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Blue Carbon: Legal and Social Challenges for Coastal Communities in Indonesia

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ABSTRACT

Blue carbon refers to the ability of coastal ecosystems such as mangroves, seagrass meadows and brackish lands to absorb and store large amounts of carbon, making them one of the most effective natural solutions in climate change mitigation. In Indonesia, which has a vast wealth of coastal ecosystems, blue carbon plays an important role not only in maintaining environmental balance, but also in supporting the lives and livelihoods of coastal communities. However, this great potential has not been fully utilized optimally due to various barriers, especially in legal and social aspects. This article aims to examine in depth the role of environmental law in supporting blue carbon management in Indonesia and its impact on coastal communities. The main focus of this study includes tenure issues (land rights and resource access), overlapping and disharmonized regulations between sectors, and low participation of local communities in the process of policy formulation and implementation. Using a normative approach and literature study, this research identifies the need for a clearer, more inclusive, and socially just legal framework for blue carbon ecosystem management. The results of this study are expected to contribute to the formation of policies that are more responsive to environmental sustainability while ensuring the protection of the rights of coastal communities as key stakeholders.
Keyword: Blue Carbon, Environmental Law, Coastal Communities, Natural Resource Management

ABSTRAK

Karbon biru merujuk pada kemampuan ekosistem pesisir seperti mangrove, padang lamun, dan lahan payau untuk menyerap dan menyimpan karbon dalam jumlah besar, menjadikannya salah satu solusi alami paling efektif dalam mitigasi perubahan iklim. Di Indonesia, yang memiliki kekayaan ekosistem pesisir yang luas, karbon biru memainkan peran penting tidak hanya dalam menjaga keseimbangan lingkungan, tetapi juga dalam mendukung kehidupan dan mata pencaharian komunitas pesisir. Namun, potensi besar ini belum sepenuhnya dimanfaatkan secara optimal karena berbagai hambatan, terutama dalam aspek hukum dan sosial. Artikel ini bertujuan untuk mengkaji secara mendalam peran hukum lingkungan dalam mendukung pengelolaan karbon biru di Indonesia serta dampaknya terhadap komunitas pesisir. Fokus utama kajian ini mencakup isu tenurial (hak atas lahan dan akses sumber daya), tumpang tindih dan disharmonisasi regulasi antar sektor, serta rendahnya partisipasi masyarakat lokal dalam proses perumusan dan implementasi kebijakan. Dengan menggunakan pendekatan normatif dan studi pustaka, penelitian ini mengidentifikasi kebutuhan akan kerangka hukum yang lebih jelas, inklusif, dan berkeadilan sosial dalam pengelolaan ekosistem karbon biru. Hasil kajian ini diharapkan dapat memberikan kontribusi dalam pembentukan kebijakan yang lebih responsif terhadap keberlanjutan lingkungan sekaligus menjamin perlindungan hak-hak komunitas pesisir sebagai pemangku kepentingan utama.
Kata Kunci: Karbon Biru, Hukum Lingkungan, Komunitas Pesisir, Pengelolaan Sumber Daya Alam

1. Introduction

Climate change is one of the most pressing challenges facing the global community, with increasingly significant environmental, social, and economic impacts. In an effort to reduce greenhouse gas (GHG) emissions, the international community agreed to the Paris Agreement in 2015, which targets limiting global temperature rise to well below 2°C, and preferably to 1.5°C above pre-industrial levels. One approach gaining increasing recognition in this context is nature-based approaches, particularly those that utilize blue carbon ecosystems such as mangroves, seagrass meadows, and salt marshes as natural carbon sinks.

Blue carbonBlue carbon refers to the carbon absorbed and stored in marine and coastal ecosystems such as mangroves, seagrasses, and salt marshes. These ecosystems have the extraordinary ability to absorb carbon dioxide (CO_2) from the atmosphere through photosynthesis and store it in plant biomass and sediments for very long periods, even hundreds to thousands of years. Because of this ability, blue carbon ecosystems play a strategic role in climate change mitigation efforts by helping to reduce greenhouse gas concentrations in the atmosphere.

Beyond functioning as a carbon sink, blue carbon ecosystems also provide other crucial ecosystem services, including preventing coastal erosion, protecting coastal areas from large waves and storms, and providing a vital habitat for various types of marine flora and fauna, including protected and economically valuable species. Furthermore, these ecosystems support the sustainability of fisheries, which are a source of livelihood for coastal communities.

In Indonesia, which boasts one of the world's longest coastlines and extensive coastal areas, blue carbon plays a crucial role in mitigating the negative impacts of climate change, particularly in coastal areas vulnerable to sea level rise, erosion, and other environmental damage. The Indonesian government, along with several international institutions and civil society organizations, has begun to recognize the importance of preserving blue carbon ecosystems as part of its national climate change adaptation and mitigation strategy.

However, significant challenges remain in the conservation and restoration of blue carbon ecosystems. Many coastal areas are experiencing serious degradation due to unsustainable human activities, such as mangrove clearing for shrimp farms, land reclamation for infrastructure development, and marine pollution from industrial and domestic waste. As a result, the ecosystem's capacity to store carbon is drastically reduced. When blue carbon ecosystems are damaged or lost, carbon previously safely stored in sediments can be released back into the atmosphere as CO_2, exacerbating the accumulation of greenhouse gases and accelerating climate change.

In principle, in the eradication of criminal acts in general, several efforts can be made, while to provide a deterrent effect is the last resort, namely by using the provisions and suggestions that have been contained this is plainly stated in article 10 of the criminal code. Contains regulations related to the main criminal offenses, including imprisonment, capital punishment, fines and the penalty of cover-up for additional crimes, which is related to the revocation of certain rights, the announcement of judges' decisions and the confiscation of certain goods.[1] Meanwhile, if we reflect on the perpetrators of crimes against children, the efforts that can be given to prevent crimes that will be caused by child perpetrators. In his book, Soedarto defines child crime as "an act that indicates that if the behavior or criminal act committed by children, this clearly violates norms and values that will clearly have a detrimental impact on society and others".[2]

Figure 1. Blue carbon potential in Indonesia

[1] R. Sugandhi, 1980, Criminal Code (KUHP) with its Explanation, National Business, Surabaya, page 12.
[2] Soedarto, 1987, Kapita Selekta Criminal Law, Alumni, Bandung, page 154.

Figure 2. Mangrove damage in Indonesia

Coastal communities are among the most vulnerable to the impacts of climate change, particularly those caused by sea-level rise, tidal flooding, coastal erosion, and increasingly intense extreme weather. In Indonesia, approximately 65% of the population lives within a 50-kilometer radius of the coastline, making the country one of the most vulnerable to coastal-based climate risks. Coastal communities' heavy dependence on marine resources for economic, social, and cultural needs exacerbates the negative impacts when coastal ecosystems are degraded, whether by climate change or anthropogenic activities.[3]

Globally, of the 151 countries with at least one blue carbon ecosystem, only 28 explicitly include coastal wetlands in their climate mitigation strategies, as outlined in their Nationally Determined Contribution (NDC) documents. Meanwhile, the other 59 countries incorporate blue carbon into their adaptation strategies. This fact reflects that formal recognition of the strategic role of blue carbon ecosystems remains limited globally.[4].

Indonesia has approximately 3.2 million hectares of mangrove forests, but 700,000 hectares of these have been deforested, primarily for fish farms, as is the case in Indramayu Regency, West Java. In Balikpapan Bay, East Kalimantan, coastal conversion continues, threatening the sustainability of the region's mangroves. Meanwhile, seagrass beds are also under pressure. On Bangka Island, tin mining has resulted in the loss of 240,000 hectares of coastal ecosystems, including 5,000 hectares of coral reefs. In Banten Bay, seagrass beds have been damaged by 35% of the total seagrass area.

Brackish swamp, as a transition zone between land and sea, is also not immune to pressure. In Sembilang National Park, South Sumatra, land conversion for shrimp ponds and illegal logging activities have caused serious degradation of this ecosystem. If damaged, these three ecosystems—mangroves, seagrass meadows, and brackish marshes—not only lose their ecological function but also release stored carbon into the atmosphere as CO_2, exacerbating the climate crisis.[5]

The Indonesian government, through the Peat and Mangrove Restoration Agency (BRGM), has targeted the restoration of 600,000 hectares of mangroves by 2024. However, the program's implementation remains far from expectations. As of 2022, restoration has achieved less than 6% of the target, while the peatland restoration program has achieved 25% of its four-year target. Limited suitable land, lack of community participation, and limited funding are key challenges to the program's implementation.

The omission of blue carbon from Indonesia's NDC creates a significant policy vacuum, as these ecosystems not only play a role in absorbing and storing carbon emissions over the long term, but also strengthen the resilience of coastal communities to the impacts of climate change. This lack of formal recognition also deprives Indonesia of strategic opportunities to access international climate financing, such as the Green Climate Fund (GCF), and weakens its position in global climate diplomacy forums. Despite their significant potential, Indonesia's blue carbon ecosystems currently

[3]DC Donato, JB Kauffman, D. Murdiyarso, et al. (2011). Mangroves among the Most Carbon-Rich Forests in the Tropics. Nature Geoscience, 4(5), 293–297

[4]D. Herr, E. Landis, E. Pidgeon, & S. Gizza, (2017). Guidelines for Blue Carbon and Nationally Determined Contributions. IUCN and Conservation International

[5]Peat and Mangrove Restoration Agency (BRGM). (2023). Mangrove Rehabilitation Program Performance Report 2020–2022.

face serious threats from various anthropogenic pressures. Land conversion for shrimp ponds, reclamation, industrial activities, and pollution are the main causes of coastal ecosystem degradation. It is estimated that the destruction of Indonesia's coastal ecosystems contributes up to 42% of total global blue carbon emissions, a very significant figure.[6].

On the other hand, a carbon economy-based approach has begun to be implemented through the development of blue carbon-based business models involving coastal communities. While promising, the implementation of this policy has not yet shown significant results and may even undermine the national emissions reduction target, as stated in Indonesia's National Development Planning (NDC), which commits to reducing emissions by 29% independently and 41% with international support by 2030, in line with the Paris Agreement commitments.

2. Research methods

This research uses a normative legal research method, namely research conducted by examining library materials or secondary data. The normative legal research method relies on library materials or secondary data consisting of three main categories: first, primary legal materials that are authoritative and binding, such as laws and regulations, presidential and ministerial decrees, and regional regulations; second, secondary legal materials that provide explanations of primary legal materials, such as legal journals and scientific works; and third, tertiary legal materials that provide further guidance or explanations, such as legal dictionaries, encyclopedias, and cumulative indexes.

Data collection techniques were conducted through a library study, reviewing literature and documents related to the research object, and quoting secondary data such as laws and regulations, reference books, journal articles, archives, theories, and sources from the mass media and the internet. This approach aims to analyze and evaluate laws and regulations related to blue carbon and provide recommendations for policy improvements for the sustainability of coastal ecosystems and climate change mitigation in Indonesia.

3. Result and Discussion

Blue carbon,which refers to the ability of coastal ecosystems such as mangroves, seagrasses, and swamps to absorb and store carbon dioxide (CO_2), has become an important component in global climate change mitigation strategies.[7]In Indonesia, the country with the second-longest coastline in the world after Canada, the potential for blue carbon is enormous. Indonesia's coastal ecosystems contribute significantly to carbon sequestration while providing vital ecosystem services, such as coastal protection, biodiversity support, and livelihoods for coastal communities.[8]

However, despite its potential, blue carbon management presents complex legal and social challenges. One key challenge is the gap between national policies and local socio-ecological realities.[9]Coastal communities, particularly indigenous peoples and small-scale fishers, often depend directly on mangrove ecosystems for their daily needs, from fishing and firewood to cultural and spiritual uses. However, top-down conservation and restoration policies often fail to provide equitable and meaningful participation.[10]

For example, in Jayapura, Papua, the Enggros indigenous women's community faces pressure from development and pollution that threaten the sustainability of their mangrove forests. These forests serve not only as a source of food and medicine but also as part of their cultural identity. However, they are often excluded from decision-making processes related to the management of these areas.

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[6]L. Pendleton, DC Donato, BC Murray, et al. (2012). Estimating Global "Blue Carbon" Emissions from Conversion and Degradation of Vegetated Coastal Ecosystems. PLOS ONE, 7(9), e43542.

[7]UNEP, Out of the Blue: The Value of Coastal Ecosystems for Climate Mitigation (Nairobi: United Nations Environment Programme, 2020), 10.

[8]World Bank, Blue Carbon: Opportunities for Climate Action in Coastal and Marine Ecosystems (Washington, DC: World Bank, 2021), 5.

[9]M. Fitrian Ardiansyah et al., (2020). Governing Blue Carbon in Indonesia: Challenges and Opportunities, Marine Policy 121, 104184.

[10]Muhammad Fachri, (2021). The Importance of Mangroves for the Lives of Coastal Communities, Journal of Coastal Social Ecology 8, No. 2 123–135.

3.1 Challenges of Blue Carbon Implementation in Indonesia

Despite Indonesia's enormous blue carbon potential, both in terms of ecosystem size and carbon stocks, the implementation of blue carbon strategies still faces complex structural, institutional, and social challenges. Despite the existence of progressive policy umbrellas, such as Presidential Regulation No. 98 of 2021 concerning the Economic Value of Carbon, and the commitment to mangrove restoration through the Peat and Mangrove Restoration Agency (BRGM), implementation on the ground often does not align with central-level planning.[11]

One of the main challenges is how to translate the economic potential of blue carbon into tangible benefits that can be directly felt by communities, especially coastal communities. Green economy approaches, often elitist and top-down, fail to fully address the real needs of coastal communities who depend on coastal resources for their survival. This creates a gap between national rhetoric and local reality, with communities often not substantially involved in the planning, implementation, or monitoring of blue carbon projects.[12]

1. Weak Institutions at the Regional Level

The underdevelopment of local institutions poses a serious obstacle. Many local governments lack technical units or competent human resources to manage blue carbon programs. The absence of a dedicated institutional structure for blue carbon management has resulted in sporadic, unintegrated, and unsustainable conservation and restoration initiatives. This is exacerbated by low regional fiscal capacity, which hinders the implementation of results-based projects that require significant initial investment.

2. Lack of Cross-Sector Coordination

The overlapping authority between agencies such as the Ministry of Environment and Forestry (KLHK), the Ministry of Maritime Affairs and Fisheries (KKP), the BRGM (National Agency for the Conservation of Natural Resources and Marine Resources), and local governments often leads to policy stagnation and inter-sectoral conflicts. Implementing blue carbon projects requires cross-sectoral synergy, but in practice, sectoral egos and differing interpretations of regulations, particularly regarding the use of marine and coastal areas, often arise. Coordination between central and regional government agencies is key to ensuring that blue carbon policies do not negate each other, but rather reinforce each other.

3. Minimal Participation and Trust of Coastal Communities

As the actors most impacted and closest to blue carbon ecosystems, coastal communities are often excluded from decision-making processes. This results in a low sense of ownership of restoration or conservation projects, which can ultimately lead to program failure. Furthermore, a lack of community understanding of the value of blue carbon ecosystems also hinders active engagement. Blue carbon projects must be developed with a rights-based approach to ensure inclusive and equitable community participation.

4. Capacity Development Challenges

Human resource capacity, both at the government and local community levels, remains inadequate to understand and manage blue carbon programs. Technical training curricula, field mentoring, and strengthening the role of academics and NGOs are essential to sustainably build this capacity. Without this capacity building, the risk of programs becoming unsustainable, manipulative, or merely symbolic increases.

5. Lack of Integrated Data and Information

The availability of accurate spatial and temporal data on the extent, condition, and carbon absorption capacity of ecosystems such as mangroves, seagrass beds, and brackish waters remains very limited and scattered across various agencies. Without reliable data, decision-making, from budget allocation, to determining priority conservation areas, to establishing the economic value of carbon, will be inaccurate. Initiatives such as the National Carbon Accounting System or a region-

[11]Nina Lestari.(2020). Meaningful Participation in Conservation: A Case Study of Indigenous Communities and Mangrove Policy, Journal of Law and Development 50(1), 88–102.

[12]ACTIA. (2023). Prospects and Challenges of Blue Carbon. Retrieved from: https://actiaclimate.com/prospek-dan-tantangan-karbon-biru-blue-carbon

based carbon inventory system need to be urgently developed and integrated with existing national information systems.

6. Fragmented Financing

Despite opportunities from international financing schemes like the Green Climate Fund, budget absorption and investment in the blue carbon sector remain suboptimal. Blue carbon projects also require clear and transparent financial incentives and carbon market mechanisms. Without these, private sector participation and long-term public support will be difficult to achieve.

3.2 Existing National Legal Framework

In the legal aspect, Indonesia has issued a number of regulations to support the economic value of carbon and environmental management:

a. Presidential Regulation No. 98 of 2021: Regulating the economic value of carbon to achieve the Nationally Determined Contribution (NDC) targets and control greenhouse gas (GHG) emissions through carbon trading, offsets, and fiscal incentives5.
b. Regulation of the Minister of Energy and Mineral Resources No. 16 of 2022: Develop procedures for implementing carbon trading in the power generation sub-sector, including energy efficiency and carbon unit calculations6.
c. Presidential Regulation No. 14 of 2024: Provides a legal basis for Carbon Capture and Storage (CCS) and Carbon Capture, Utilization and Storage (CCUS) activities, which serve as a complement to the national emission reduction strategy7.

However, there are no specific regulations comprehensively addressing blue carbon as an ecosystem commodity and its protection mechanisms based on local community rights. Many blue carbon initiatives still operate as donor-driven projects or cross-ministerial programs that are not yet integrated into a robust legal system.

3.3 Towards an Inclusive and Rights-Based Approach

To address these challenges, a more inclusive, equitable, and rights-based legal and policy approach is needed. This approach places local communities, particularly indigenous communities and small-scale fishers, at the center of the planning, implementation, and evaluation of blue carbon programs. Recognition and protection of land rights, marine management areas, and local knowledge are crucial to ensuring the long-term success of coastal ecosystem conservation and restoration programs.8

The national legal framework needs to be strengthened with collaborative governance mechanisms (co-management) between the government, communities, and the private sector. Furthermore, the development of results-based financing incentive schemes, such as payments for ecosystem services (PES), must prioritize transparency, accountability, and equitable distribution of benefits to local communities.

3.4 Legal Loopholes in Implementation

The destruction of mangrove, seagrass, and brackish marsh ecosystems in Indonesia not only results in the loss of biodiversity but also contributes significantly to increased carbon emissions due to the release of stored carbon from biomass and sediments. Furthermore, this destruction directly impacts the economic resilience of coastal communities, many of whom depend on coastal resources for their livelihoods. Therefore, conservation and restoration efforts are crucial for maintaining ecological balance while supporting the social and economic sustainability of local communities.[13].

However, despite the issuance of several regulations and policy frameworks, there are still various legal loopholes that have the potential to hinder the effective implementation of blue carbon protection:

1. Overlapping Authority between Central and Regional Governments: Blue carbon ecosystem management involves various ministries and institutions, such as the Ministry of Environment

[13]H. Trismadi, & M. Ras. (2021). The Role of Blue Carbon Ecosystems in Climate Change Mitigation. Journal of Environmental Sciences, 19(2), 111-124.

and Forestry (KLHK), the Ministry of Maritime Affairs and Fisheries (KKP), and the Peat and Mangrove Restoration Agency (BRGM). Furthermore, there is a division of authority between the central and regional governments in the management of coastal areas and small islands. For example, Law Number 32 of 2004 concerning Regional Government gives regional governments the authority to manage marine areas up to 12 miles from the coastline, while the central government manages marine areas beyond 12 miles. However, there is overlap with other regulations regarding the authority to manage marine resources, such as Law Number 32 of 2014 concerning Maritime Affairs. Differences in interpretation of the boundaries of authority between the central and regional governments often lead to conflicts in marine resource management.[14]

2. Law Number 11 of 2020 concerning Job Creation, along with its derivative regulations, facilitate the implementation of National Strategic Projects (PSN), including in coastal areas. This has the potential to open up opportunities for the conversion of blue carbon ecosystems, such as mangroves and seagrass meadows, into industrial areas, ports, or fish ponds. 3 While strategic projects are often considered to have high economic value, this approach ignores long-term ecological value and leads to the erosion of protection for conservation areas such as Coastal and Small Island Marine Conservation Areas (KKLP).
3. Revision of Presidential Decree No. 98 of 2021: The proposal to revise Presidential Regulation No. 98 of 2021 to allow voluntary carbon trading without compliance with applicable laws and regulations could reduce the effectiveness of blue carbon management and violate the principle of utilizing natural resources for public welfare. Several parties are pushing for a revision of the Presidential Regulation to allow voluntary, free carbon trading without compliance with applicable laws and regulations, including the refusal to record records, information disclosure, and so on.

This condition shows that coastal ecosystem restoration and conservation efforts in Indonesia still face major challenges and require serious attention from all parties to achieve the established climate change mitigation targets.

3.5 Challenges in the Context of the Paris Agreement

As a country that has ratified the Paris Agreement through Law No. 16 of 2016, Indonesia has set a target of reducing greenhouse gas emissions by 31.89% independently and up to 43.20% with international support by 2030, as outlined in its Nationally Determined Contribution (NDC). One critical component in achieving this target is the protection and management of blue carbon ecosystems.

However, in practice, there is a disconnect between global climate policy and domestic sectoral policies. For example, the revised Mineral and Coal Mining Law (Law No. 3 of 2020) expands the scope for mining exploitation, even in forest and coastal areas, which contradicts emissions reduction efforts. The expansion of coal and nickel mining, touted as part of the energy transition, actually contributes to deforestation and coastal degradation, and increases the national carbon footprint.[15]

On the other hand, the lack of integration between emission data from the marine and coastal sectors and the national inventory system means that blue carbon has not been fully taken into account in national climate planning.[16]The absence of a community-based blue carbon monitoring system also results in low community involvement in monitoring and reporting ecosystem degradation.

To overcome this, it is necessary:

a. Policy harmonizationbetween ministries and institutions, by integrating sustainability principles into development planning;

[14]MA Putri (2020). Regional Government Authority in Marine Resource Management. Indonesian Journal of Maritime Law, 5(1), 34-45.

[15]ESDM. (2022). Study of Mining Sector Emissions and Their Impact on Indonesia's NDC, Ministry of Energy and Mineral Resources, Jakarta, p. 45

[16]E. Mcleod, G.L. Chmura, S. Bouillon, et al. (2011). A Blueprint for Blue Carbon. Frontiers in Ecology and the Environment, 9(10), 552–560

b. Strengthening legal and institutional capacityat the local level, including training for local officials in environmental law enforcement;
c. Strict zoning arrangementsand the establishment of permanent conservation areas that cannot be replaced, in order to permanently maintain the ecological function of coastal areas;
d. Active involvement of local communities, including women's groups, indigenous communities, and traditional fishermen, in decision-making and resource management.

3.6 Case Study of Blue Carbon Implementation in Indonesia

One concrete example of the challenges facing blue carbon implementation in Indonesia is the Makassar New Port (MNP) reclamation project, supported by sea sand mining in the waters off Galesong, Takalar Regency, South Sulawesi. This project aims to expand the port as part of a national maritime and logistics infrastructure development program. However, the project has also caused significant ecological damage, serious social impacts, and legal conflicts between coastal communities and the state.

Marine sand mining activities by PT Boskalis Indonesia used for MNP reclamation have caused extreme water turbidity, which has caused damage to coral reef ecosystems, seagrass beds, and decreased fisheries productivity, including catches of squid, octopus, and reef fish which are the main source of livelihood for fishermen1. Even after mining activities have stopped, the community stated that catches have not returned to their original levels, indicating ecological damage that may be long-term or permanent.

Furthermore, abrasion triggered by physical disruption to coastal dynamics has caused damage to residents' homes and public infrastructure. In Bontomarannu Village, abrasion reached 15 meters inland, destroying dozens of fishermen's homes and public access roads. Communities from Lae-Lae Island and the Galesong region actively resisted these activities through peaceful demonstrations, advocacy, and legal complaints. However, the state's response to this resistance has instead criminalized fishermen and students who advocate for the right to a healthy environment and the survival of coastal communities. In June 2023, several activists were arrested by authorities for opposing reclamation, demonstrating a repressive tendency in addressing resource conflicts.

3.7 Violations of the Principles of Environmental Protection and Community Rights

This case demonstrates the inconsistency between infrastructure development practices and various environmental legal provisions and community rights, including:

1. Article 28H paragraph (1) of the 1945 Constitution
   Ensuring that everyone has the right to live in physical and spiritual prosperity, to have a home, and to enjoy a good and healthy environment. Ecosystem damage due to reclamation and sand mining clearly violates these constitutional rights.
2. Article 65 paragraph (1) and (2) of Law No. 32 of 2009 concerning Environmental Protection and Management (PPLH Law)
   States that everyone has the right to a good and healthy environment and the right to access information, participation, and fairness in environmental management. In this case, the lack of meaningful community participation and the lack of transparency in project information indicate a violation of this principle.4
3. Article 37 paragraph (1) and (2) of Law No. 27 of 2007 in conjunction with Law No. 1 of 2014 concerning Management of Coastal Areas and Small Islands (PWP3K Law)
   Every coastal area utilization activity requires a location permit and a management permit that take into account ecological and social aspects. If reclamation and mining projects are carried out without an adequate strategic environmental assessment (KLHS) or without involving coastal communities as key stakeholders, this could constitute an administrative and substantial violation.
4. Article 66 of the Environmental Management Law

Affirming that anyone who advocates for environmental rights cannot be prosecuted criminally or sued civilly. The criminalization of fishermen and activists in this case is a direct violation of applicable positive law in Indonesia.

3.8 The Relationship between Blue Carbon and Environmental Justice

The coral reef, seagrass, and coastal mangrove ecosystems in the Spermonde and Galesong areas are not only crucial for biodiversity but also serve as natural carbon sinks within the blue carbon scheme. Damage to these ecosystems results in the loss of carbon sequestration potential and even releases stored carbon into the atmosphere, thus exacerbating climate change. Without recognizing the rights of coastal communities in natural resource management, including the right to information, participation, and environmental justice, large-scale projects like these will not only cause a social crisis but also undermine Indonesia's contribution to international climate commitments, as stipulated in the National Development Planning (NDC) and the Paris Agreement.

The impact of reclamation and sea sand mining cases on blue carbon and coastal communities is:[17]

1. Environmental Impact
   a. Degradation of blue carbon ecosystems: Marine sand mining and reclamation have damaged seagrass beds, coral reefs, and coastal areas, which are vital components of blue carbon ecosystems. The loss of underwater vegetation reduces nature's ability to absorb carbon and accelerates the release of stored carbon from sediments.
   b. Loss of biodiversityThe Spermonde waters are a vital habitat for various marine species, including reef fish, octopus, and other biota. Ecosystem damage has led to population declines and changes in the structure of marine communities.
   c. Coastal abrasion: Changes in currents and sedimentation due to dredging of sea sand have triggered quite severe abrasion in several coastal villages, destroying infrastructure and narrowing the residential areas of the community2.
2. Social Impact
   a. The threat to fishermen's livelihoods: Sand mining activities are causing damage to fishing grounds. Fishermen are losing access to key marine resources, and catches are declining drastically.
   b. Criminalization and repression of citizens: Peaceful protests by fishermen and environmental activists were met with arrests, intimidation and criminalization, which is contrary to the constitutional right to express opinions and fight for a healthy environment (Law No. 32/2009 Article 66).
   c. Cultural erosion of coastal communities: Beyond its economic significance, the sea holds spiritual and cultural value for communities like those on Lae-Lae Island. Marine damage also means the destruction of the living space and socio-cultural identity of indigenous and coastal communities.
3. Economic Impact
   a. Long-term economic losses: Although the reclamation project claims to bring economic growth, the damage to coastal resources has resulted in the loss of income for fishermen, increased costs for repairing abrasion, and the loss of tourism potential based on ecotourism and sustainable fisheries.
   b. Inequality of access to resources: Large projects such as MNP often benefit large corporations and governments, but neglect the economic well-being of local communities, creating structural inequalities in natural resource management.
4. Legal and Governance Impacts
   a. Weakening of the supremacy of environmental law: When reclamation and mining activities continue despite causing major ecological and social impacts, this shows that the precautionary principle and the implementation of AMDAL are not consistently enforced.

[17]**Asrim Surianti, & Wardana (2023).**Analysis of the Impact of Sea Sand Mining on the Environment and Socio-Economy in Kamelanta Village, Kapontori District, Buton Regency. UNIDAYAN Civil Engineering Innovation Media Journal, 12(2)

b. Violation of the principles of openness and participation: Not involving the community in the decision-making process and environmental studies means violating the principles of participation and transparency as regulated in the PPLH Law and the PWP3K Law.

5. Impact on National Climate Commitments
   a. Failed to support NDC targets and the Paris Agreement: Damage to blue carbon ecosystems has resulted in the failure of natural carbon absorption efforts and has instead contributed to increased greenhouse gas emissions, contrary to Indonesia's emission reduction targets.
   b. Indonesia's diplomatic image has been tarnished: As a country that actively advocates for global climate action, this case highlights the inconsistency between the international narrative and domestic practices, which could undermine international confidence in Indonesia's climate commitments.

Policy Recommendations

1. Regulatory Alignment:Harmonizing existing regulations to avoid overlapping authority and ensure effective blue carbon management.
2. Strengthening Tenure Rights: Providing legal certainty over land and natural resource rights for coastal communities through the recognition and protection of customary rights.
3. Community Participation:Increase active community involvement in the decision-making process and implementation of blue carbon management policies.
4. Strict Law Enforcement:Strengthening law enforcement against violations that damage blue carbon ecosystems and the rights of coastal communities.

3.9 Multi-stakeholder Cooperation in Encouraging the Implementation of Blue Carbon Policies in Indonesia

Addressing the complex legal and social challenges of blue carbon management in Indonesia cannot be done in a sectoral or piecemeal manner. A collaborative approach involving various stakeholders at the local, national, and international levels is required. In this context, multi-stakeholder collaboration is a crucial pillar for strengthening governance, encouraging policy innovation, and ensuring the sustainability of blue carbon programs.

The Coordinating Ministry for Maritime Affairs and Investment (Kemenko Marves) has facilitated various collaborative initiatives with several countries and international institutions, including Saudi Arabia, the United Arab Emirates, Singapore, South Korea, the World Bank, and the World Economic Forum. This collaboration encompasses strategic aspects such as extensive mangrove forest rehabilitation, scientific studies on blue carbon reserves and potential, the development of mangrove research and education centers, and coastal community empowerment programs focused on increasing economic capacity and community-based conservation.

To accelerate and strengthen the effective implementation of blue carbon policies, here are some recommendations that need to be adopted immediately:

1. Strengthening Regional Institutions
   The Ministry of Maritime Affairs and Fisheries (MMAF) needs to encourage the establishment and strengthening of institutional units at the regional level specifically addressing blue carbon issues. These institutions must be capable of carrying out cross-sector coordination, monitoring, and supervision functions based on local community participation.
2. Accelerating the Implementation of National Policies
   Existing regulations related to blue carbon, such as Presidential Regulation No. 98 of 2021 concerning the Economic Value of Carbon, need to be immediately operationalized in the form of implementing regulations, technical guidelines, and incentive mechanisms. This is crucial for the marine sector to make a significant contribution to achieving the greenhouse gas emission reduction targets set in Indonesia's Nationally Determined Contribution (NDC).
3. Improving Coordination Across Institutions and Government Levels
   A coordinating platform is needed that integrates policies across ministries and agencies (such as the Ministry of Environment and Forestry, the Ministry of Marine Affairs and Fisheries,

the BRGM, and local governments) to avoid overlapping authority and program fragmentation. This coordination also needs to involve the private sector and donor agencies to ensure synergy in financing and technical assistance.

4. Inclusive and Meaningful Community Engagement
   Coastal communities must be involved not only as beneficiaries but also as key actors in the planning, implementation, and evaluation of blue carbon programs. This approach will strengthen the program's social legitimacy, reduce the potential for conflict, and foster a sense of ownership over natural resource conservation.
5. Sustainable Capacity Building
   A long-term, integrated training and technical assistance program is needed for both local government officials and local communities. This program should include technical understanding of the functions of blue carbon ecosystems, participatory governance, and access to climate finance schemes and carbon markets.

3.10 Efforts made in implementing blue carbon policies in Indonesia

Efforts to implement blue carbon policies in Indonesia have shown strategic progress in several aspects, although they still face complex legal and social challenges. The government, along with non-state actors, has adopted various approaches to strengthen the conservation and restoration of coastal ecosystems that act as crucial carbon sinks, including mangroves, seagrass beds, and brackish marshes.[18]

One of the main strategies developed is community-based management, which positions local communities as key actors in the protection and sustainable use of blue carbon ecosystems. This model aligns with the rights-based approach, which is increasingly recognized within the framework of sustainable development. By strengthening local capacity, providing incentives, and actively engaging in coastal spatial planning, communities become not only beneficiaries but also primary stewards of the natural resources they have inherited from generation to generation.

Furthermore, multi-stakeholder partnerships are also a pillar of the national strategy. The involvement of central and regional governments, the private sector, non-governmental organizations, and the international community is crucial for achieving greater impact. Several blue carbon-based restoration projects, such as those supported by the United Nations Development Programme (UNDP), the International Climate Initiative (IKI), and Norway, have successfully driven mangrove reforestation in several coastal areas in Indonesia, including the coasts of Kalimantan, Sulawesi, and Papua.

Integration of science and research-based dataIt also serves as an important foundation for developing evidence-based policy. Spatial data, carbon mapping, and studies of the economic sustainability of blue carbon ecosystems are used to support the designation of conservation areas, environmental impact assessments, and the development of carbon trading mechanisms. However, these technical advances have not fully addressed the legal and social challenges faced in their implementation. An uncoordinated legal framework and overlapping authority between central and regional governments often create legal uncertainty for local communities. For example, customary-managed coastal areas are often not recognized in formal governance arrangements, despite indigenous communities' centuries-old ecological protection systems.[19]

Furthermore, although innovative financing models such as the Blue Carbon Fund and carbon economic value schemes have been introduced, the benefit distribution mechanisms remain inclusive. Coastal communities, as direct managers of blue carbon resources, often receive disproportionate economic benefits, while carbon projects are accessed by large actors and external financiers. This

[18]Coordinating Ministry for Maritime Affairs and Investment. (2022). International Partnership for Optimizing the Economic Value of Blue Carbon Ecosystems. https://maritim.go.id/detail/kemitraan-internasional-untuk-optimalisasi-keekonomian-ekosistem-karbon-biru

[19]Greenpeace Indonesia. (2021). Makassar New Port Reclamation Affects Kodingareng Fishing Communities. https://www.greenpeace.org/indonesia/siaran-pers-2/44684/reklamasi-makassar-new-port-menyengsarakan-masyarakat-nelayan-kodingareng

inequality gives rise to social conflict and resistance to conservation programs perceived as neglecting environmental justice.

Environmental awareness and education campaigns are an integral part of the long-term strategy. Training programs, field schools, and other educational initiatives have been conducted to increase community understanding of the ecological and economic value of blue carbon ecosystems. However, community participation will be ineffective without legal protection that guarantees land rights, customary territories, and resource access. The implementation of these policies, in some areas, has shown increased mangrove vegetation coverage, enhanced carbon sequestration capacity, and restoration of ecosystem services, including increased capture fisheries yields. However, these achievements remain partial and fail to address the root causes of structural issues, particularly those related to legal governance and equitable distribution of benefits.

4. Conclusion

Blue carbon ecosystems such as mangroves, seagrass meadows, and brackish water marshes play a strategic role in global climate change mitigation efforts due to their ability to absorb and store carbon over the long term. Indonesia, with its extensive coastline and the world's largest blue carbon reserves, has significant potential to utilize coastal ecosystems as part of its national climate strategy. However, this potential has not been fully realized due to significant legal and social challenges.

Legally, overlapping authority between the central and regional governments, inconsistent regulations, and the lack of explicit inclusion of blue carbon in Indonesia's National Development Planning (NDC) document reflect weaknesses in national climate policy governance. Socially, coastal communities, who are at the forefront of ecosystem management and protection, are often excluded from meaningful participation in policy formulation and implementation. In some cases, they experience conflict, criminalization, and loss of access to their traditional management areas.

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