



THE COMPARISON OF BLUE CARBON CREDIT REGULATIONS AND IMPLEMENTATION IN INDONESIA, KENYA, MADAGASCAR, AND AUSTRALIA

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Rahmah Salsabilla¹, Afanin Fariq Fajriya², Rachma Ananda Sulaiman³

¹*Faculty of Law, Universitas Gadjah Mada, rahmahsalsabilla@mail.ugm.ac.id*

²*Faculty of Law, Universitas Gadjah Mada, afaninfariqfajriya@mail.ugm.ac.id*

³*Faculty of Law, Universitas Gadjah Mada, rachmaanandasulaiman2004@mail.ugm.ac.id*

Abstract: Global climate change, driven partly by forest degradation, presents urgent challenges. Forests, key carbon sinks, are often converted for economic and social gains, reducing cover and increasing emissions. Addressing this requires innovative solutions like Blue Carbon Ecosystems (BCEs), especially mangroves and seagrass, which offer significant carbon storage potential and social, economic benefits. Blue Carbon Credits (BCC) are one mechanism to harness this, but Indonesia's BCC implementation remains underdeveloped despite its rich coastal resources. This study reviews Indonesia's regulatory framework and progress, comparing it with other countries. Using a qualitative, case-based approach, the findings show that Indonesia has strong opportunities but faces institutional fragmentation, overlapping authority, and data issues. Lessons from other nations suggest Indonesia can improve governance, data sharing, and BCC effectiveness.

Keywords: Blue Carbon Ecosystems; Carbon Credits; Coastal Management; Environmental Policy; Indonesia

I. INTRODUCTION

Today, global climate change has become one of the most important environmental issues and has affected various aspects of life around the world. Specifically, over the past decade, there has been a significant increase in greenhouse gas (GHG)

concentrations, causing global surface temperatures to rise by 1.5 degrees Celsius.¹ This is evident in the 2022 report by the Intergovernmental Panel on Climate Change (IPCC), which states that climate change has had a detrimental impact around the world.² One of these impacts is the increase in global carbon emissions, which has implications for global warming that threatens human sustainability, thus requiring environmental protection and management through government commitments. Currently, the Indonesian government has several legal instruments regarding environmental protection and management, namely Law No. 32 of 2009 related to Environmental Protection and Management (Law 32 of 2009) and specified in Presidential Regulation No. 98 of 2021 related to the Implementation of Carbon Economic Value for the Achievement of Nationally Determined Contribution Targets and Greenhouse Gas Emission Control in National Development (Perpres 98 / 2021). This Presidential Regulation serves as the legal umbrella that legitimizes the use of market-based instruments for climate change control.³

However, Indonesia's high GHG emissions place it in sixth position as the world's largest GHG emitter.⁴ Most GHG emissions come from land-based sources, as evidenced by deforestation and fires, which historically account for more than 42 percent of Indonesia's GHG emissions.⁵ The high rate of deforestation in Indonesia from 2001 to 2023 is evidenced by the loss of 85 percent of tree cover, making Indonesia one of the top five countries in the world that has lost the most forest area over the past two decades.⁶ In addition, the downward trend in land cover caused by deforestation has increased significantly in the last three years, as can be seen in Picture 1.⁷

¹ Perserikatan Bangsa – Bangsa Indonesia, 2022. *Penyebab dan Dampak Perubahan Iklim*. <https://indonesia.un.org/id/175273-penyebab-dan-dampak-perubahan-iklim>.

² Intergovernmental Panel on Climate Change, 2022. *AR6 Climate Change 2022: Mitigation of Climate Change*. <https://www.ipcc.ch/report/sixth-assessment-report-working-group-3/>.

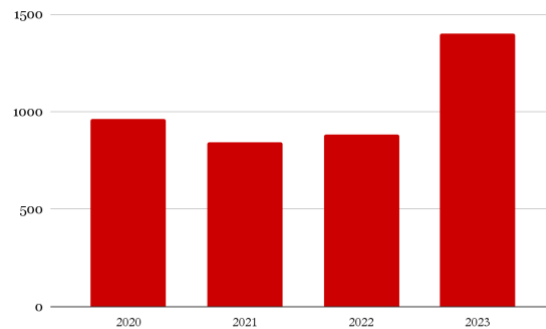
³ Undang-Undang Nomor 32 Tahun 2009 tentang Perlindungan dan Pengelolaan Lingkungan Hidup (LN. No. 140 Tahun 2009, TLN No. 5059).

⁴ Badan Pusat Statistik, 2019. *Emisi Gas Rumah Kaca menurut Jenis Sektor 2000 – 2019*. <https://www.bps.go.id/id/statistics-table/>.

⁵ World Bank Group, 2023. *Laporan Iklim dan Pembangunan Negara Asia Timur Pasifik Indonesia*. Jakarta: World Bank, p. 7.

⁶ Global Forest Watch, 2024. *Indonesia Deforestation Rates & Statistics*. <https://www.globalforestwatch.org/dashboards/country/IDN/?lang=id>.

⁷ Global Forest Watch, *Ibid*.



Picture 1. Forest Deforestation Rate (in Mha) 2020–2023.

Source: Global Forest Watch, 2023.

It can be concluded that significant deforestation indicates the inability of forests to absorb GHG emissions, thereby exacerbating climate change. This shows that forests cannot be relied upon as the sole means of reducing GHG emissions. Therefore, the government has introduced a carbon reduction mechanism through a carbon economic value scheme implemented in the form of carbon trading and carbon credits, as regulated in various regulations. Ministry of Environment and Forestry Regulation No. 21 of 2022 is the main basis for the application of Carbon Economic Value (NEK) by establishing two mechanisms, namely emissions trading (cap-and-trade) and GHG emissions offsets (baseline-and-credit), as well as confirming SRN PPI as the official recording system. Meanwhile, LHK Regulation No. 7 of 2023 specifically regulates carbon trading in the forestry sector with detailed guidelines for the development of offset projects in various types of forest areas. Presidential Regulation No. 14 of 2024 related to Carbon Capture and Storage (CCS) expands technology-based decarbonization pathways and provides legal certainty for investments in emission capture.

However, seeing as the regulations still focus on forestry and technology, we need to look at the potential for blue carbon credits as a way to expand the economic value of carbon to include coastal and marine ecosystems as an alternative solution for comprehensive emission reduction, considering Indonesia's marine potential as the world's largest archipelago with rich biodiversity.⁸ Coastal areas have biodiversity in the form of coastal ecosystems consisting of mangrove forests, coral reefs,

⁸ Rokhmin Dahuri, et al., 1996. *Pengelolaan Sumber Daya Wilayah Pesisir dan Lautan Secara Terpadu*. Jakarta: PT Paradya Permata, p. 1.

seagrass beds, and vast swamps.⁹ These coastal ecosystems are capable of absorbing around 50 percent of total emissions stored in their sediment layers.¹⁰ The utilization of carbon storage in coastal and marine areas is referred to as the Blue Carbon Ecosystem (EKB).

Sustainable management of coastal and marine areas is a manifestation of the protection and respect for human rights, which is realized through the right to manage the environment and the right to a sustainable environment.¹¹ Article 28H paragraph (1) of the 1945 Constitution of the Republic of Indonesia (UUD NRI 1945) mandates that every person has the right to a good and healthy environment.¹² The consequence of this article is that the government has an obligation to always preserve the environment, one of which is in the aspect of utilizing coastal and marine areas that have strategic value in various aspects of community life.¹³ However, in the implementation of blue carbon credits, there are problems in institutional, regulatory, and economic aspects. Therefore, in order to optimize blue carbon credits as one of the efforts to reduce carbon, the author proposes a study that reviews the implementation of blue carbon credits in Indonesia and conducts a comparative study with other countries to gain a comprehensive understanding of the characteristics, application, and steps taken by Indonesia in developing blue carbon credit mechanisms.

Based on the description of the background and status quo, the author formulates two issues that will be examined further, which are:

- 1) How are blue carbon credits regulated and implemented in Indonesia?
- 2) How are blue carbon credits regulated and implemented in other countries?

This paper has two objectives, which are:

- 1) To understand and analyze the regulation and implementation of blue carbon credits in Indonesia.

⁹ *Ibid.*

¹⁰ Ayundya Annisa Putri, et al., 2022. *Ekosistem Pesisir sebagai Penghasil Karbon Biru*. Journal of Environmental Policy and Technology 1, no. 1, p. 14.

¹¹ Amnesty International Indonesia, 2022. *HAM dan Lingkungan*. <https://www.amnesty.id/referensi-ham/amnestypedia/ham-dan-lingkungan/03/2022/>.

¹² Undang-Undang Dasar Negara Republik Indonesia Tahun 1945.

¹³ Undang-Undang Nomor 32 Tahun 2014 tentang Kelautan (LN No. 294 Tahun 2014, TLN No. 5603).

- 2) To understand and analyze the regulation and implementation of blue carbon credits in other countries.

This paper has two research benefits, which are:

- 1) Theoretically, this research contributes to the development of legal and environmental policy literature related to carbon economic value mechanisms, particularly in the context of blue carbon ecosystems.
- 2) Practically, the results of this research can be used as a reference for academics, policy makers, and stakeholders in understanding the regulation and implementation of blue carbon credits in Indonesia and other countries.

II. RESEARCH METHODS

This study was carried out at Gadjah Mada University, Yogyakarta, between June and November 2025. Throughout this period, all stages of the research were conducted through an extensive review of literature and an examination of legal documents associated with the regulation and implementation of blue carbon credits. The study focuses on stakeholders who hold influential roles in the environmental and marine sectors, namely policymakers, scholars of environmental law, and private entities with potential involvement in blue carbon credit initiatives. These groups were selected because of their importance in shaping, executing, and assessing legal frameworks within the blue economy and the management of coastal resources.

A normative juridical method was adopted to guide the research. This approach was chosen because it enables a structured examination of legal norms and regulatory instruments, while also providing a basis for selecting and interpreting the sources necessary to understand the research problem. The analysis utilized three categories of legal materials: primary sources, including national laws and international policy documents; secondary sources, such as academic publications, books, and official reports; and tertiary sources, including legal dictionaries and encyclopedic references. These materials were analyzed using descriptive and analytical techniques to interpret applicable legal standards and to compare them with blue carbon credit practices implemented in other countries. The comparative dimension was included to help identify a legal model that could be adapted to Indonesia's context.

The selection of these methods is intended to ensure transparency, logical coherence, and analytical rigor, allowing readers to assess the reliability and validity

of the study. The research is considered successful when its legal interpretation remains accurate and when it produces normative recommendations relevant to national blue economy policy development. The credibility of the analysis is strengthened through consistency with the theoretical framework, clarity of legal reasoning, and alignment with evolving national and international regulations on blue carbon credit mechanisms. Assessment of the study is conducted through academic review and peer evaluation of the resulting manuscript to guarantee its scholarly contribution to environmental law.

III. ANALYSIS AND DISCUSSION

a. Carbon Credit Regulation and Implementation System in Indonesia

Blue Carbon Credits (BCC) constitute a certification-based instrument designed to facilitate greenhouse gas mitigation through the conservation and sustainable management of marine ecosystems, particularly seagrass meadows and mangrove forests. The operationalization of BCC yields multifaceted ecological and socio-environmental functions, including carbon sequestration and long-term carbon storage, biodiversity preservation, coastal protection, and the enhancement of climate resilience. These strategic benefits necessitate systematic governance and optimal utilization by the State as an integral element of sound environmental administration. In pursuit of these objectives, the Government of Indonesia has promulgated the Ministerial Regulation of the Ministry of Marine Affairs and Fisheries Number 1 of 2025 on the Procedures for Implementing the Economic Value of Carbon in the Marine Sector (Ministerial Regulation of MMAF No. 1/2025). This regulatory instrument demonstrates the government's policy commitment to advancing and institutionalizing BCC within the national carbon governance framework. Notwithstanding this normative progress, several structural and operational challenges continue to impede the effective management of BCC in Indonesia. Accordingly, this study delineates the analysis of BCC implementation and its attendant issues into two principal sections, as presented below:

Regulation of Blue Credit Carbon in Indonesia

In the Indonesian regulatory framework, the implementation of Blue Carbon Credits (BCC) is operationalized through three principal modalities: (i) land management aimed at expanding the relevant ecological area; (ii) land management intended to preserve existing ecological coverage; and (iii) biodiversity management. These modalities apply specifically to mangrove and seagrass ecosystems, given their status as the most substantial coastal carbon sinks, their extensive spatial

distribution, and their measurable contribution to national greenhouse gas absorption.

In addition, BCC trading activities may be undertaken by business entities, both domestic and foreign, through Indonesia's greenhouse gas emissions trading and offset architecture. The emissions trading mechanism applies exclusively to entities subject to an upper-emission threshold established through the Greenhouse Gas Emission Limit Determination (GHG-ELD), which is issued by the minister responsible for marine affairs and fisheries. Conversely, entities operating outside the GHG-ELD framework participate through an offset mechanism, which requires the preparation of a Mitigation Action Design Document (MADD) and a Mitigation Action Progress Report (MAPR) as part of the mandatory measurement, reporting, and verification process. Beyond domestic and cross-border transactions, BCC instruments may also be traded across different segments of the maritime sector. With respect to remuneration, Indonesia adopts a performance-based payment model, under which financial compensation is allocated to marine conservation zones or island protection areas that demonstrably maintain or enhance blue carbon-bearing ecosystems.

Implementation of Blue Credit Carbon in Indonesia

At present, the implementation of Blue Carbon Credits (BCC) in Indonesia is primarily supported by two categories of marine biodiversity, namely mangrove ecosystems and seagrass meadows, both of which exhibit exceptionally high carbon-sequestration capacity. The ecological importance and carbon potential of each ecosystem are elaborated below.

1) Mangrove Ecosystems

Mangrove ecosystems constitute a distinct assemblage of tropical coastal vegetation dominated by tree species capable of surviving in saline waters.¹⁴ These ecosystems provide multiple functions, including a physical function in stabilizing coastlines, an ecological function in supporting coastal fisheries, and a socio-economic function in sustaining the livelihoods of coastal communities.¹⁵ Importantly, mangroves operate as highly effective natural carbon sinks because their biomass and sediments store substantial amounts

¹⁴ Ahmad Muhtadi Rangkuti, et al., 2017. *Ekosistem Pesisir dan Laut Indonesia*. Jakarta: Cahaya Prima Sentosa, p. 77.

¹⁵ Ahmad Muhtadi Rangkuti, et al., *Ibid*.

of carbon dioxide while producing oxygen through photosynthesis.¹⁶ This contribution to the global carbon cycle underscores the necessity of coordinated and scientifically informed management by all relevant stakeholders.

Indonesia contains the largest mangrove area in the world, representing approximately 22.4 percent of global mangrove coverage and distributed across 257 regencies and municipalities.¹⁷ Based on the 2021 National Mangrove Map issued by the Ministry of Environment and Forestry, Indonesia's mangrove ecosystems span 3,364,076 hectares, consisting of 2,661,281 hectares within forest zones and 702,799 hectares in coastal areas.¹⁸ Empirical assessments indicate that Indonesian mangroves store an average of 891.70 tons of carbon per hectare, resulting in an estimated national carbon stock of approximately 2.89 teratons of carbon.¹⁹ These figures confirm the strategic importance of implementing evidence-based conservation and restoration measures.

2) Seagrass Ecosystems

Seagrasses, which are submerged flowering plants inhabiting shallow marine environments, function as primary producers that play a vital role in maintaining the productivity and ecological stability of coastal ecosystems.²⁰ Seagrass meadows provide essential ecological and economic functions, including oxygen production and the reduction of carbon dioxide concentrations through effective carbon sequestration.²¹ Indonesia possesses the second-largest seagrass coverage globally, accounting for approximately 15 percent of global seagrass meadows and spanning roughly 293,464 hectares.²² On average, Indonesian seagrass ecosystems store 0.94 tons of carbon per hectare, resulting in a total carbon stock of 141.98 kilotons of

¹⁶ Nuddin Harahab, 2010. *Penilaian Ekonomi Hutan Mangrove dan Aplikasinya dalam Perencanaan Wilayah Pesisir*. Yogyakarta: Graha Ilmu, p. 62.

¹⁷ Kementerian Lingkungan Hidup dan Kehutanan Republik Indonesia. *Tata Kelola Mangrove yang Baik: Bagaimana Mewujudkannya*, Retrieved August 05, 2024, <http://pojokiklim.menlhk.go.id/>.

¹⁸ Portal Informasi Indonesia, 2022. *Peta Mangrove Nasional*. Retrieved August 05, 2024, <https://indonesia.go.id/mediapublik/detail/1793#:~:text=Berdasarkan%20Peta%20Mangrove%20Nasional%20oleh%20Kementerian%20Lingkungan%20Hidup,dalam%20kawasan%20serta%20702.799%20hektaree%20di%20luar%20kawasan.>

¹⁹ Portal Informasi Indonesia, *Ibid*.

²⁰ Ahmad Muhtadi Rangkuti, et al., *Op. Cit.*, p. 265.

²¹ Ahmad Muhtadi Rangkuti, et al., *Op. Cit.*, p. 287.

²² Ahmad Muhtadi Rangkuti, et al., *Ibid*.

carbon, with an annual sequestration potential of 6.59 tons per hectare. Despite this potential, the national sequestration capacity of seagrass ecosystems remains suboptimal because nearly 80 percent of the thirteen dominant species exhibit indicators of ecological stress and poor health.²³ Carbon-storage performance varies significantly depending on the size of the meadow, the species composition, and habitat conditions.²⁴ The ability of seagrass to absorb carbon stored in biomass depends on the extent of seagrass and where it grows.²⁵ These circumstances necessitate comprehensive, integrated, and long-term policy interventions to enhance the productivity, resilience, and sustainability of Indonesia's seagrass ecosystems.

Although the Blue Carbon Credit (BCC) has been formally adopted in Indonesia, its implementation continues to encounter significant challenges concerning the long term sustainability of seagrass meadows and mangrove ecosystems, which constitute the principal sources of blue carbon. These challenges may be classified into three major domains, namely social, institutional, and economical issues.

1) Social Issues

The primary challenge to BCC implementation lies in the deteriorating condition of blue carbon ecosystems, exacerbated by fragmented governmental datasets that impede an integrated conservation strategy. Concurrently, anthropogenic pressures, including the conversion of mangroves into aquaculture ponds, coastal reclamation activities, and escalating marine pollution, have intensified ecosystem degradation.²⁶ In 2020 alone, approximately twelve thousand tons of marine waste entered Indonesian waters, diminishing ecosystem integrity and weakening the carbon sequestration capacity of blue carbon habitats. If these pressures remain unmitigated, the declining ecological health of coastal systems will reduce their capacity to store carbon, thereby contributing to heightened atmospheric CO₂ concentrations and accelerating climate change trajectories.

²³ A'an J. Wahyudi, et al., 2018. *The Potentials of Carbon Stock and Sequestration of Indonesia's Mangrove and Seagrass Ecosystem*. ResearchCenter for Oceanography - Indonesian Institute of Sciences, p. 9.

²⁴ A'an J. Wahyudi, et al., *Op. Cit.*, p. 9.

²⁵ Agustin Rustam, et al., 2021. *Pengaruh Perubahan Lingkungan Terhadap Stok Karbon pada Ekosistem Lamun di Pulau – Pulau Kecil, Studi Kasus: Gugusan Kepulauan Seribu*. Jurnal Kelautan Nasional 16, no. 3, p. 204.

²⁶ Luh De Suriyan, 2021. *Begini Tantangan dan Strategi Pengelolaan Karbon Biru di Indonesia*. Mongabay. Retrieved October 05, 2025, <https://mongabay.co.id/2021/07/12/begini-tantangan-dan-strategi-pengelolaan-karbon-biru-di-indonesia/>.

2) Institutional Issues

From an institutional perspective, the governance of the BCC regime involves multiple entities, most prominently the Ministry of Environment and Forestry and the Ministry of Marine Affairs and Fisheries, alongside various national and sub national bodies. The absence of a unified coordinating authority has resulted in regulatory fragmentation and heightened risks of bureaucratic rivalry. Although the Ministry of Marine Affairs and Fisheries has been mandated, through Ministerial Regulation 1 of 2025, to regulate blue carbon trade, institutional dualism persists because BCC governance encompasses conservation mechanisms in addition to market mechanisms. This dualism is reinforced by the coexistence of two distinct statutory regimes, namely Law 41 of 1999, which assigns mangrove authority to the Ministry of Environment and Forestry, and Law 1 of 2014, which confers marine ecosystem authority upon the Ministry of Marine Affairs and Fisheries.

These overlapping legal mandates create a terrestrial–marine divide in mangrove governance that, in practice, produces inconsistent and often competing management approaches. For example, several marine conservation zones formally under the Ministry of Marine Affairs and Fisheries are nonetheless managed by the Ministry of Environment and Forestry pursuant to spatial planning instruments, leading to sub optimal governance outcomes.²⁷ By contrast, the governance of seagrass meadows, which falls predominantly under the Ministry of Marine Affairs and Fisheries, demonstrates greater institutional coherence due to the absence of overlapping jurisdiction. Collectively, these dynamics underscore the urgent need for a designated leading sector capable of consolidating authority, harmonising regulatory regimes, and ensuring coordinated implementation of Indonesia’s BCC framework.

3) Economical Issues

Indonesia’s extensive marine resources impose a corresponding obligation upon the State to ensure the protection and sustainability of its coastal and marine ecosystems. Despite the proliferation of governmental initiatives intended to demonstrate this commitment, implementation has remained inconsistent, largely due to fluctuations in the political orientation of marine conservation policy. The gap between declared commitments and realised

²⁷ WRI Indonesia, 2021. *Memahami Perencanaan Ruang untuk Melindungi Ekosistem Mangrove*. Retrieved August 09, 2024, <https://wri-indonesia.org/id/wawasan/memahami-perencanaan-ruang-untuk-melindungi-ekosistem-mangrove>.

outcomes is reflected in the country's mangrove conservation performance. At the 2022 One Ocean Summit, President Joko Widodo announced Indonesia's pledge to rehabilitate 600,000 hectares of mangroves by 2024 as part of broader climate-mitigation and marine-ecosystem restoration measures.²⁸ However, as reported by the Minister of Environment and Forestry, the actual rehabilitation achieved by 2024 amounted to approximately 130,000 hectares, falling substantially short of the established target.²⁹

The economic dimension of this governance deficit is evident in the limited fiscal capacity allocated for ecosystem conservation through the State Budget (APBN). The Director of the Environmental Fund Management Agency (BPDH) has stated that the APBN can only cover roughly 34 percent of Indonesia's annual financial needs to achieve its 2030 Nationally Determined Contribution (NDC).³⁰ While the total projected NDC financing requirement is approximately IDR 4,000 trillion, APBN resources contribute only around IDR 1,200 trillion, thereby leaving a significant funding gap.³¹ Although the government has attempted to mobilise alternative conservation financing through non-state sources, including private entities and the World Bank,³² nearly 70 percent of these funds remain concentrated in land-based sectors such as forestry, leaving marine and coastal conservation—including areas relevant to blue-carbon ecosystems and potential BCC development—comparatively underfunded.³³

²⁸ Eri Sutrisno, 2022. *Komitmen Indonesia untuk Konservasi Laut*. Indonesia.GO.ID: Portal Informasi Indonesia. Retrieved August 09, 2024, <https://indonesia.go.id/kategori/editorial/4405/komitmen-indonesia-untuk-konservasi-laut?lang=1?lang=1?lang=1?lang=1?lang=1?lang=1>.

²⁹ Pramono Dwi Susetyo, 2023. *Apa Kabar Pengelolaan Mangrove di Indonesia*. Kompas.id. Retrieved August 09, 2024, <https://www.kompas.com/tren/read/2023/02/09/100700365/apa-kabar-pengelolaan-mangrove-di-indonesia?page=all>.

³⁰ Pramono Dwi Susetyo, 2023. *Ibid*.

³¹ Pramono Dwi Susetyo, 2023. *Ibid*.

³² Atalya Puspa, 2023. *BPDH Gelontorkan Rp3 Triliun untuk Rehabilitasi Mangrove 2023*. Mediaindonesia.com. Retrieved August 09, 2024, <https://mediaindonesia.com/humaniora/548796/bpdh-gelontorkan-rp3-triliun-untuk-rehabilitasi-mangrove-2023>.

³³ Reni Saptati D. I., 2023. *Jaga Lingkungan Hidup, APBN Lindungi Masa Depan*. Mediakeuangan. Retrieved August 09, 2024, <https://mediakeuangan.kemenkeu.go.id/article/show/jaga-lingkungan-hidup-apbn-lindungi-masa-depan>.

A similar pattern appears in the budget allocations of the Ministry of Marine Affairs and Fisheries.³⁴ From the IDR 10.7 trillion proposed in the 2025 draft budget submitted to the House of Representatives, expenditures are directed predominantly toward aquaculture industrialisation, fishing-fleet maintenance, coastal community infrastructure, and fish-stock assurance.³⁵ Moreover, analysis of the 2024 MMAF budget reveals minimal allocations for the Directorate-General of Marine Spatial Management, which includes the Directorate for Marine Conservation and Biodiversity. This budgetary prioritisation sidelines coastal-ecosystem conservation at a time when such ecosystems are critical to climate-change mitigation, including potential BCC generation.³⁶



Picture 2. Overview of Budget Allocation Based on KKP Expenditure Types.
Source: DPR Commission IV, 2023.

The cumulative effect of these fiscal and institutional tendencies is an escalating pressure on marine conservation areas. According to assessments by Destructive Fishing Watch Indonesia, declining public funding has significantly weakened the State's capacity to sustain marine-conservation programmes.³⁷ Overall, these conditions demonstrate that the government has yet to centre coastal and marine-ecosystem conservation within its environmental policy framework, despite the sector's substantial potential to

³⁴ Aulia Damayanti, 2024. *KKP Minta Tambahan Anggaran 2025 Jadi Rp 10,7 T, Ini Rinciannya*. Retrieved August 10, 2024, <https://finance.detik.com/berita-ekonomi-bisnis/d-7385480/kkp-minta-tambahan-anggaran-2025-jadi-rp-10-7-t-ini-rinciannya>.

³⁵ Aulia Damayanti, *Ibid*.

³⁶ Badan Keahlian DPR RI, 2023. *Kumpulan Analisis Siklus Pembahasan Nota Keuangan dan RAPBN 2024 Mitra Komisi IV*. Jakarta: DPR RI, p. 1.

³⁷ Mongabay Indonesia, 2017. *Indonesia Hadapi Tantangan Besar Pengelolaan Kawasan Konservasi Laut*. Retrieved August 10, 2024, <https://kumparan.com/official-mongabay-indonesia/indonesia-hadapi-tantangan-besar-pegelolaan-kawasan-konservasi-laut-142UfpGz95/4>.

contribute to national climate-mitigation objectives and the broader development of Indonesia's BCC regime.

b. The Use of Blue Carbon Credits in Various Countries

The development of blue carbon credits has emerged as a global innovation because it is considered more effective in reducing greenhouse gas emissions than land-based forest mechanisms. Many countries, including Indonesia, are actively strengthening their blue carbon initiatives. To obtain a broader understanding, this study compares Indonesia's concepts, potential, and advantages with three other countries—Kenya, Madagascar, and Australia. These countries were selected due to their environmental similarities, comparable socioeconomic conditions, and shared legal and development pressures.

Environmentally, all three countries possess substantial mangrove ecosystems that have experienced notable degradation, reflecting conditions also seen in Indonesia. Kenya's mangrove area covers around 61,271 hectares, while Madagascar holds approximately 227,150 hectares. Australia has a significantly larger mangrove extent of about 1.1 million hectares, representing nearly 7% of global mangrove distribution. Despite this, Australia has recorded mangrove losses of around 17% since the 1950s. Kenya experienced roughly 20% degradation between 1985 and 2009, while Madagascar recorded about 10% mangrove decline from 1995 to 2018. These patterns demonstrate shared ecological challenges and highlight the urgency of more effective blue carbon ecosystem management.

Second, the social and economic aspects, coastal communities in Kenya and Madagascar share similarities with Indonesia, as many rely on mangrove-based livelihoods such as fishing, crab and shrimp harvesting, and mangrove wood collection. In Kenya, this dependence is reflected in communities like Gazi and Makongeni. Australia, however, is different. Its population is generally not economically dependent on mangrove ecosystems; instead, mangroves are valued mainly for their ecological function as key marine habitats. Even so, some local groups, particularly Aboriginal communities, still maintain a close reliance on natural coastal environments.

Third, in legal terms, Kenya and Madagascar have governmental structures that mirror Indonesia's system. Kenya operates under a presidential model, while Madagascar adopts a semi-presidential system. Both countries divide authority

between national and regional levels; however, neither has established national regulations specifically governing blue carbon credits. Existing initiatives in both states are largely community-driven. In contrast, Australia—operating under a constitutional monarchy—exhibits strong central government involvement, with blue carbon credit policies regulated at the national level. These environmental, socioeconomic, and legal parallels position the three countries as relevant comparators for Indonesia. Such comparison helps identify the potential challenges and opportunities Indonesia may encounter by examining policy conditions and implementation practices in other jurisdictions.

Mikoko Pamoja Project Overview

Mikoko Pamoja is a mangrove conservation and carbon-credit initiative based on ecosystem services in Kenya. The project emerged from concerns among local communities regarding mangrove degradation, which had led to declining fish stocks, limited access to clean water, and worsening sanitation issues.³⁸ Management and utilization of the project are carried out directly by local residents through a community-based organization.³⁹ To date, Mikoko Pamoja has successfully reforested approximately 117 hectares of mangrove forest and generates an annual carbon benefit of about 2,043 tons of CO₂.

1) Regulatory Framework and Policy Basis

Mikoko Pamoja is not regulated under Kenya's statutory framework; instead, it operates under the Plan Vivo Project Design Document (PDD).⁴⁰ This document outlines the design, governance arrangements, and implementation mechanisms of the project. In addition to the PDD, two other documents are required, including evidence of mangrove protection and restoration.⁴¹ Once all requirements are fulfilled, Mikoko Pamoja applies for certification to generate tradable carbon credits. These credits have attracted both domestic and international investors. Accountability is ensured through annual evaluations and payments related to project performance.

³⁸ Global Mangrove Alliance. *Mikoko Pamoja: Business Case for Carbon Credit in Gazi-Kwale County, Kenya*. <https://www.mangrovealliance.org/mikoko-pamoja/>.

³⁹ Plan Vivo, 2023. *Ten Years of Mikoko Pamoja*. <https://www.planvivo.org/Blog/ten-years-mikoko-pamoja>.

⁴⁰ Plan Vivo. *Mikoko Pamoja – Documents*. <https://www.planvivo.org/mikoko-pamoja-documents>.

⁴¹ Plan Vivo. *Plan Vivo Project Design Document (PDD)*. <https://www.planvivo.org/mikoko-pamoja-documents>.

2) Challenges and Constraints

The project faces two major challenges: external environmental stressors and policy gaps.⁴² External stressors refer to pressures originating outside the mangrove ecosystem that create ecological stress. These include waste-flow stressors, local and regional stressors such as oil spills, and temporal stressors such as pest outbreaks and gradual impacts of climate change.⁴³ The second challenge is the absence of clear, direct regulations governing the project. Limited legal guidance undermines long-term sustainability, financing stability, and consistent project management. It also weakens preventive efforts against external stressors. Although no dedicated regulation exists, several supporting policies are relevant, including the Fisheries Act of Kenya (2012), Article 11(1) of the Kenya Land Act (2012), and the National REDD+ framework.

3) Project Achievements

Mikoko Pamoja contributes to eight Sustainable Development Goals (SDGs), including poverty reduction, quality education, gender equality, clean water and sanitation, climate action, life below water, life on land, and peaceful, just, and inclusive societies.⁴⁴ These achievements focus on community empowerment and welfare, with 70 percent of project income allocated directly to village development initiatives, provision of school facilities, water and sanitation project funding, and other community services.

Blue Forest, Madagascar

Blue Forest is a sustainable development initiative that integrates ecological, social, and economic objectives through mangrove conservation, restoration, and sustainable management.⁴⁵ For local communities, the project not only protects ecosystems but also restores fish habitats and strengthens the livelihoods of fishers. Economically, mangrove conservation increases fish catch, thereby improving community income. In addition, the Malagasy government utilizes mangrove

⁴² The Commonwealth, 2020. *Studi Kasus: Restorasi dan Konservasi Mangrove yang Dimotori Masyarakat di Teluk Gazi, Kenya - Pembelajaran dari Proyek Karbon Biru Awal (sedang berjalan)*. <https://thecommonwealth-org.translate.goog/case-study/case-study-community-led-mangrove-restoration-and-conservation-gazi-bay-kenya-lessons? x tr sl=en& x tr tl=id& x tr hl=id& x tr pto=tc>.

⁴³ Jacob Phelps, 2015. *Menakar Kelaikan Skema Pembayaran 'Karbon Biru'*. Kabar Hutan. <https://forestsnews.cifor.org/27645/menakar-kelaikan-skema-pembayaran-karbon-biru?fnl=en>.

⁴⁴ Plan Vivo, *Op.Cit*.

⁴⁵ Blue Forest Solutions. *Madagascar*. <https://www.blueforestsolutions.org/madagascar>.

restoration for the generation and sale of carbon credits. Socially, rising community income creates a multiplier effect that enhances overall well-being. Blue Forest operates in two major bays in Madagascar: the Tahiry Honko Bay and the Tsimipaika Bay.⁴⁶

1) Governance and Organizational System

The project is jointly managed by the government and Blue Ventures, an organization dedicated to supporting coastal fishers in remote and rural communities by restoring fisheries and securing community rights.⁴⁷ Blue Ventures employs two main approaches: policy engagement and management. The management approach involves developing fisheries management plans using the Locally Managed Marine Area (LMMA) model, which emphasizes community-led resource governance. Blue Ventures also develops ecosystem service payment schemes through Plan Vivo certification and Verra carbon credits.⁴⁸ On the policy side, Blue Forest supports the government by raising public awareness, providing information to legislators, and contributing to the strengthening of REDD+ programs.

2) Regulatory Framework and Policies

The Malagasy government implements a national REDD+ strategy through the REDD+ Technical Committee and the Ministry of Agriculture. The strategy incorporates local communities through the transfer of management rights to ensure mangrove protection.⁴⁹ Carbon stock assessments are conducted through mapping and analyses of mangrove forest change, helping identify priority conservation zones. In addition to national frameworks, local regulations govern conservation through traditional agricultural and fisheries practices. Blue Ventures also contributes to ecosystem service payment schemes by marketing Plan Vivo certificates and Verra carbon credits.⁵⁰

3) Challenges and Constraints

Blue Forest faces two major categories of challenges: policy-related and socio-cultural. First, policy challenges arise because mangroves span terrestrial and marine zones, placing them under different legal jurisdictions.⁵¹ This

⁴⁶ Blue Forest Solution. *Madagascar Blue Forests Project: Diving deeper into project pathways*. <https://www.blueforestsolutions.org/madagascar2>.

⁴⁷ Blue Ventures. *About Blue Ventures*. <https://blueventures.org/about/>.

⁴⁸ Blue Forest Solution, *Ibid*.

⁴⁹ *Ibid*.

⁵⁰ *Ibid*.

⁵¹ *Ibid*.

fragmented landscape often leads to regulatory conflicts and overlapping authority between the Ministry of Environment and Ecology and the Ministry of Marine Resources and Fisheries. Such overlaps hinder coordinated conservation efforts. Second, from a socio-economic perspective, achieving sustainable ecological development requires a long timeframe, while communities often prioritize short-term benefits.⁵² Maintaining community participation therefore requires balancing long-term ecological goals with short-term incentives.

4) Project Achievements

Blue Forest's sustainable development model advances ecological reconciliation while supporting community resilience. To date, the project has strengthened four key areas: reducing economic vulnerability, protecting ecosystems, developing local expertise and regional replication capacity, and managing approximately 25,230 hectares of mangrove forest across the Tahiry Honko and Tsimipaika bays.

Clean Energy Regulator, Australia

Australia's blue carbon credit system differs from community-centered schemes in Kenya and Madagascar, which rely heavily on local participation in resource management. In contrast, Australia adopts a nationally integrated, government-led regulatory framework. The system is administered by the Clean Energy Regulator (CER) and operates through the issuance of Australian Carbon Credit Units (ACCUs), covering both clean energy development and emissions reduction initiatives.

1) Mechanism: CER & ACCU Scheme

Under the Tidal Restoration of Blue Carbon Ecosystems Method, as defined in the Methodology Determination 2022, project developers must remove or modify tidal restrictions (e.g., sea walls or bunds) to reintroduce tidal flow, thereby restoring coastal wetland ecosystems⁵³. Permanently restoring tidal inundation re-wets soils and restores vegetation, enabling sequestration of carbon in both biomass and soil, and avoiding emissions from previously drained areas. To be eligible, proponents must conduct a hydrological assessment that includes tidal inundation mapping, predict sea-level rise, and

⁵² *Ibid*

⁵³ Australian Government, 2025. *Methods for the Australian Carbon Credit Unit Scheme*. <https://cer.gov.au/schemes/australian-carbon-credit-unit-scheme/accu-scheme-methods#agriculture-methods>.

submit a maintenance plan plus other management documents. The crediting period under this method is 25 years.

2) Relevant Policies and Legislation

- a) The Carbon Credits (Carbon Farming Initiative – Tidal Restoration of Blue Carbon Ecosystems) Methodology Determination 2022 provides the detailed rules for project eligibility under the ERF. DCCEEW+1.⁵⁴
- b) The scheme is underpinned by the Carbon Credits (Carbon Farming Initiative) Act 2011 and associated rules. Clean Energy Regulator.⁵⁵
- c) In addition, the Blue Carbon Conservation, Restoration and Accounting Program (2021–2025) invests \$30.6 million to support mangrove, seagrass, and tidal marsh restoration and to demonstrate their ecosystem service value. DCCEEW.⁵⁶

3) Challenges & Barriers

Australia's blue carbon credit system faces significant market-related and climate-related obstacles. On the market side, ACCU price volatility, limited project scale, and absence of a centralized marketplace reduce financial predictability and uptake.⁵⁷ Climate challenges, particularly drought, threaten restoration efforts by damaging vegetation, reducing ecosystem resilience to pests, and increasing fire risk.⁵⁸

To address these issues, the government has taken several actions: it reformed the ACCU scheme by improving transparency in the project register, implementing bilateral contracts for ACCU sales, and strengthening project permanence requirements. Moreover, CER supports scientific monitoring through hydrological guidelines and satellite-based observation to detect drought stress and inform ecological rehabilitation.

⁵⁴ Blue Forest Solutions. *National Policy Approach*.
<https://www.blueforestsolutions.org/national-policy>.

⁵⁵ *Ibid.*

⁵⁶ *Ibid.*

⁵⁷ Department of Climate Change, Energy, The Environment and Water of Australian Government, 2025. *What's protected under the EPBC Act*.
<https://www.dcceew.gov.au/environment/epbc/our-role/what-is-protected#:~:text=The%20Environment%20Protection%20and%20Biodiversity,is%20Australia's%20main%20environmental%20law.&text=The%20EPBC%20Act%20protects%20nationally.and%20ecological%20communities%20as%20threatened>.

⁵⁸ Jones Day, 2022. *Evolving Carbon Markets: Australian Carbon Credit Units*.
<https://www.jonesday.com/en/insights/2022/04/australian-carbon-credit-units#:~:text=The%20price%20of%20ACCU%20has,projects%20entitled%20to%20create%20ACCU>.

4) Achievements & Impact

Through its regulatory framework and funding programs, the Clean Energy Regulator has enabled blue carbon restoration projects that deliver carbon sequestration, biodiversity protection,⁵⁹ and social benefits. The program especially supports First Nations communities by creating employment and enabling landholders to generate ACCUs. [minister.dcccew.gov.au](https://www.minister.dcccew.gov.au)¹ By integrating environmental outcomes with carbon financing, Australia's approach demonstrates how national-level regulation can scale blue carbon restoration effectively.

IV. CONCLUSION

Indonesia's Blue Carbon Credits (BCC) are currently regulated under Ministerial Regulation MMAF No. 1/2025. This regulation emphasizes three main mechanisms: managing coastal areas for ecosystem expansion, conserving existing areas, and protecting biodiversity—specific to mangroves and seagrass ecosystems. BCC can later be traded via emission trading schemes and greenhouse gas offset systems. Managing blue carbon is also seen as a way to boost community involvement in conservation, address economic issues faced by coastal communities, and help reduce deforestation. Countries like Kenya, Madagascar, and Australia have already adopted carbon-trade-based blue carbon management, resulting in positive environmental, social, and economic benefits. However, Indonesia still faces social, institutional, and economic challenges in BCC implementation. This research highlights opportunities for the government to deepen research and development efforts on BCC. We recommend that the government establish community-based organizations focused on environmentally responsible BCC management to foster local participation and raise awareness. Additionally, providing guidance and oversight for these community initiatives can help ensure their success.

⁵⁹ Department of Climate Change, Energy, The Environment and Water of Australian Government, 2023. *Independent Review of Australian Carbon Credit Units - Carbon Market Basics*. Australia Government. <https://www.dcccew.gov.au/climate-change/publications/accus-implementation-plan>.

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