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Blue Carbon Policy Direction in Optimizing the Potential of Coastal Areas

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Abstract

The potential of coastal areas through coastal and marine ecosystems is very important to minimize the increase in carbon emissions by becoming a means of carbon absorption through the blue carbon mechanism. Blue carbon has the potential because of its role in carbon sequestration to minimize the impact of the climate crisis. Unfortunately, the potential of blue carbon through coastal areas is not in line with policies that do not manifest optimal environmental optimization. To maximize the potential of blue carbon and protect coastal ecosystems, it is necessary to reorient derivative policies and revoke policies that have the potential to threaten coastal ecosystem areas. The method used in this study is normative juridical, with a policy approach and a conceptual approach. This research is based on the hypothesis that the central government demonstrates insufficient resolve about determining and implementing efforts to optimize coastal areas, with an economic orientation that emphasizes coastal ecosystems leading to policy directions towards exploitation rather than conservation. Thus, the direction of the blue carbon policy is expected to be synchronous and optimal to explore the potential of Indonesia's coastal areas and contribute to significantly reducing the impact of the climate crisis.

Keywords: Blue Carbon; Climate Change; Coastal Area; Environmental Management; Legal policy.

1. INTRODUCTION

Indonesia, as an archipelagic country with the second longest coastline in the world, has great potential in coastal and marine ecosystems that play an important role in climate change mitigation. [1] Climate change, which is part of the dynamics of the development of global environmental utilization, is caused by the interaction between its components and external factors, such as volcanic eruptions, and variations in sunlight, including human activities, such as changes in land use and the use of fossil fuels.[2] Climate change itself has been formally defined since 1992 by the United Nations Framework Convention on Climate Change (UNFCCC), where climate change is defined as a form of change that occurs in the climate as a consequence of human activities directly or indirectly changing the composition of the global atmosphere and the variability of the

1 M. Wildan Humaidi, Hariyanto, and Mabarroh Azizah, "Green Philanthropy: Islamic Activism on Indonesia's Environmental Democracy," Ijtihad: Jurnal Wacana Hukum Islam Dan Kemanusiaan 24, no. 2 (2024): 167–91, https://doi.org/10.18326/IJTIHAD.V24I2.167-191.

2 Naomi Klein, *This Changes Everything*, *International Review of Applied Economics*, vol. 36, 2022, https://doi.org/10.1080/02692171.2022.2064604.

 DOI: http://dx.doi.org/10.29303/ius.v13i1.1585

natural climate in comparable periods. This climate crisis needs to be faced through adaptation and mitigation mechanisms,[3] this is because the implications of climate change are multisectoral and massive, with the probability of global economic losses of USD 1.2 trillion within a period of 15 years.[4]

The implementation of the blue carbon framework in Indonesia is very crucial because, in addition to talking about governance, this context also talks about climate change adaptation strategies.[5] This efficient framework needs to integrate the lines of orientation and coordination, evaluation of programs in climate change mitigation such as the REDD + program which has too much overlap of stakeholders so that governance is ineffective, or the hesitant carbon tax program and lack of commitment policy consistency manifested by the postponement of the implementation of the carbon tax starting from 2022 until now postponed to 2025,[6] shows certain intrigues that are contrary to environmental interests.[7]

Blue carbon, which optimizes the role of coastal mangrove areas, is proof that coastal ecosystems also play an important role in climate change mitigation.[8] Referring to article 4 of Law Number 32 of 2024 concerning the Conservation of Biological Natural Resources and Their Ecosystems states that the conservation of biological natural resources and their ecosystems is the responsibility and obligation of the government, local governments, and communities. Circular efforts between the central and regional governments play an important role in environmental management because Indonesia can realize policy integration as mandated by Law Number 6 of 2023 describe that environmental sector is affair for central government is responsible for forming, regulations at the national level which include strategic plans, funding strategies, authorized stakeholders and their communication, as well as monitoring and evaluation. This policy is then derived from local government policies, both at the provincial, district/city levels, and smaller local governments.

Ideally, the provincial government formulates a policy of national policy adaptation, synchronization and coordination, and reporting mechanisms. It is followed up by district/city-level policies that discuss implementation, local-level collaboration, and

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3 Ikhsan Wahyudi et al., "The Urgency of Ratification of the New and Renewable Energy Law in Efforts to Develop Sustainable Energy as an Instrument for Climate Change Adaptation and Mitigation," *Jurnal IUS Kajian Hukum Dan Keadilan* 12, no. 3 (2024): 607–16, https://doi.org/10.29303/ius.v12i3.1469.including oil, gas, and coal, while new and renewable energy sources are still considered alternatives. This dependence on fossil fuels presents at least three significant risks: 1

4 Fachrizal Woma Yudhana et al., "Formulasi Kebijakan Penerapan Pajak Karbon Di Indonesia" 1, no. 16 (2022): 68–78.

5 Jinsu Jang and Wiwiek Awiati, "Karbon Biru Di Indonesia: Memahami Pentingnya Konservasi Dan Restorasi Untuk Mencapai Netralitas Karbon," *Jurnal Hukum Dan Bisnis (Selisik)* 9, no. 1 (2023): 18–36.

6 Nanda Vico and Josua Sianipar, "Dekonstruksi Transisi Energi Melalui Optimalisasi Energi Terbarukan Dengan Akselerasi Pajak Karbon," *Constitution Journal* 3, no. 1 (2024): 99–114, https://doi.org/10.35719/constitution.v3i1.97.

7 Siti Fatimah, Jamal Wiwoho, and Isharyanto, "Global Perspectives on Freedom of Expression in Environmental Governance: Legal Implications and Challenges," *Jambe Law Journal* 7, no. 2 (2024): 481–507, https://doi.org/10.22437/home.v7i2.456.

8 Vico and Sianipar, "Dekonstruksi Transisi Energi Melalui Optimalisasi Energi Terbarukan Dengan Akselerasi Pajak Karbon."

local-level monitoring.[9] Meanwhile, at the level under the district/city government, both local governments and non-governmental organizations have a portion of participation in implementation, volunteerism, as well as education and socialization.[10] The direction of the blue carbon policy in Indonesia can be more synchronous and optimal so that it can explore the potential of coastal areas to the maximum and contribute significantly to reducing the impact of the climate crisis.[11]

This ideal conception will be difficult to realize if the central government as the central policy center orients its agenda which is contrary to the purpose of managing and utilizing the ecosystem in a sustainable, harmonious, harmonious, and balanced manner for the welfare of the community. One of these disorientations is in the Job Creation Law which states in the geothermal sector, where the government prioritizes geothermal mining over ecosystem conservation. This ideal conception will be difficult to realize if the central government as the center of policy directs its agenda that is contrary to the goals of managing and utilizing ecosystems in a sustainable, harmonious, harmonious, and balanced manner for the welfare of the community. One of these disorientations is in geothermal policies where the government prioritizes geothermal mining over ecosystem conservation. This is reflected in Article 5 of Law Number 21 of 2014 concerning Geothermal which is revised through Law Number 6 of 2023 concerning the Job Creation Law which states that the Implementation of Geothermal by the Central Government as referred to in Article 4 paragraph (2) is carried out against:Geothermal for Direct Utilization located in:

1) Across provincial areas including production forest areas and protected forest areas; 2.
2) Conservation Forest Areas; 3.
3) conservation areas in waters; and 4.
4) a sea area of more than 12 (twelve) miles measured from the 'coastline towards the open sea in the whole of Indonesia.

a. Geothermal for Indirect Utilization in all regions of Indonesia, including production forest areas, protected forest areas, conservation forest areas, and marine areas.

The geothermal concession policy in water conservation has indeed been accommodated since 2014 in the geothermal law, with the implementation of this law there is a lot of criticism about the environmental impact, especially from the water sector. The Job Creation Law, which is present as a form of revision to the Geothermal Law, actually strengthens exploitation by emphasizing aspects of technical norms and policies so as to encourage geothermal exploitation in the waters to continue and threaten Conservation in the waters, which will cover an existing mangrove area of 3,442,614 ha and a potential mangrove of 777,636 ha, is threatened if carried out for the sake of geothermal mining under the pretext of energy transition. [12]

This disintegration condition is very dangerous for the good of the environment, especially the blue carbon optimization agenda during the government's orientation to maximize the potential of natural resources from dirty energy.[13] This study uses normative juridical research by using a normative approach to examine the constellation

9 Mahrus Ali, "Overcoming the Dilemma between the Clarity and Flexible Norms in Environmental Offenses," *De Jure: Jurnal Hukum Dan Syar'iah* 14, no. 2 (2022): 276–87, https://doi.org/10.18860/j-fsh.v14i2.18279.

10 Taufiqurokhman, *Kebijakan Publik : Pendelegasian Tanggungjawab Negara Kepada Presiden Selaku Penyelenggara Pemerintahan*, *Kebijakan Publik*, I (Jakarta: Fakultas Ilmu Sosial dan Ilmu Politik Universitas Moestopo Beragama, 2019).

11 Abdul Matin Bin Salman and Eko Asmanto, "Islamic Environmental Stewardship: A Sociological Approach to Hadith and Legal Frameworks for Ecological Responsibility," *Volksgeist: Jurnal Ilmu Hukum Dan Konstitusi* 7, no. 2 (2024): 361–78, https://doi.org/10.24090/volksgeist.v7i2.12205.

12 Badan Pusat Statistik, "Statistik Sumber Daya Laut Dan Pesisir 2024" (Jakarta, 2024).

13 Macartan Humphreys, Jeffrey D. Sachs, and Joseph E. Stiglitz, *Escaping The Resource Curse*, 2007.

of laws and regulations related to the existence of mangroves, equipped with a policy approach to analyze policy actualization in mangrove conservation in Indonesia, and is complemented by a conceptual approach to map the ideal concept in mangrove conservation and its orietnade to blue carbon. This research is shown to reorient the direction of blue carbon policies in Indonesia to be more synchronous and optimal so that it can explore the potential of coastal areas to the maximum and contribute significantly to reducing the impact of the climate crisis.

2. ANALYSIS AND DISCUSSION

The conception of blue carbon implementation is an activity that needs to be planned in the long term. The visibility of this policy will not only last for the next five years, but it can be more than that, it represents a climate change policy that must have a sustainable development orientation.[14] In the context of blue carbon policies, an ideal policy framework needs to consider several key elements that enable the effective and sustainable management of blue carbon ecosystems such as seagrass, mangroves, and seaweeds.

2.1. Blue Carbon Ideal Regulation

In For the implementation of the policy, there are four main frameworks, namely, Legal features, Policy features, Market features, and Institutional features[15] The legal aspect consisting of sub-aspects of regulation will discuss the regulatory needs of certain sectors. This aspect is closely related to the aspect of policy formation because it will talk about what is needed from the sector, the problems that occur in the sector, to the implementers and beneficiaries of the sector. [16]

In the field of blue carbon, this regulatory aspect is closely related to environmental management, this is due to the similarity of blue carbon elements that are part of the environmental sector. The application of blue carbon that has a wide impact requires hierarchical regulation from the general level to the local order in its implementation.[17] At this level, laws and regulations play an active role in directing and guiding policy formulation that will be one level below the aspect of laws and regulations. Climate change, whose impacts are minimized through adaptation and mitigation measures, creates systematic policy inclusivity and policy integration, for example, the Philippines, which uses its coastline for blue carbon implementation, outlines its initial steps in legislation supporting climate change mitigation in the Philippines, namely the Climate Change Act of 2009 (Republic Act 9729) and the Biofuels Act of 2007 (Republic Act of the Republic 9367). The application of the legal framework is a framework for the climate change strategy entitled the national climate change action plan which concerns carbon management strategies, one of which is blue carbon.[18]

14 Kementrian PPN/Bappenas Republik Indonesia, "PEDOMAN TEKNIS PENYUSUNAN RENCANA AKSI : TUJUAN PEMBANGUNAN BERKELANJUTAN (TPB)/ SUSTAINABLE DEVELOPMENT GOALS (SDGs)" (2020).

15 Blue Carbon Initiative, "Guidance for National Blue Carbon Activities" (New York, 2012).

16 Jeffrey J. Kelleway et al., "A National Approach to Greenhouse Gas Abatement through Blue Carbon Management," *Global Environmental Change* 63, no. December 2019 (2020): 102083, https://doi.org/10.1016/j.gloenvcha.2020.102083.

17 Dian Puspaningrum, Vikisastro Suleman, and Ernikawati Ernikawati, "Potensi Blue Carbon Ekosistem Mangrove Pilohulata Gorontalo Utara," *Gorontalo Journal of Forestry Research* 6, no. 2 (2023): 121, https://doi.org/10.32662/gjfr.v6i2.3191.

18 Valerie Kwan et al., "Permanence Risks Limit Blue Carbon Financing Strategies to Safeguard Southeast Asian Mangroves," *Communications Earth and Environment* 6, no. 1 (2025): 1–8, https://doi.org/10.1038/s43247-025-02035-4.

The policy aspect consists of sub-aspects of national strategy, national plans, strategic programs, and stakeholder initiatives. This aspect is the second aspect of structural governance, this aspect talks about an active framework that can be an implementation mechanism in the implementation of legal aspects.[19] This aspect will discuss the management of the resources used, the planned targets, and the strategic steps in achieving those targets, this aspect can be specific to a specific field or have a broader scope.

The concretization of this aspect in the context of blue carbon is related to strategic steps in the implementation of existing laws and regulations, especially regarding climate change management. The integration between blue carbon and climate change management is critical given that one of the goals of blue carbon is to control climate change on a local, national, and global scale.[20] This step has been taken by many countries, such as Japan through the Roadmap for Carbon Recycling Technology 2019 & the Green Growth Strategy Through the Achievement of Carbon Neutrality 2050. In addition to being concrete, policies can also be general, but still address blue carbon such as Qatar through the National Strategy for Environment and Climate Change Qatar and the United States through the Plan to Conserve Global Forest: Critical Carbon Sinks. However, the policy will return to the authority and commitment of each country, because there are also policies that have a blue carbon dimension but have implications for blue carbon, one of which is Indonesia through the National Action Plan for Climate Change Adaptation (RAN-API) policy which only discusses coastal ecosystem management strategies. The policy dimension cannot be an unequivocal representation of the success rate and quality of the policy, but it can represent the commitment of each country.

The market aspect consists of sub-aspects of driving that have the potential to affect economic dynamics.[21] A law and policies that are implemented will certainly affect the dynamics of people's lives, these dynamics can be in the fields of government, social, economic, and political. This impact represents laws and policies as government actions that have a dimension to people's lives and political dynamics.[22]

In the context of the implementation of the blue carbon policy, the impact is felt in all aspects of governmental, economic, social, and political dynamics. In the context of governance, the implementation of blue carbon policies often requires coordination across sectors and levels of government, from the central to the regions. This can increase institutional capacity and encourage the strengthening of regulations and more effective environmental monitoring. On the economic side, blue carbon policies can create new opportunities through carbon trading, ecosystem restoration, and ecosystem services, which in turn can increase state revenues and create new jobs in related sectors.[23]

Socially, the application of blue carbon has a positive impact by increasing the awareness and participation of local communities in environmental conservation.[24] Education and community engagement programs can strengthen the relationship

19 Juan M. Barragán Muñoz, "Progress of Coastal Management in Latin America and the Caribbean," *Ocean and Coastal Management* 184, no. July 2019 (2020), https://doi.org/10.1016/j.ocecoaman.2019.105009.

20 Gege Zhu et al., "Research Status and Development Trend of Greenhouse Gas in Wetlands: A Bibliometric Visualization Analysis," *Ecology and Evolution* 15, no. 2 (2025), https://doi.org/10.1002/ece3.70938.

21 Roger Ullman, Vasco Bilbao-Bastida, and Gabriel Grimsditch, "Including Blue Carbon in Climate Market Mechanisms," *Ocean and Coastal Management* 83 (2013): 15–18, https://doi.org/10.1016/j.ocecoaman.2012.02.009.

22 Suyahman, Suud Sarim Karimullah, and Muh Akbar Fhad Syahril, *Intersectionality in Social Justice: Unpacking the Complexity of Oppression*, *Jambura Law Review*, vol. 7, 2025, https://doi.org/10.33756/jlr.v7i1.27828.

23 Ze Li et al., "Impact of Public Participation on Coastal Pollution Emissions under the Growth of Personal Income," *Journal of Coastal Research* 109, no. sp1 (2020): 39–44, https://doi.org/10.2112/JCR-SI109-007.1.

24 Jan Ramel A. Tumbaga, Marilene C. Hipolito, and Arneil G. Gabriel, "Community Participation toward Biodiversity Conservation among Protected Areas in Pangasinan, Philippines," *Environment, Development and Sustainability* 23, no. 3 (2021): 4698–4714, https://doi.org/10.1007/s10668-020-00705-1.

between communities and coastal ecosystems, as well as increase community resilience to climate change.[25] However, these policies can also pose social challenges, especially if there is no equitable mechanism for compensation or management of the rights of local communities. In the political realm, blue carbon policies are often associated with national and international commitments to climate change mitigation, as seen in the nationally determined contributions (NDCs) in the Paris Agreement. Strong political support is needed to overcome policy barriers and achieve mitigation targets.[26] In some countries, these policies can also be a tool for environmental diplomacy, strengthening the country's position in international climate negotiations and attracting green investment from the global community.[27]

The institutional aspect consists of ministries, institutions, and special teams. This aspect is a consequential aspect of the birth of a law or policy. Implementation that involves giving authority to authorized stakeholders through attribution, delegation, or mandate shows the implementing side of a law or policy.[28] The existence of a blue carbon policy has significant implications for the structure and function of the institutions involved, such as ministries, agencies, and special teams.

In setting standard standards regarding legal, policy, and institutional aspects, the Government of Indonesia can use the European Union as a benchmark. The European Union has a shared conservation area called Natura 2000. This area is a conservation area based on the commitment of flora and fauna of European countries. In the context of geothermal, as part of the potential of renewable energy, geothermal is certainly a very valuable resource, including for the European Union. In its legal aspect, which is represented by Regulation (EU) 2024/1991 Of The European Parliament And Of The Council of 24 June 2024 on nature restoration and amending Regulation (EU) 2022/86, which is the basis for the formation of the Natura 2000 area as a conservation area, in this law there is no mention of exceptions for geothermal areas but in this law it is rigidly determined regarding the importance of a scientific approach and prioritizing the interests of flora and fauna, Including in policy-making that is destructive to the resilience of flora and fauna. [29]

In terms of policy, the European Union has strict regulations regarding the existence of geothermal in the Natura 2000 area, first geothermal needs to be divided first about its type, then in the impact aspect cateforization is made regarding geothermal impacts starting from Construction, Operation, and Decommissioning, after division, geothermal companies need to meet aspects of environmental impact mitigation, such as Construction impacts on vegetation can be minimised through careful planning of plant layout and road layouts to minimise land intake, and the use of directional drilling, Control of drilling effluent is controlled via the Water Framework Directive and can be achieved through water treatment and the use of drilling waste sumps, Technical solutions are available to minimise noise emissions, such as insulation of installations, reduction of turbine speed, noise barrier, Technical solutions are available

25 Federico Ignacio Isla et al., "Erosion in Buenos Aires Province: Coastal-Management Policy Revisited," *Ocean and Coastal Management* 156 (2018): 107–16, https://doi.org/10.1016/j.ocecoaman.2017.09.008.

26 Naswar et al., "Exploring SDGs Regulatory Frameworks and Regional Regulation for Climate Change Mitigation and Adaptive Resilience in Coastal Communities," *Jurnal IUS Kajian Hukum Dan Keadilan* 12, no. 3 (2024): 572–87, https://doi.org/10.29303/ius.v12i3.1543.

27 W. R. Turrell et al., "Clarifying the Role of Inorganic Carbon in Blue Carbon Policy and Practice," *Marine Policy* 157, no. September (2023): 105873, https://doi.org/10.1016/j.marpol.2023.105873.

28 Stephen C.L. Watson et al., "Inclusion of Condition in Natural Capital Assessments Is Critical to the Implementation of Marine Nature-Based Solutions," *Science of the Total Environment* 838, no. February (2022): 156026, https://doi.org/10.1016/j.scitotenv.2022.156026.

29 European Union, "Regulation (EU) 2024/1991 of the European Parliament and of the Council of 24 June 2024 on Nature Restoration and Amending Regulation (EU) 2022/869," OJ L, 2024 European Union § (2024), https://eur-lex.europa.eu/eli/reg/2024/1991/oj.

to minimise noise emissions, such as insulation of installations, reduction of turbine speed, noise barrier, and Intensive monitoring should be implemented to avoid any harmful impact by Natura 2000 Commission.[30]

In the institutional aspect, the commission in the context of Natura 2000 is quite competent and comprehensive because it uses a scientific approach in formulating decisions and prioritizing conservation aspects.[31] This is clearly better than Indonesia, which is like the example of the case of geothermal use in Kamojang and Ijen which actually resulted in the destruction of nature reserve areas even in Kamojang until the status of the nature reserve was downgraded to a nature tourism park.[32] The ideological war between geothermal and blue carbon is a topic that is sidelined because it is narrated as if it never clashes with each other. Overall, the implementation of blue carbon policies requires a science approach at all levels of government, as well as the involvement of a wide range of competent stakeholders.[33] This helps ensure that policies are effective in achieving the goals of conservation and restoration of blue carbon ecosystems and supporting climate change mitigation.[34]

In designing a harmonized blue carbon policy framework and an integral and efficient framework, the International Union for Conservation of Nature and Natural Resources (IUCN) has formulated an ideal framework in legal aspects, namely:

1. Provide a legal framework that allows integrated coastal carbon mitigation efforts to be pursued as part of national climate change mitigation efforts, and synergize with other existing policies and incentive schemes
2. Integrate the guidance provided in the "2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands (Wetland Supplement)" into national GHG accounting to demonstrate commitment and determination to address this issue at the national level;
3. Identify existing national policies for the conservation, restoration, and management of coastal ecosystems and assess how blue carbon activities can be integrated;
4. Identify and provide clarification on land ownership and property rights issues in coastal and marine areas. The fair and secure distribution of carbon-based incentives in coastal systems requires ownership regimes and rights in coastal areas to be assessed and addressed, including in carbon mechanisms such as REDD + or voluntary carbon offsets; [35]
5. Developing, or revising as appropriate, national climate change plans or strategies.[36] For example:
    a. A comprehensive national strategy that takes into account the various drivers that cause emissions (e.g. deforestation, agriculture, aquaculture, coastal development) across various lands and seascapes;

30 L Lammerant, I Laureysens, and K Driesen, *Potential Impacts of Solar, Geothermal and Ocean Energy on Habitats and Species Protected under the Birds and Habitats Directives.*, 2020, https://op.europa.eu/en/publication-detail/-/publication/edf7213a-02c9-11eb-8919-01aa75ed71a1/language-en.

31 Lammerant, Laureysens, and Driesen.

32 Kementrian Lingkungan Hidup dan Kehutanan, "Keputusan Menteri Lingkungan Hidup Dan Kehutanan Nomor SK.25/MENLHK/SETJEN/PLA.2/1/2018 Tentang PERUBAHAN FUNGSI DALAM FUNGSI POKOK KAWASAN HUTAN DARI SEBAGIAN KAWASAN CAGAR ALAM KAMOJANG SELUAS t 2,391 (DUA RIBU TIGA Rr\TUS SEMBILAN PULUH SATU) HEKTAR DA," 603 § (2018).

33 Turrell et al., "Clarifying the Role of Inorganic Carbon in Blue Carbon Policy and Practice.""green carbon" (Crooks et al., 2018

34 Mathew A. Vanderklift et al., "A Guide to International Climate Mitigation Policy and Finance Frameworks Relevant to the Protection and Restoration of Blue Carbon Ecosystems," *Frontiers in Marine Science* 9, no. July (2022): 1–14, https://doi.org/10.3389/fmars.2022.872064.

35 Friedrich Soltau, *Fairness and Equity in Climate Change* (New York: Pace Law School, 2008).

36 Edward Elgar, *Climate Law and Developing Countries* (Massachuasetts: Edward Elgar Publishing, 2016).

b. National REDD + strategies or programs that include mangroves (plants and soils);

c. A National Appropriate Mitigation Action (NAMA) strategy/plan/framework for coastal marine ecosystems;

d. Integrated Coastal Zone Management (ICZM), Marine Spatial Planning (MSP), and Marine Protected Areas (MPAs) policies and measures designed to protect coastal ecosystems by considering the potential for carbon sequestration and storage. To date, different approaches to coastal conservation have not explicitly addressed the carbon mitigation potential of blue carbon ecosystems. There is a significant opportunity to integrate carbon sequestration management into coastal zone planning.

6. Ensure transparency of financial carbon flows and the implementation of environmental and social protections. The implementation of environmental, social, and governance protections is an integral part of fair, effective, transparent, and accountable climate change mitigation efforts.[37]

By aligning policies with existing guidelines, it is hoped that laws and regulations and blue carbon management policies can be oriented and managed properly so that the goal of minimizing the impact of climate change can be realized.[38]

2.2. Indonesian Coastal Conservation Policy

Indonesia, with its long coastline and rich coastal ecosystems, has great potential for blue carbon conservation. Blue carbon ecosystems such as mangroves, seagrasses, and tidal swamps play an important role in storing carbon and helping to mitigate climate change. The Indonesian government has recognized the importance of this ecosystem and integrated blue carbon policies into national development plans.[39]

Indonesia has one of the largest mangrove ecosystems in the world, covering 3,442,614 ha of existing mangroves and 777,636 ha of mangrove potential.[40] These mangroves are not only important for biodiversity but are also very effective in absorbing and storing carbon dioxide from the atmosphere.[41] In addition to mangroves, seagrass meadows, and tidal swamps also contribute significantly to carbon sequestration. Mangroves as one of the fundamental elements of blue carbon are included in coastal resources and small islands according to Law No. 27 of 2007 and Law No. 1 of 2014 concerning the Management of Coastal Areas and Small Islands (PWP3K Law), and are categorized as forests based on Law No. 41 of 1999 concerning Forestry (Forestry Law). Based on this definition, the Ministry of Environment and Forestry (MoEF) has the main authority in managing mangroves in state forest areas, while the Ministry of Marine Affairs and Fisheries (KKP) is responsible for mangrove management in coastal areas and small islands outside forest areas. The role of the Ministry of Environment and Forestry is more dominant in mangrove management because they are authorized over 79 % of

37 Dorothée Herr, Amber Himes-Cornell, and Dan Laffoley, *National Blue Carbon Policy Assessment Framework*, *International Union for Conservation of Nature*, 2016.

38 Yuki Sofue et al., "Identifying Changes in Mangrove Landscapes in the Philippines and Indonesia Using Remote Sensing and Community Perceptions: Towards Ecosystem Services Management," *Regional Studies in Marine Science* 82, no. July 2023 (2025): 104023, https://doi.org/10.1016/j.rsma.2025.104023.

39 Indonesia Ocean Justice Intiative, "Ekosistem Karbon Biru Sebagai Modal Alam Kritis: Tata Kelola Ekosistem Karbon Biru Di Indonesia," vol. 14, 2016.

40 "Data Peta Mangrove Nasional.Pdf," n.d.

41 Adam Irwansyah Fauzi et al., "Assessing Potential Climatic and Human Pressures in Indonesian Coastal Ecosystems Using a Spatial Data-Driven Approach," *ISPRS International Journal of Geo-Information* 10, no. 11 (2021), https://doi.org/10.3390/ijgi10110778.

mangroves located in forest areas, while the MPA manages 21 % of those located in non-forest areas.[42]

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In the mandate of this level of law, there is a cross-institutional implementation in the implementation of management and supervision functions. This cross-institution involves the Ministry of Environment and Forestry, the Ministry of Marine Affairs and Fisheries, and the Regional Government. Meanwhile, in the planning process, there is additional involvement of the Ministry of Agrarian and Spatial Planning and Bappenas. In its implementation, this law has a level of implementation policy up to the local government stage.

The management and preservation of coastal areas are very relevant to the concept of blue carbon, which focuses on the protection and restoration of coastal ecosystems such as mangroves, seagrasses, and tidal swamps that can absorb large amounts of carbon. One of the regulations that is the implementing regulation in the context of blue carbon is Government Regulation Number 22 of 2021, this regulation provides a national framework for environmental protection and management, which includes blue carbon ecosystems. The implementation of blue carbon policies can be integrated into national strategies to reduce greenhouse gas emissions and mitigate climate change.

The existence of these government regulations is a strong foundation for the implementation of blue carbon policies in Indonesia, both at the national, provincial, and district or city levels as an effort to ensure that the preservation of the coastal environment supports effective climate change mitigation. In addition to the order of laws and regulations, coastal area management is also contained in the policy of the National Action Plan for Climate Change Adaptation (RAN-API) as a strategic scheme for climate change adaptation in Indonesia, the strategic plan in this RAN-API includes:

1. Cluster for Capacity Building of Coastal Populations and Small Islands Related to Climate Change.

   The action plan in this cluster is directed at socializing public awareness of the phenomenonandimpactofclimatechange;Developingtheutilizationofcoastalresources and small islands Developing coasts and small islands for the people, maintaining and rehabilitation water resources in coastal areas, and small islands, and Strengthening infrastructure (electricity transportation networks, clean water, and communication)[44] in coastal areas and small islands by using appropriate technology.
2. Cluster of Environmental and Ecosystem Management and Utilization for Climate Change Adaptation.

42 Indonesia Ocean Justice Intiative, "Ekosistem Karbon Biru Sebagai Modal Alam Kritis: Tata Kelola Ekosistem Karbon Biru Di Indonesia."

43 Indonesia Ocean Justice Intiative.

44 Yordan Gunawan, Muhammad Arya Ansar, and Siti Asdilla Dzakiyyah, "Navigating the Waters of Conflict : Indonesia and Malaysia ' s Maritime Boundary Dispute in the Sulawesi Sea and Malacca Straits," *Jambura Law Review* 7, no. 01 (2025): 152–75.

The action plan in this cluster is directed to improve the quality of the environment in coastal areas and small islands; identification, maintenance, and rehabilitation of coastal ecosystems and small islands; as well as the maintenance and rehabilitation of non-structural protected zones or natural beaches and the areas behind them based on the results of studies and identification of coastal ecosystems and small islands.[45]

3. Cluster Implementation of Structural and Non-Structural Adaptation Measures to Anticipate the Threat of Climate Change.

   The action plan in this cluster is directed at the development of Coastal Resilience Villages (CRV); assisting in the development of PPK; identification and elevation adjustment and strengthening of vital structures and facilities, such as roads, port piers, and settlements in coastal areas and small islands; increasing the resilience of agricultural resources and coastal ponds to the threat of climate change; and identifying, constructing, and maintaining coastal protection structures (sea walls, groins, breakwaters, coastal nutrients, tidal sluices, etc.).[46]

4. Cluster Integration of Adaptation Measures in Coastal and Small Islands Management Plans.

   The action plan in this cluster is directed to identify and map the potential of small islands; formulate norms, standards, guidelines, and criteria (NSPK) for climate change rehabilitation and adaptation in coastal areas and small islands; carry out risk assessment and adaptation to climate change in coastal areas and small islands; sectoral/subsectoral risk assessment and mapping and climate change adaptation at the district/city level; prepare a document on the layout and planning of coastal areas and small islands based on the results of climate change risk assessment and adaptation; and to supervise and control spatial planning and zoning of coastal and marine areas against climate change.[47]

5. Cluster for Improving Climate Change Adaptation Support Systems in Coastal Areas and Small Islands.

   The action plan in this cluster is focused on efforts to improve research and study of coastal resource potential; increasing research capacity on the phenomenon and impact of climate change in coastal areas and small islands; developing an early warning system for climate and oceanographic disasters; and strengthen institutional and cross-sectoral coordination for mitigation and adaptation in coastal areas and small islands.[48]

   The great potential of blue carbon is unfortunately beginning to find loopholes for disintegration that do not reflect the main orientation of environmental conservation. First, the Government of Indonesia has perpetuated the enactment of Article 5 of Law Number 21 of 2014 concerning Geothermal which is revised through Law Number 6 of 2023 concerning the Job Creation Law which regulates the legalization of geothermal mining in waterways that will damage mangrove forests in Indonesia. Although it does not directly mention the nomenclature of destruction, the sentence 'done against' in this article leads to the government's approval to shift mangrove areas for geothermal projects. The Government of Indonesia also issued Government Regulation No. 27 of 2021 concerning the Implementation of the Marine and Fisheries Sector, as an

45 Kristina Pikelj et al., "Implementing an Efficient Beach Erosion Monitoring System for Coastal Management in Croatia," *Ocean and Coastal Management* 156, no. November 2017 (2018): 223–38, https://doi.org/10.1016/j.ocecoaman.2017.11.019.

46 Mirta Zupan et al., "How Good Is Your Marine Protected Area at Curbing Threats?," *Biological Conservation* 221, no. March (2018): 237–45, https://doi.org/10.1016/j.biocon.2018.03.013.

47 Cormac Walsh, "Integration of Expertise or Collaborative Practice?: Coastal Management and Climate Adaptation at the Wadden Sea," *Ocean and Coastal Management* 167, no. January 2018 (2019): 78–86, https://doi.org/10.1016/j.ocecoaman.2018.10.004.

48 Kementrian PPN/Bappenas Republik Indonesia, "Rencana Aksi Nasional Adaptasi Perubahan Iklim (RAN-API)" (2014).

implementing regulation on marine and fisheries conservation, unfortunately articles 3 to 7 of this regulation already reflect the economic orientation at the expense of the core zone of the mangrove ecosystem can be changed for the benefit of national strategic projects.

Apart from the positive legal aspect, threats to mangrove conservation as one of the main sources when talking about blue carbon are also reflected in a study formulated by the Indonesian Forum for the Environment (WALHI) which found that by 2040 there will at least 3,527,120.17 hectares of reclamation projects that are being and will be implemented by the Government. In the project, mangrove recognition and protection are only given an area of 52,455.91 hectares.[49]

The government's inattention to mangrove areas can harm the potential implementation of blue carbon, which is a coastal ecosystem-based climate change mitigation strategy. Mangroves play an important role in absorbing and storing large amounts of blue carbon, much more efficiently than inland forests. However, if the government does not pay enough attention in the form of protection, rehabilitation, and sustainable management policies, mangrove areas are vulnerable to deforestation due to land conversion and infrastructure development. This degradation not only reduces the ability of ecosystems to absorb carbon but also causes the release of carbon stored in mangrove sediments into the atmosphere, exacerbating climate change.

Lack of attention to mangrove conservation also impacts coastal ecosystems as a whole, including declining biodiversity, reduced protection against abrasion and natural disasters, and loss of livelihoods for coastal communities that depend on these ecosystems. Without strong regulations and support from the government, the blue carbon potential of mangrove ecosystems will not be able to be optimized in efforts to mitigate global carbon emissions.

2.3. Ideal scheme of Indonesia's blue carbon policy

The blue carbon policy in Indonesia has not specifically targeted and oriented blue carbon and carbon control as its main goals, however, the blue carbon policy in Indonesia includes various measures to protect and restore coastal ecosystems such as mangroves, seagrasses, and tidal swamps that can absorb carbon. This policy evaluation shows that Indonesia has taken significant steps in integrating the concept of blue carbon into national environmental policies. Mangrove conservation efforts through reforestation programs and coastal ecosystem protection supported by laws and regulations, such as Law No. 27 of 2007 concerning the Management of Coastal Areas and Small Islands, show a strong commitment to climate change mitigation. However, the implementation of blue carbon policies still faces several challenges.

First and foremost, Indonesia needs to amend Article 5 of Law Number 21 of 2014 concerning Geothermal which is revised through Law Number 6 of 2023 concerning the Job Creation Law which regulates geothermal to legalize geothermal mining in mangrove forest areas as well as articles 3 to 7 of Government Regulation Number 27 of 2021 concerning the Implementation of the Marine and Fisheries Sector, which allows the core zone of the mangrove ecosystem to be changed for the benefit of national strategic projects. To integrate all actions in tackling climate change, Indonesia needs a special law that specifically discusses and regulates climate change control strategies, one of which includes blue carbon as one of the instruments of climate change control. This step is very crucial because it relates to the legal aspect as the main framework for the implementation of climate change management. The existence of this regulation

49 Potret Ocean Grabbing, D I Pesisir, and Laut D A N Pulau-pulau Kecil, "NEGARA MELAYANI SIAPA ? POTRET OCEAN GRABBING," 2023.

also provides clear direction and orientation regarding the handling of climate change in Indonesia.

The second step is to improve the institutional structure, in the author's perspective, too many institutions are involved in the planning, management, and supervision stages. There are a total of five institutions involved in the whole series, these five institutions do not include the special units that were formed, especially if the Climate Change Law has been born or a special policy that talks about carbon management in Indonesia. Unfortunately, the large quantity of institutions does not represent an institutional pattern that has a high commitment to the protection of conservation areas, this is manifested in the case of the Kamojang nature reserve which was 'lost' by the geothermal project so that the fertility of the area was reduced and its status was downgraded to a nature tourism park, as well as the ijen nature reserve area which also experienced land fertility degradation, so that the institutional pattern that the author criticizes is not only in terms of the quantity of institutions, rather, it is the commitment and character of an institution that has a high commitment and scientific approach in decision-making.

This is also exacerbated by the fact that coordination between ministries and relevant agencies is often suboptimal, this is evident because there is too much bureaucracy involved in the management mechanism of coastal ecosystems, which will have an impact on hindering the effectiveness of program implementation on the ground. The Ministry of Environment and Forestry (MoEF) and the Ministry of Maritime Affairs and Fisheries (KKP) need to be more synchronized in the management of coastal ecosystems, including Bappenas, the Ministry of Agrarian Affairs and Local Governments in exercising their authority, as well as reducing the involvement of these institutions in the implementation of blue carbon.

In addition to the institutional aspect, the policy implementation aspect also needs to be revitalized, the Kamojang nature reserve event needs to be used as a benchmark for policy making, with the 'defeat' of nature conservation with geothermal projects shows that there is a mistake in internalizing values by viewing the energy transition as more important than environmental sustainability. With the nature of the Indonesian state that has a high relationship between indigenous peoples and the environment, the policy pattern integrates scientific approaches and the involvement of local communities in conservation programs.

The scientific approach is not only an option but a must in formulating mangrove conservation protection policies to optimize the potential of blue carbon as a solution to mitigate global climate change.[50] With a strong scientific foundation, policies will be more effective, efficient, and able to have a long-term positive impact on environmental sustainability as well as the welfare of coastal communities.[51] In addition, community involvement in developing and implementing blue carbon ecosystem management, such as blue carbon projects, contributes to building social resilience, preserving cultural values, and protecting ecosystem services that have a major impact on their livelihoods.[52] Overall, blue carbon policies in Indonesia show great potential in their contribution to global climate change mitigation and the conservation of coastal ecosystems. However, to achieve greater success, there needs to be a fairly broad increase in improvisation, ranging from the regulatory sector, and institutions, to community participation.

50 Daniel T. Dalton et al., "A Conceptual Framework for Biodiversity Monitoring Programs in Conservation Areas," *Sustainability (Switzerland)* 15, no. 8 (2023): 1–15, https://doi.org/10.3390/su15086779.

51 Nina Marie E. Lister, "A Systems Approach to Biodiversity Conservation Planning," *Environmental Monitoring and Assessment* 49, no. 2–3 (1998): 123–55, https://doi.org/10.1023/A:1005861618009.

52 Lindsay Wylie, Ariana E. Sutton-Grier, and Amber Moore, "Keys to Successful Blue Carbon Projects: Lessons Learned from Global Case Studies," *Marine Policy* 65 (2016): 76–84, https://doi.org/10.1016/j.marpol.2015.12.020.

3. CONCLUSION

The blue carbon policy in Indonesia has shown a promising direction in optimizing the potential of coastal areas. This policy plays an important role in mitigating climate change through the preservation of coastal ecosystems such as mangroves and seagrasses that have a high capacity to absorb carbon. The government's commitment is contradictory to the existing of the Job Creation Law and Government Regulation No. 27 of 2021 concerning the Implementation of the Marine and Fisheries Sector, which provides concessions for the destruction of mangrove ecosystems for national strategic projects or geothermal mines that are not in line with climate change mitigation and sustainable environmental conservation. Improvisation needs to be carried out by revising contradictory provisions and ratifying the enactment of the Climate Change Law, then followed by institutional improvements by revitalizing and streamlining the authority and bureaucratic flow of coastal ecosystem management to make the implementation of blue carbon effective. With this, the implementation of blue carbon will have an impact on carbon emission mitigation as a form of the state's role in suppressing the impact of climate change, at the same time, this step will increase Indonesia's blue growth and blue economy which will affect Indonesia's economic and social dynamics.

REFERENCES

Ali, Mahrus. "Overcoming the Dilemma between the Clarity and Flexible Norms in Environmental Offenses." *De Jure: Jurnal Hukum Dan Syar'iah* 14, no. 2 (2022): 276–87. https://doi.org/10.18860/j-fsh.v14i2.18279.

Badan Pusat Statistik. "Statistik Sumber Daya Laut Dan Pesisir 2024." Jakarta, 2024.

Barragán Muñoz, Juan M. "Progress of Coastal Management in Latin America and the Caribbean." *Ocean and Coastal Management* 184, no. July 2019 (2020). https://doi.org/10.1016/j.ocecoaman.2019.105009.

Blue Carbon Initiative. "Guidance for National Blue Carbon Activities." New York, 2012.

Dalton, Daniel T., Vanessa Berger, Vanessa Adams, Judith Botha, Stephan Halloy, Hanns Kirchmeir, Andrej Sovinc, Klaus Steinbauer, Vid Švara, and Michael Jungmeier. "A Conceptual Framework for Biodiversity Monitoring Programs in Conservation Areas." *Sustainability (Switzerland)* 15, no. 8 (2023): 1–15. https://doi.org/10.3390/su15086779.

"Data Peta Mangrove Nasional.Pdf," n.d.

Elgar, Edward. *Climate Law and Developing Countries*. Massachuasetts: Edward Elgar Publishing, 2016.

European Union. Regulation (EU) 2024/1991 of the European Parliament and of the Council of 24 June 2024 on nature restoration and amending Regulation (EU) 2022/869, OJ L, 2024 European Union § (2024). https://eur-lex.europa.eu/eli/reg/2024/1991/oj.

Fatimah, Siti, Jamal Wiwoho, and Isharyanto. "Global Perspectives on Freedom of Expression in Environmental Governance: Legal Implications and Challenges." *Jambe Law Journal* 7, no. 2 (2024): 481–507. https://doi.org/10.22437/home.

v7i2.456.

Fauzi, Adam Irwansyah, Anjar Dimara Sakti, Balqis Falah Robbani, Mita Ristiyani, Rahiska Tisa Agustin, Emi Yati, Muhammad Ulin Nuha, et al. "Assessing Potential Climatic and Human Pressures in Indonesian Coastal Ecosystems Using a Spatial Data-Driven Approach." *ISPRS International Journal of Geo-Information* 10, no. 11 (2021). https://doi.org/10.3390/ijgi10110778.

Friedrich Soltau. *Fairness and Equity in Climate Change*. New York: Pace Law School, 2008.

Grabbing, Potret Ocean, D I Pesisir, and Laut D A N Pulau-pulau Kecil. "NEGARA MELAYANI SIAPA ? POTRET OCEAN GRABBING," 2023.

Gunawan, Yordan, Muhammad Arya Ansar, and Siti Asdilla Dzakiyyah. "Navigating the Waters of Conflict : Indonesia and Malaysia ' s Maritime Boundary Dispute in the Sulawesi Sea and Malacca Straits." *Jambura Law Review* 7, no. 01 (2025): 152–75.

Herr, Dorothée, Amber Himes-Cornell, and Dan Laffoley. *National Blue Carbon Policy Assessment Framework*. *International Union for Conservation of Nature*, 2016.

Humaidi, M. Wildan, Hariyanto, and Mabarroh Azizah. "Green Philanthropy: Islamic Activism on Indonesia's Environmental Democracy." *Ijtihad: Jurnal Wacana Hukum Islam Dan Kemanusiaan* 24, no. 2 (2024): 167–91. https://doi.org/10.18326/IJTIHAD.V24I2.167-191.

Humphreys, Macartan, Jeffrey D. Sachs, and Joseph E. Stiglitz. *Escaping The Resource Curse*, 2007.

Indonesia Ocean Justice Intiative. "Ekosistem Karbon Biru Sebagai Modal Alam Kritis: Tata Kelola Ekosistem Karbon Biru Di Indonesia." Vol. 14, 2016.

Isla, Federico Ignacio, Luis Cortizo, Alejandra Merlotto, German Bértola, Melisa Pontrelli Albisetti, and Cecilia Finocchietti. "Erosion in Buenos Aires Province: Coastal-Management Policy Revisited." *Ocean and Coastal Management* 156 (2018): 107–16. https://doi.org/10.1016/j.ocecoaman.2017.09.008.

Jang, Jinsu, and Wiwiek Awiati. "Karbon Biru Di Indonesia: Memahami Pentingnya Konservasi Dan Restorasi Untuk Mencapai Netralitas Karbon." *Jurnal Hukum Dan Bisnis (Selisik)* 9, no. 1 (2023): 18–36.

Kelleway, Jeffrey J., Oscar Serrano, Jeffrey A. Baldock, Rachel Burgess, Toni Cannard, Paul S. Lavery, Catherine E. Lovelock, et al. "A National Approach to Greenhouse Gas Abatement through Blue Carbon Management." *Global Environmental Change* 63, no. December 2019 (2020): 102083. https://doi.org/10.1016/j.gloenvcha.2020.102083.

Kementrian Lingkungan Hidup dan Kehutanan. Keputusan Menteri Lingkungan Hidup dan Kehutanan Nomor SK.25/MENLHK/SETJEN/PLA.2/1/2018 tentang PERUBAHAN FUNGSI DALAM FUNGSI POKOK KAWASAN HUTAN DARI SEBAGIAN KAWASAN CAGAR ALAM KAMOJANG SELUAS t 2,391 (DUA RIBU TIGA Rr\TUS SEMBILAN PULUH SATU) HEKTAR DA, 603 § (2018).

Kementrian PPN/Bappenas Republik Indonesia. PEDOMAN TEKNIS PENYUSUNAN

RENCANA AKSI : TUJUAN PEMBANGUNAN BERKELANJUTAN (TPB)/ SUSTAINABLE DEVELOPMENT GOALS (SDGs) (2020).

———. Rencana Aksi Nasional Adaptasi Perubahan Iklim (RAN-API) (2014).

Klein, Naomi. *This Changes Everything. International Review of Applied Economics*. Vol. 36, 2022. https://doi.org/10.1080/02692171.2022.2064604.

Kwan, Valerie, Daniel A. Friess, Tasya Vadya Sarira, and Yiwen Zeng. "Permanence Risks Limit Blue Carbon Financing Strategies to Safeguard Southeast Asian Mangroves." *Communications Earth and Environment* 6, no. 1 (2025): 1–8. https://doi.org/10.1038/s43247-025-02035-4.

Lammerant, L, I Laureysens, and K Driesen. *Potential Impacts of Solar, Geothermal and Ocean Energy on Habitats and Species Protected under the Birds and Habitats Directives.*, 2020. https://op.europa.eu/en/publication-detail/-/publication/edf7213a-02c9-11eb-8919-01aa75ed71a1/language-en.

Li, Ze, An Li, Xiao-Zhen Dai, and Jie Dai. "Impact of Public Participation on Coastal Pollution Emissions under the Growth of Personal Income." *Journal of Coastal Research* 109, no. sp1 (2020): 39–44. https://doi.org/10.2112/JCR-SI109-007.1.

Lister, Nina Marie E. "A Systems Approach to Biodiversity Conservation Planning." *Environmental Monitoring and Assessment* 49, no. 2–3 (1998): 123–55. https://doi.org/10.1023/A:1005861618009.

Naswar, Aminuddin Ilmar, Muhammad Mutawalli Mukhlis, Achmad, and Rasyikah Md Khalid. "Exploring SDGs Regulatory Frameworks and Regional Regulation for Climate Change Mitigation and Adaptive Resilience in Coastal Communities." *Jurnal IUS Kajian Hukum Dan Keadilan* 12, no. 3 (2024): 572–87. https://doi.org/10.29303/ius.v12i3.1543.

Pikelj, Kristina, Igor Ružić, Suzana Ilić, Mike R. James, and Branko Kordić. "Implementing an Efficient Beach Erosion Monitoring System for Coastal Management in Croatia." *Ocean and Coastal Management* 156, no. November 2017 (2018): 223–38. https://doi.org/10.1016/j.ocecoaman.2017.11.019.

Puspaningrum, Dian, Vikisastro Suleman, and Ernikawati Ernikawati. "Potensi Blue Carbon Ekosistem Mangrove Pilohulata Gorontalo Utara." *Gorontalo Journal of Forestry Research* 6, no. 2 (2023): 121. https://doi.org/10.32662/gjfr.v6i2.3191.

Salman, Abdul Matin Bin, and Eko Asmanto. "Islamic Environmental Stewardship: A Sociological Approach to Hadith and Legal Frameworks for Ecological Responsibility." *Volksgeist: Jurnal Ilmu Hukum Dan Konstitusi* 7, no. 2 (2024): 361–78. https://doi.org/10.24090/volksgeist.v7i2.12205.

Sofue, Yuki, Jay Mar D. Quevedo, Kevin Muhamad Lukman, and Ryo Kohsaka. "Identifying Changes in Mangrove Landscapes in the Philippines and Indonesia Using Remote Sensing and Community Perceptions: Towards Ecosystem Services Management." *Regional Studies in Marine Science* 82, no. July 2023 (2025): 104023. https://doi.org/10.1016/j.rsma.2025.104023.

Suyahman, Suud Sarim Karimullah, and Muh Akbar Fhad Syahril. *Intersectionality in Social Justice: Unpacking the Complexity of Oppression*. *Jambura Law Review*. Vol.

7, 2025. https://doi.org/10.33756/jlr.v7i1.27828.

Taufiqurokhman. *Kebijakan Publik : Pendelegasian Tanggungjawab Negara Kepada Presiden Selaku Penyelenggara Pemerintahan*. *Kebijakan Publik*. I. Jakarta: Fakultas Ilmu Sosial dan Ilmu Politik Universitas Moestopo Beragama, 2019.

Tumbaga, Jan Ramel A., Marilene C. Hipolito, and Arneil G. Gabriel. "Community Participation toward Biodiversity Conservation among Protected Areas in Pangasinan, Philippines." *Environment, Development and Sustainability* 23, no. 3 (2021): 4698–4714. https://doi.org/10.1007/s10668-020-00705-1.

Turrell, W. R., W. E.N. Austin, S. P. Philbrick, C. Tilbrook, and H. Kennedy. "Clarifying the Role of Inorganic Carbon in Blue Carbon Policy and Practice." *Marine Policy* 157, no. September (2023): 105873. https://doi.org/10.1016/j.marpol.2023.105873.

Ullman, Roger, Vasco Bilbao-Bastida, and Gabriel Grimsditch. "Including Blue Carbon in Climate Market Mechanisms." *Ocean and Coastal Management* 83 (2013): 15–18. https://doi.org/10.1016/j.ocecoaman.2012.02.009.

Vanderklift, Mathew A., Dorothée Herr, Catherine E. Lovelock, Daniel Murdiyarso, Jacqueline L. Raw, and Andrew D.L. Steven. "A Guide to International Climate Mitigation Policy and Finance Frameworks Relevant to the Protection and Restoration of Blue Carbon Ecosystems." *Frontiers in Marine Science* 9, no. July (2022): 1–14. https://doi.org/10.3389/fmars.2022.872064.

Vico, Nanda, and Josua Sianipar. "Dekonstruksi Transisi Energi Melalui Optimalisasi Energi Terbarukan Dengan Akselerasi Pajak Karbon." *Constitution Journal* 3, no. 1 (2024): 99–114. https://doi.org/10.35719/constitution.v3i1.97.

Wahyudi, Ikhsan, Farhan, Muh Risnain, and Yulias Erwin. "The Urgency of Ratification of the New and Renewable Energy Law in Efforts to Develop Sustainable Energy as an Instrument for Climate Change Adaptation and Mitigation." *Jurnal IUS Kajian Hukum Dan Keadilan* 12, no. 3 (2024): 607–16. https://doi.org/10.29303/ius.v12i3.1469.

Walsh, Cormac. "Integration of Expertise or Collaborative Practice?: Coastal Management and Climate Adaptation at the Wadden Sea." *Ocean and Coastal Management* 167, no. January 2018 (2019): 78–86. https://doi.org/10.1016/j.ocecoaman.2018.10.004.

Watson, Stephen C.L., Gordon J. Watson, Nicola J. Beaumont, and Joanne Preston. "Inclusion of Condition in Natural Capital Assessments Is Critical to the Implementation of Marine Nature-Based Solutions." *Science of the Total Environment* 838, no. February (2022): 156026. https://doi.org/10.1016/j.scitotenv.2022.156026.

Wylie, Lindsay, Ariana E. Sutton-Grier, and Amber Moore. "Keys to Successful Blue Carbon Projects: Lessons Learned from Global Case Studies." *Marine Policy* 65 (2016): 76–84. https://doi.org/10.1016/j.marpol.2015.12.020.

Yudhana, Fachrizal Woma, Maria Madalina, Universitas Sebelas Maret, and Jawa Tengah. "Formulasi Kebijakan Penerapan Pajak Karbon Di Indonesia" 1, no. 16 (2022): 68–78.

Zhu, Gege, Yan Wang, Anshu Huang, and Yingying Qin. "Research Status and Development Trend of Greenhouse Gas in Wetlands: A Bibliometric Visualization Analysis." *Ecology and Evolution* 15, no. 2 (2025). https://doi.org/10.1002/ece3.70938.

Zupan, Mirta, Fabio Bulleri, Julian Evans, Simonetta Fraschetti, Paolo Guidetti, Antoni Garcia-Rubies, Marta Sostres, et al. "How Good Is Your Marine Protected Area at Curbing Threats?" *Biological Conservation* 221, no. March (2018): 237–45. https://doi.org/10.1016/j.biocon.2018.03.013.