforming Indonesia's ocean potential into measurable outcomes.

Global ocean governance is lagging behind climate ambition, leaving a critical gap in how marine issues are integrated into national climate strategies.

The ocean now occupies a position similar to where broad climate issues stood a decade ago: while the impact of climate change is acknowledged, substantive global governance measures remain limited. Most countries have established targets for land-based emissions under the Paris Agreement, but few understand how an ocean and climate narrative can be integrated into NDCs and policy targets.

Over the past five years, ecosystem-based governance has gained traction, as shown by the High Seas Treaty and the Kunming-Montreal Global Biodiversity Framework. The latter emphasises the critical need to enhance biodiversity conservation in a context where climate action, social equity and sustainable development are key, further highlighting the need for an integrated approach to ocean governance (Boran and Pettorelli 2024; Haas et al. 2022). This evolving global landscape presents Indonesia with both the responsibility and opportunity to turn international commitments into actionable national strategies.

Beyond ocean governance gaps, the broader challenge lies in responding to the interconnected pressures of exceeding planetary boundaries. Isolated efforts – such as tackling plastic waste without addressing climate change – have been shown to be insufficient (Richardson et al. 2023). There are large and far-reaching costs that come from exceeding planetary boundaries; plastic-related damage, for example, is projected to reach an estimated cumulative cost of US$281 trillion by 2040 (Andersen 2025; Robinet 2025), a staggering amount that encompasses damage to vulnerable blue carbon ecosystems and ocean-based sectors. This underscores the urgency of coordinated, integrated responses among countries. The recent push for a global treaty on plastic pollution shows how countries can mobilise to address specific problems through both mandatory and voluntary commitments, recognising issues such as plastic dependency (Jianping and Rui 2025) and the role of key players in plastic pollution, such as China, India and the United States.

At the regional level, there is an immediate need for climate policy in Southeast Asia that explicitly integrates ocean-based mitigation. ASEAN has established several key instruments, including the ASEAN Leaders' Declaration on the Blue Economy in 2021 and the ASEAN Blue Economy Framework in September 2023. While both references recognise blue economy sectors, they stop short of setting region-wide, enforceable ocean-based climate mitigation targets. There are urgent reasons to do so: Southeast Asia is home to extensive mangrove and seagrass ecosystems, primarily located in the Western Coral Triangle, Sunda Shelf and Andaman Coast, and the pressure on blue ecosystems is significant. Studies project that these ecosystems could release up to 2,391 teragrams of carbon dioxide equivalent ($TgCO_2e$) if the ongoing land conversion to agriculture and coastal erosion are not addressed (Adame et al. 2021; Blanton et al. 2024).

3.1.

Partial commitment: Blue Nature-based Solutions are not yet fully established in Indonesia's NDC

Despite growing global momentum, the implementation of blue NbS continues to lag behind land-based efforts (Riisager-Simonsen et al. 2022). Some argue this slow progress reveals critical 'evidence gaps and barriers to implementation' (O'Leary et al. 2024). But there are recent positive signs: at a global level, blue NbS work has gained traction in 2025 with promising prospects for blue finance and investment (e.g. blue bonds, carbon credits), improved data-gathering and tracking systems (e.g. ocean accounting pilots and initiatives), and more targeted integration of blue NbS and mitigation strategies.

Blue NbS offer more than just environmental benefits – they can provide a framework for transforming governance, policy and practice across government and the private sector. By promoting a shift in mindsets, behaviours and practices, blue NbS can influence national planning and policies, reshape work practices and introduce new tools, methodologies and guidelines across ocean-based industries. These shifts expose the shortcomings of current management systems and societal arrangements, and highlight the need to achieve long-term sustainability for blue natural capital and the livelihoods that depend on it (O'Leary et al. 2024).

For Indonesia, blue NbS is the missing link to meet climate commitments under its NDCs. Globally, there is no established template for an NDC, meaning each country decides what to include and how new sectors and targets will be framed. It is broadly recognised that most countries lack ocean-based action in their NDCs, which presents an opportunity for 'modern maritime states' like Indonesia to take a lead role (Rochwulaningsih et al. 2019). Indonesia's blue economy strategies have demonstrated an increasing focus on the mitigation potential of protecting and restoring blue ecosystems and the opportunities for carbon trading as a means to support Paris-aligned climate goals. As a consequence, the government is placing an increasing emphasis on the role of the blue economy as a framework for developing and managing ocean resources. Aligning blue NbS with NDC targets can accelerate climate action while promoting biodiversity and sustainable development, making it essential to Indonesia's low-carbon, climate-resilient future.

As part of Indonesia's long-term development goal in 2045, Indonesia can elevate the ambitions of its second NDC by fostering greater collaboration across government agencies, private sector stakeholders, and local communities. Working closely with these key stakeholders can provide an enabling environment to take NDC ambitions from policy to implementation on the ground with measurable targets and co-benefits.

3.2.

Operational fixes to unlock the potential of Indonesia's blue ecosystems and maritime decarbonisation

The increasing global interest in blue carbon markets and biodiversity credits presents a significant opportunity for Indonesia to put an economic value on the role of its marine ecosystems, a sign of increasing market recognition of the country's extensive and valuable coastal and marine ecosystems. Yet data challenges remain. National data on blue carbon ecosystems' location, extent, health and threats can lead to robust policies and strategies to enhance protection and restoration activities. This is also a key factor in developing carbon markets, as well as new and sustainable financial flows to enhance blue ecosystems and livelihoods.

Beyond the challenge of obtaining robust data, ensuring fair market valuation on marine ecosystems requires rigorous measurement, reporting and verification (MRV) to ensure integrity and equitable benefit-sharing, as well as clear incentive systems to internalise the value of marine ecosystems.

By developing and adopting globally standardised, science-based methods for accurately measuring and verifying carbon storage, Indonesia can enable small-scale projects to participate more effectively in these markets, unlocking new sources of investment and incentivising local community engagement. Moreover, clear incentive mechanisms can even nudge the markets toward conserving and restoring blue ecosystems such as mangroves and seagrass, and even incentivise marine-based industries like shipping and port operators to increase their operational efficiency and reduce emissions.

In essence, ensuring better data supply and data access, as well as creating a robust domestic MRV system, requires better national policy and institutional coordination. In Indonesia, blue carbon-related policy has gained momentum over the past five years, with the launch of two foundational policy guidelines: the Blue Carbon Strategy Framework in 2017 and the Blue Economy Roadmap 2023–2045. But research still shows science and policy remain disconnected, which directly impacts climate action (Quevedo et al. 2023). Meanwhile, Indonesia's maritime industry decarbonisation efforts remain relatively nascent, despite the country already having a blue economy roadmap in place until 2045.

One way to enhance national policy and institutional coordination is better policy communication and its influence on practice. Blue carbon ecosystems experts agree that an open and transparent flow of information is fundamental for a relevant, timely and balanced implementation of the adaptation and mitigation agenda linked to governance – and is crucial for the implementation of blue carbon projects on the ground (Vinata et al. 2024; Megha and Thompson 2026).

Lastly, ocean accounting is emerging as a key tool for overcoming some of these challenges and unlocking the full potential of Indonesia's blue ecosystems and maritime decarbonisation. Over the past five years, ocean accounting has gained momentum as a method to quantify and value marine resources, offering clearer insights into their socio-economic and ecological contributions (Loureiro et al. 2023). It is increasingly recognised as crucial for advancing MSP and facilitating integrated decision-making (Gacutan et al. 2022), and strengthens global ocean governance by improving transparency, accountability and responsible resource management. Ultimately, ocean accounting helps align ocean management with broader sustainability objectives.

BOX 3

What is ocean accounting?

In ecosystems management, an 'account' refers to tracking the quantity or condition of key natural assets over time. By regularly monitoring changes in these assets, such as increases, decreases and shifts, policy-makers can identify trends and make informed decisions. Ocean accounting extends this concept to marine environments, using international standards and methods to record and analyse data like maps and indicators. This reveals the health, extent and dynamics of ocean ecosystems, as well as the dependencies and flows at play. A deeper understanding of these systems is key to improved management and sustainable decision-making about ocean resources, maritime industries, livelihoods and other related activities (Loureiro et al. 2023).

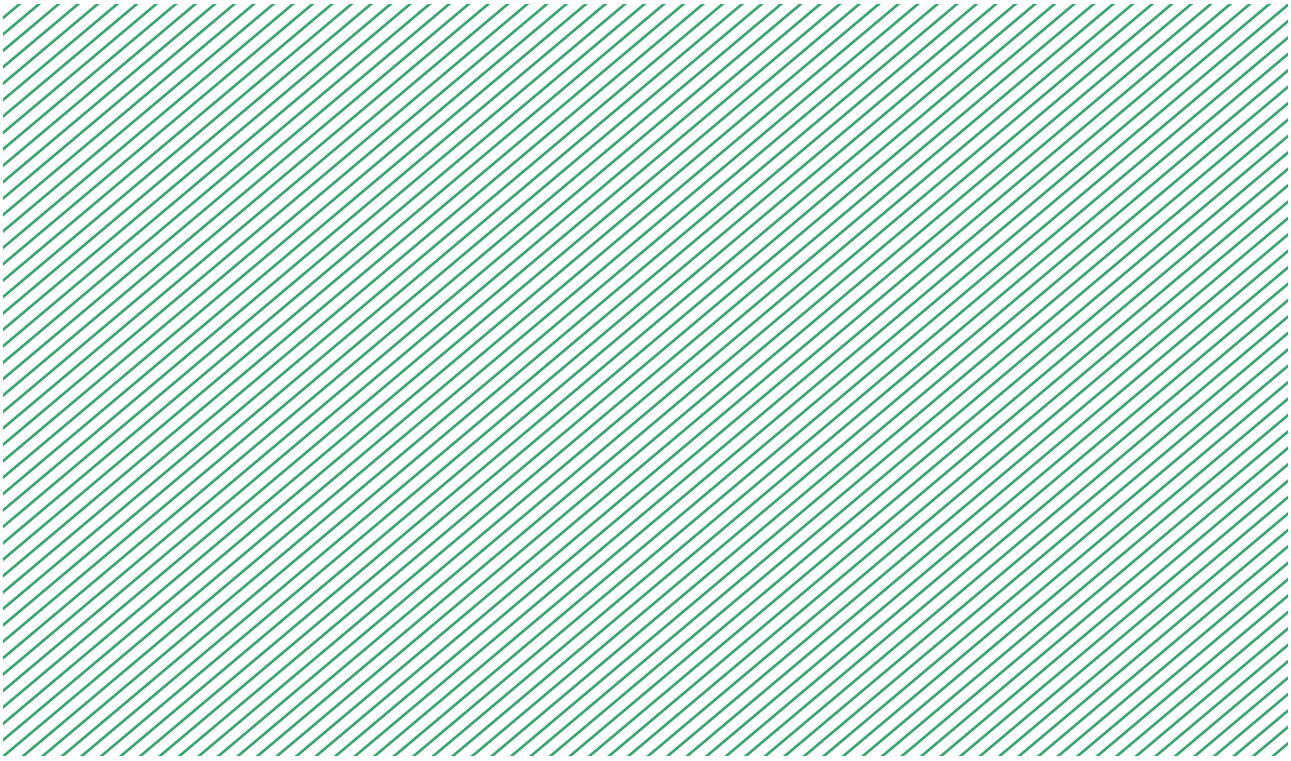
3.3.

How finance reform can play a role in blue carbon investments

Finance remains one of the most persistent operational gaps in Indonesia's ocean–climate agenda. Funding streams for blue carbon, sustainable fisheries, maritime decarbonisation, and other ocean-based climate initiatives exist, but they are fragmented and suboptimally aligned with national priorities, particularly the NDC. The capital is there, but the coherent systems to direct it toward credible, science and net zero-aligned projects are not.

A central issue is the absence of a unified framework to define and guide what qualifies as sustainable ocean investment. Ocean-based mitigation and adaptation – important components for a sustainable ocean economy – are still not fully recognised in mainstream financial planning, leaving financiers uncertain about risk profiles, eligibility and long-term value (Sumaila et al. 2020). Financing decisions tend to remain ad hoc, reflecting institutional inertia more than deliberate policy design. Tools like the TKBI can be an effective way to create certainty and consistency. The TKBI is a finance taxonomy developed by the Indonesian financial regulator to guide the screening criteria for sustainable finance that can support the financial industries aligned with the country's climate and economic goals. Integrating blue-economy sectors into tools like the TKBI would ensure that financial flows reinforce national climate and development priorities rather than operating in isolation.

Better data and coordination can also boost financial institutions' confidence in blue carbon investments. Challenges also limit the readiness of blue projects for investment. Climateworks' interactions with practitioners indicate that financial institutions lack access to reliable data that links MSP, ocean accounting and investment return performance indicators. Giving financial institutions access to better data and governance would make risk assessments easier, reduce uncertainty and make investment more transparent and scalable. Improving Indonesia's blue-finance architecture is less about finding funding and more about building the infrastructure to channel existing capital efficiently to ocean priorities already defined in policy.



Chapter 4: Recommendations to unlock ocean–climate action

Indonesia's ocean–climate ambition will only move from vision to delivery if governance, finance and regional cooperation work in concert. Strengthening governance ensures that policy, science and livelihoods are integrated through clear national frameworks and place-based MSP. Mobilising sustainable blue finance aligns capital with these frameworks, turning policy into investable projects that deliver measurable climate, social and economic outcomes. Regional cooperation through ASEAN multiplies these impacts, enabling shared standards for data, carbon accounting and renewable-energy deployment that advance collective ocean–climate resilience.

Together, these recommendations create an implementation pathway for Indonesia to lead the global blue transition.

1.

Strengthen ocean and climate governance to set a new bar for sustainable economic growth

1.1 Integrated national ocean governance that connects policy, science and livelihoods can move the country from ambition to execution.

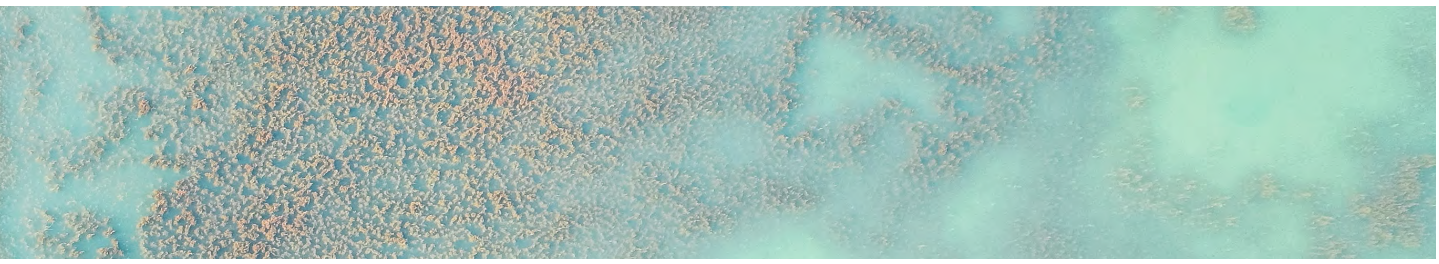
Climateworks Centre's 2024 consultation with blue carbon practitioners underscored the need for governance that reflects the interdependence of ecosystems, biodiversity and coastal communities' wellbeing – anchored in the principles of the Kunming–Montreal Global Biodiversity Framework and COP30 priorities. MSPs, supported by ocean accounting and local knowledge, can form the operational backbone of this effort.

1.2 Building a unified ocean data system is essential to turn knowledge into action.

A comprehensive stocktake of ocean-related data, encompassing carbon cycles, biodiversity and socio-economic indicators, is needed to identify critical gaps and guide research priorities, enabling policy-makers to shift from diagnosing problems to implementing and monitoring solutions. The stocktake would include carbon and biodiversity, reference baselines and socio-economic indicators that are linked with Indonesia's national carbon accounting and registry systems. Such clarity is essential to support a transition from problem identification to policy development, implementation, and ongoing monitoring and evaluation. Moreover, establishing a robust data framework for the ocean will be crucial for scaling efforts and ensuring effective management of marine resources over time.

1.3 Indonesia can take the lead in implementing the High Seas Treaty and set a new regional standard for marine protection and sustainable blue growth.

Indonesia's recent ratification of the High Seas Treaty marks a significant milestone in global marine governance (Mishra 2025), reflecting an increased international commitment to protecting biodiversity in international waters (Gjerde et al. 2022). By advancing international MPAs and effectively implementing the High Seas Treaty, Indonesia can take the lead in shaping regional ocean governance. This, in turn, can catalyse broader commitments from other nations, especially as the treaty pushes for protected areas in international waters. Indonesia's involvement also opens new opportunities for investments in sustainable fisheries, marine tourism and conservation projects, which are critical for funding global MPA initiatives.



2.

Mobilising Indonesia's sustainable blue finance

2.1 Indonesia's financial ecosystem can recognise and mobilise the full potential of the blue economy.

Integrating blue sectors into the TKBI can send a strong policy signal to banks, investors and capital markets, clarifying what qualifies as sustainable blue investment and aligning financial flows with national climate and development priorities. This integration can be reinforced by practical enablers such as financial sector training, tailored investment guidelines and demonstration pipelines that show credible returns while maintaining environmental integrity.

2.2 Building sector-specific systems can boost financier confidence in investing in the blue economy, turning blue finance into a mainstream investment class.

Fisheries, marine tourism, ecosystem conservation and maritime industries form the core of Indonesia's ocean economy and hold significant potential for emissions reduction and resilience-building. Channelling finance toward these blue economy sectors can yield multiple dividends: sustainable fisheries can secure food systems; eco-tourism generates low-carbon livelihoods; marine ecosystem conservation preserves natural carbon sinks; and decarbonised industries enhance global competitiveness. Building sector-specific technical capacity and data systems will allow financiers to better assess risk and develop bankable projects, turning blue finance from a niche into a mainstream investment class.

2.3 Aligning finance with governance reforms can ensure that capital flows are guided by credible data, clear policies and measurable outcomes.

A robust governance framework linking investment and financial return on investments backed by MSP, ocean accounting and transparent monitoring will enable financial institutions to identify, value and de-risk blue investments in a responsible manner. In other words, the coherence between ocean governance and financial systems will strengthen investor confidence, ensure accountability and create a reinforcing cycle where evidence-based policy attracts capital, and capital supports long-term sustainability.

3.

Regional cooperation for accelerating ocean-based climate action

3.1 Regional cooperation is the next frontier for accelerating ocean-based climate action in Indonesia.

The ocean stands at the forefront of Southeast Asia's economic and security agenda. It is estimated that one-third of global shipping passes through the region, linking the South China Sea and the Indian Ocean. In 2023, ASEAN's trade in ocean-based goods reached an estimated US$119.7 billion (ASEAN 2023a; ASEAN 2025). However, Southeast Asia's geographical setting also makes it one of the most climate-vulnerable regions in the world, increasingly exposed to the impacts of sea-level rise, coastal erosion and extreme weather events (ASEAN 2023b).

TABLE 1: ASEAN member states' commitments in their NDCs

COUNTRY	NDC TARGET	BLUE CARBON COMMITMENT	MARINE AND COASTAL MITIGATION ACTIONS
Indonesia	Indonesia is targeting to reduce GHG emissions by 31.8% (unconditional) and 43.2% (conditional), compatible with the 1.5°C target.	+ A landscape-scale approach covering terrestrial, coastal and marine ecosystems, recognising that efforts are multi-sectoral in nature. + Inclusion of mangrove in the national GHG inventory under the wetland category as well as in the establishment of a Forest Reference Emission Level (FREL) for the Reducing Emission from Deforestation and Forest Degradation (REDD+). + Advancing sustainable marine space use for blue carbon reserves and conservation through MSP. + Expansion of marine conservation in marine protected areas and use of MSP for management of marine and coastal areas, and small islands.	+ Implement Government Regulation No.32 of 2019 on MSP and Government Regulation No.26 of 2025 on Environmental Protection and Management Planning. + Implement ocean accounting framework that integrates comprehensive data on marine and coastal ecosystems. + Update the seagrass meadow national map, developing a methodology for seagrass GHG estimation, and identify potential mitigation actions for integrating seagrass meadows into future NDCs. + Implement integrated management of mangrove, coastal and marine ecosystems and strengthen effective management and expansion of MPAs to safeguard species, genetic diversity and climate-resilient ocean biota.

CONTINUED

COUNTRY	NDC TARGET	BLUE CARBON COMMITMENT	MARINE AND COASTAL MITIGATION ACTIONS
Malaysia	Malaysia aims to achieve an absolute reduction of 15–30 $MtCO_2e$ by 2035 from the peak level, comprising up to 20 $MtCO_2e$ (unconditional) with a further 10 $MtCO_2e$ (conditional).	+ No specific commitment on blue carbon, as the country's focus is on energy, IPPU, waste, agriculture and land use, land-use change and forestry (LULUCF) sectors.	+ In the process of developing a Climate Change Bill. + Malaysia's adaptation priorities (2026–2035) include: restoring mangroves and seagrass meadows, and operationalising a Blue Economy Blueprint.
Philippines	GHG emissions reduction and avoidance of 75% – 2.71% is unconditional and 72.29% is conditional for the period of 2020 to 2030	+ Focus on agriculture, waste, industry, transport and energy sectors.	+ Undertake ocean energy baseline survey: tides, waves, currents, offshore winds, offshore solar. + Rehabilitate degraded mangroves. + Implement carbon sequestration measures for the agriculture sector, including rehabilitation/ expansion of mangrove areas. + The Department of Finance will explore using green bonds, blue bonds, sukuk bonds, sustainability bonds and other instruments to finance NDC policies and measures.
Vietnam	Reduction in GHG emissions by 15.8% (unconditional) and 43.5% (conditional) relative to BAU by 2030	+ Focus on energy, transportation, agriculture, LULUCF, waste and industrial process sectors. + Consider offshore wind power as part of its renewable energy plan (energy sector) and carbon sequestration via mangroves (LULUCF sector).	+ Complete policies and the national marine spatial plan for the development of offshore wind power. + Conserve biodiversity and ecosystems with a focus on developing marine and coastal conservation zones. + Conserve and improve forest carbon stocks – protect and restore forests, plant mangroves and coastal protection forests.

With the largest share of blue-carbon ecosystems in ASEAN and a growing record of national reforms, Indonesia is well placed to champion regional cooperation on ocean data, MSP and blue-finance pipelines. Yet blue-carbon integration across ASEAN NDCs remains uneven (ASEAN 2021) – as shown in Table 1. Coordinated regional action built on shared data, common MRV standards and consistent MSP can unlock these ecosystems' full mitigation and adaptation potential.

3.2 Indonesia can leverage its influence and scale up actions at the regional stage.

Under Indonesia's Chairpersonship in 2023, ASEAN recognised for the first time the importance of incorporating ocean-based climate action into the NDCs, long-term low greenhouse gas emissions development strategies, and adaptation communications by its Member States and all UNFCCC Parties (ASEAN 2023b).

Several regional climate policy guidelines were also produced during Indonesia's leadership in 2023, namely the ASEAN Strategy for Carbon Neutrality and the ASEAN Blue Economy Framework. The latter offers Indonesia and its neighbours a platform to align economic growth with ocean-based climate mitigation through shared principles, data systems and investment priorities (ASEAN 2023c). By advancing the Framework's 'Blue Conservation Management' agenda, Southeast Asian countries can jointly strengthen their NDCs and deliver measurable blue-carbon and renewable-energy outcomes.

Building on this regional momentum, Indonesia's experience in ocean-based climate action places it in a strong position to lead collective efforts across ASEAN. The country's progress in mangroves and seagrass ecosystems management, advancing blue carbon policies, and strengthening carbon governance may be leveraged at the regional level. By sharing lessons learned and working with its neighbours to develop common data systems, MRV approaches and blue finance pathways, Indonesia can help share its best practices in regional progress – bringing ASEAN closer to recognising the ocean as a new engine for growth that is socially, economically and environmentally sustainable.

3.3 Southeast Asia's blue ecosystems have globally significant potential that can greatly enhance regional climate policy.

The region's mangrove and seagrass ecosystems store carbon on par with terrestrial forests while providing socio-economic co-benefits (Duarte et al. 2013; Howard et al. 2017). Table 2 below provides an overview of the extent of mangrove and seagrass ecosystems across ASEAN and their estimated total biomass carbon stock values according to multiple sources. The region is estimated to contain approximately 4.82 million hectares (ha) of mangroves and 3.08 million ha of seagrass. It also highlights the region's substantial mitigation potential – averaging 6.57 tonnes of carbon per hectare (tC/ha) – if these ecosystems are conserved, restored and integrated into national and regional policies.

TABLE 2: **Distribution of mangroves and seagrass in Southeast Asia and the estimated carbon stock value**

COUNTRY	MANGROVES (HA)	SEAGRASS (HA)	BIOMASS CARBON STOCK VALUES (tC/ha)
Brunei Darussalam	11,497	430	Unknown
Cambodia	62,692	33,814	60.81
Indonesia	2,953,398	293,464	4,576.02
Lao PDR	N/A	N/A	N/A
Malaysia	524,575	1,630	477.25
Myanmar	543,539	426.35	301.66
The Philippines	284,798	2,726,220	770.71
Singapore	730	33.7	0.90
Thailand	252,799	16,570	231.77
Timor-Leste	Unknown	Unknown	Unknown
Vietnam	187,147	15,740	159.00

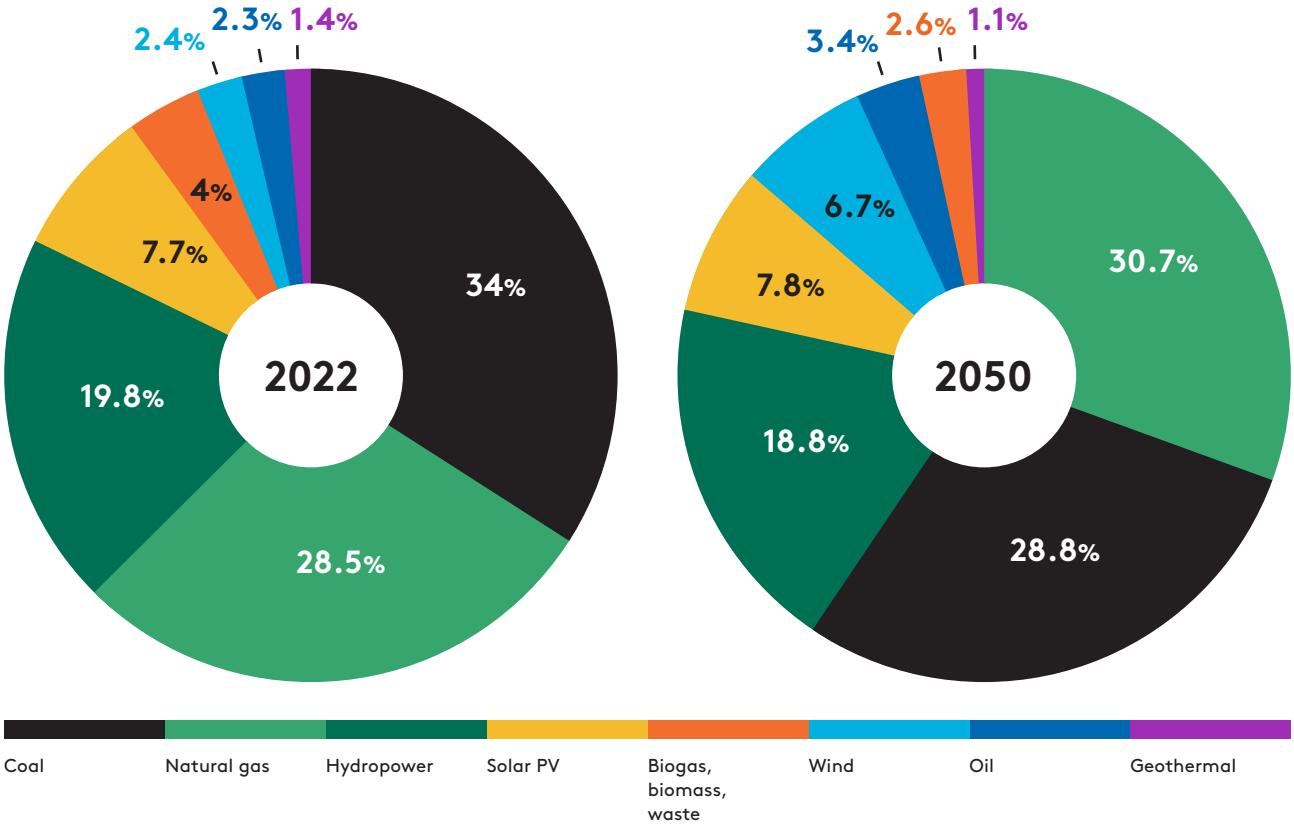
Source: Authors' aggregated and combined sources.

Integrating the sustainable management and conservation of mangrove and seagrass ecosystems would provide a clear and actionable pathway for implementing the Blue Conservation Management Strategy under the ASEAN Blue Economy Framework.

3.4 Regional ocean renewable energy cooperation offers a powerful lever to accelerate ASEAN's transition to net zero.

With energy demand projected to reach 1,107.9 million tonnes of oil equivalent (Mtoe) by 2050 (ASEAN Centre for Energy 2022), Southeast Asia will require a rapid transition toward green and clean energy alternatives. Figure 5 below highlights that new and renewable energy fuel/feedstock, such as hydropower, solar photovoltaic (PV), offshore wind, biofuel and geothermal, could comprise 37 per cent of total installed energy capacity by 2050, up from 35 per cent in 2022. Coastal and ocean-based renewable energy can become a shared regional solution, with estimates suggesting it could contribute up to 38 Mtoe to the region's energy capacity by 2050. Of this, offshore wind represents around 27.4 gigawatts (GW), equivalent to approximately 20.64 Mtoe, while emerging technologies such as tidal and wave could contribute an additional 25 GW (≈ 18 Mtoe) by 2050 (Zafira et al. 2025; IRENA 2022; ASEAN Centre for Energy 2024). This complements other renewable energy sources, such as from hydropower (153.8 GW ≈ 115.9 Mtoe), solar PV (64.2 GW ≈ 48.35 Mtoe) and biogas and biomass (55.3 GW ≈ 41.7 Mtoe). These renewable resources, together with other green and clean fuels, will also contribute to the commitment of Indonesia and its neighbours to reduce dependency on fossil fuels – mainly coal and petroleum – from 38 per cent in 2022 to 31.4 per cent in 2050.

FIGURE 5: Total installed energy capacity by fuel/feedstock in 2022 and its projection in 2050

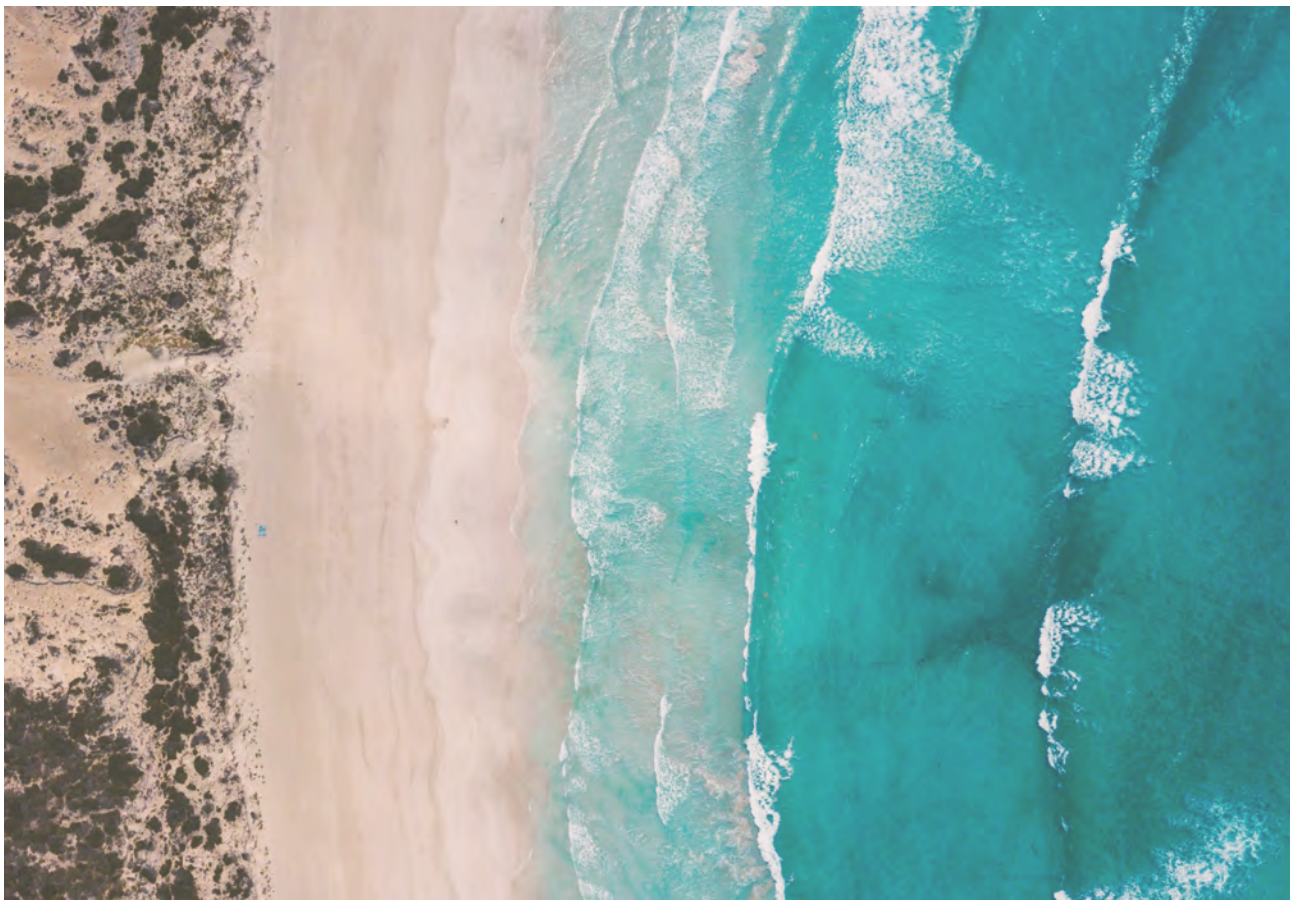


Source: Authors' processed from ASEAN Centre for Energy 2024.

3.5 Regional green shipping can steer Indonesia toward a low-carbon maritime future

Indonesia can accelerate green shipping in Southeast Asia by positioning itself as a regional connector between an existing initiative, such as the Singapore-Australia Green and Digital Shipping Corridor, and other low-carbon maritime route initiatives across the archipelago. The Singapore-Australia Green and Digital Shipping Corridor, launched in March 2024, aims to decarbonise and digitalise shipping routes by piloting green-fuel supply chains, standardising bunkering operations and enabling digital port optimisation between the two countries (DFAT 2024). Indonesia could build on this model by establishing 'green nodes' in major ports such as Tanjung Priok, Surabaya and Makassar ports, integrating renewable energy for port operations and electrifying high-traffic ferry routes. This could collectively cut up to 2.8 $MtCO_2e$ annually by 2030 (Climateworks Centre 2023).

As maritime transport accounts for roughly 5 per cent of Indonesia's national transport emissions, decarbonisation presents both a climate imperative and an economic opportunity. Efficiency measures such as cold ironing, improved routing and green-port standards can unlock new industrial investments and jobs in logistics and shipbuilding (Abhold et al. 2022; Arof et al. 2021; BPS 2022). Aligning Indonesia's domestic targets with the IMO's strategy to cut emissions by 20–30 per cent by 2030 and achieve net zero by 2050 would also strengthen its competitiveness in global trade. By collaborating with neighbouring economies to expand regional fuel infrastructure, digital logistics and training programs for zero-emissions technologies, Indonesia can establish itself as the connector of a Southeast Asian green shipping network.



Conclusion

Indonesia's vast and diverse marine ecosystems position the country as a key player in global efforts to combat climate change. Blue ecosystems offer significant potential to support climate resilience and sustainable development, provided that strategic, place-based policies are implemented. A strong link exists between Indonesia's oceans and its climate goals, with opportunities to develop a blue economy driven by integrated marine planning, innovative financing and coordinated governance. Achieving meaningful progress requires systemic change – strengthening policy execution, building strategic partnerships across sectors and scaling ocean-based climate initiatives. By taking these steps, Indonesia can unlock the full potential of its marine resources, accelerating climate action while fostering resilient and sustainable ocean economies.

Climate action over the next decade is critical, with NDCs providing the framework for countries to articulate and deliver their ambition. As part of its long-term development strategy, Indonesia's second NDC presents a crucial opportunity to embed ocean-based solutions more explicitly in its climate policy. Collaboration across ministries, non-governmental organisations and the private sector, especially those operating within ocean-based industries, will be central to this effort.

Sustainable blue finance will be critical to ensuring that this transition is both scalable and lasting, embedding blue sectors within the TKBI, strengthening project pipelines through MSP and ocean accounting, and fostering links between domestic financial institutions and regional and global investors. Indonesia's leadership within ASEAN provides a powerful platform to advance a blue carbon economy, aligning regional efforts on blue-carbon protection, maritime decarbonisation, offshore renewables and regional green shipping. By driving a coherent ocean–climate strategy at both national and regional levels, Indonesia can help shape Southeast Asia's collective path toward a low-carbon, prosperous and resilient future.

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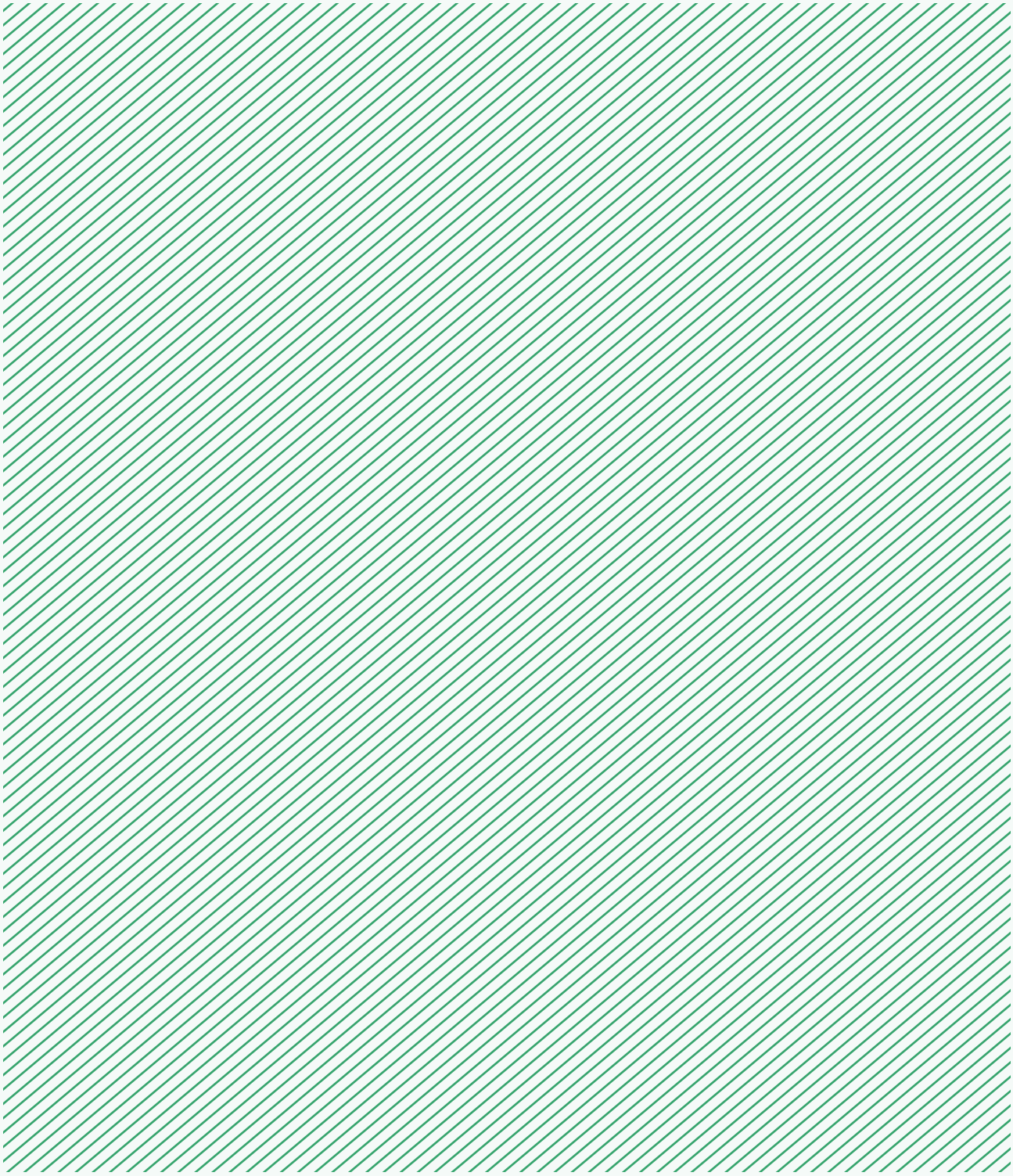

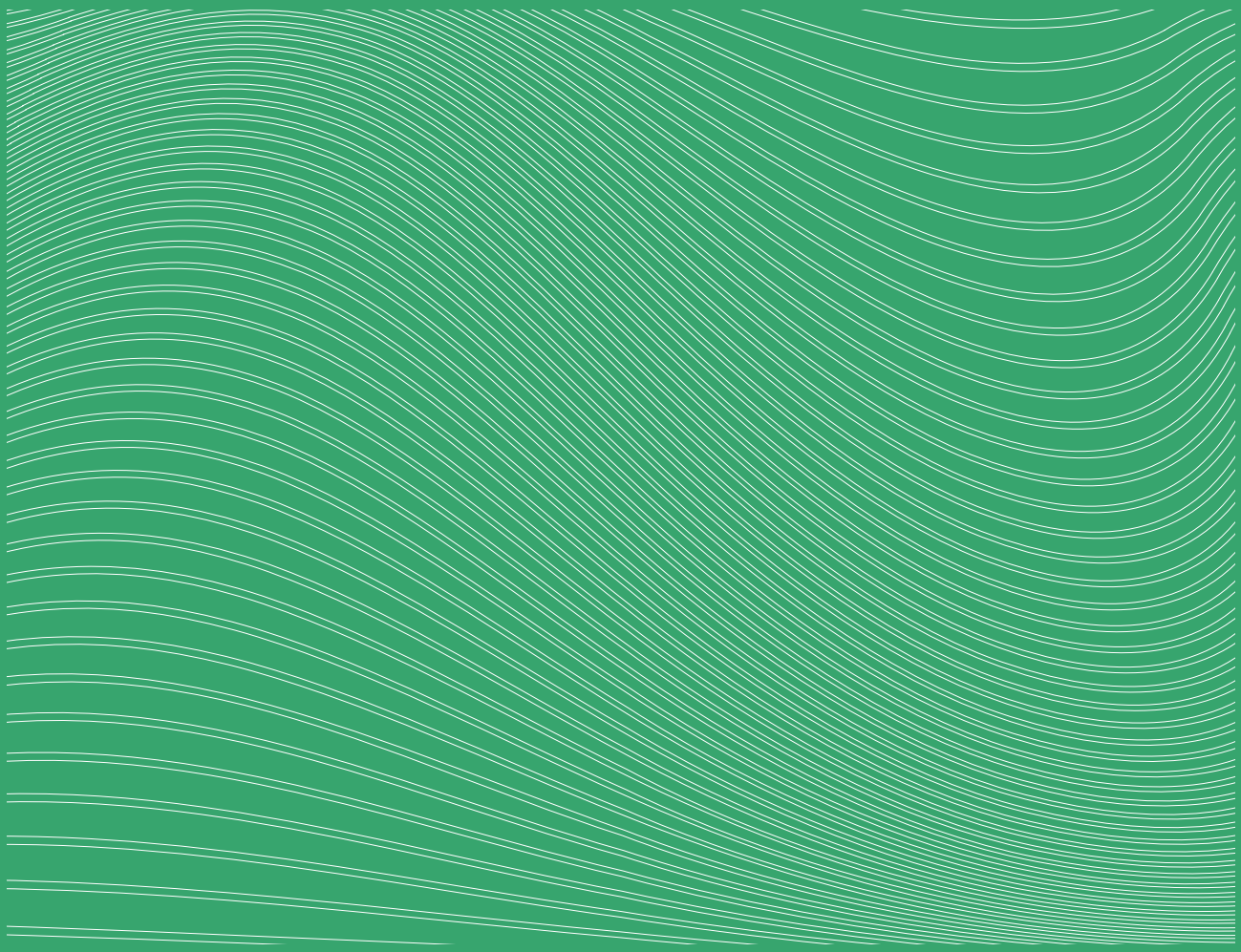

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Climateworks Centre, 2025, *Turning the tide: Advancing Indonesia's blue economy through ocean-based mitigation actions*.

Published by Climateworks Centre Melbourne, Victoria, November 2025
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