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TOWARD ECOLOGICAL EQUITY IN THE DEVELOPING ASEAN CARBON MARKET: A COMPARATIVE LEGAL ANALYSIS OF REGULATORY REFORM

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ABSTRACT

The urgency of climate mitigation in Southeast Asia, particularly in Indonesia, Vietnam, Thailand, and Malaysia, drives the need for carbon market frameworks that balance economic goals with ecological equity. Despite rapid development, a significant research gap persists in integrating ecological justice principles, especially indigenous rights and equitable benefit-sharing. This study examines ASEAN carbon market regulations and proposes legal reforms for more inclusive governance. The main objective of this study is to analyze the extent to which ASEAN carbon market regulations accommodate ecological justice principles through a normative juridical approach and to propose targeted legal reforms. The findings reveal that ASEAN carbon market regulations have established a legal basis for emissions trading but remain fragmented in protecting indigenous rights, ensuring equitable benefit-sharing, and integrating ecological justice principles. This study contributes by developing a comparative normative framework that links ecological justice with regional carbon market governance. Normatively, this study proposes targeted legal reforms to strengthen ecological equity: mandatory FPIC for indigenous rights, enforceable benefit-sharing mechanisms, standardized social-ecological justice benchmarks in ASEAN's carbon framework, and enhanced transparency through public registries. These reforms provide a legal foundation for harmonizing ASEAN carbon market governance while advancing equitable and sustainable climate mitigation.

1. Introduction

Global developments and increasingly dynamic human activities have significantly affected ecosystems and accelerated Greenhouse Gas (GHG) emissions, making climate change one of the defining global challenges of the twenty-first century.[1] As illustrated in Figure 1, global fossil CO_2 emissions have continued to rise over the past six decades, reaching record levels in recent years. Reports from international energy institutions further indicate that energy-related CO_2 emissions reached approximately 37.4 gigatons in 2023, highlighting the growing urgency for coordinated international climate action.[2]

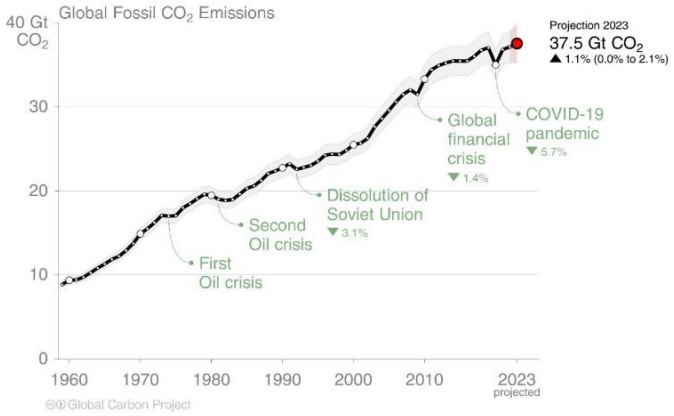


Figure 1. Carbon Emissions Growth Chart

Southeast Asia represents one of the region's most vulnerable to the impacts of climate change. Rising temperatures of approximately 0.1–0.3°Cover recent decades have intensified environmental pressures across the region, threatening food security, biodiversity, and socio-economic stability.[3] Climate-related disasters, including prolonged droughts, floods, and stronger tropical storms, have become increasingly frequent, while a projected global temperature increase of 2°C could reduce ASEAN crop yields by approximately 17%[4] At the same time, ASEAN countries also contribute significantly to global emissions, with Indonesia, Vietnam,

[1] Del Lucia, V., Competing Narratives and Complex Genealogies: The Ecosystem Approach in International Environmental Law, *Journal of Environmental Law,* Vol.27, no.1, 2015, page.97. See too, Nuria Siswi Enggarani., Independensi Peradilan dan Negara Hukum, *Law and Justice* Vol.3, no.2, 2019, page.87; Hadi Purnomo, Baharudin Baharudin, and Mohammad Nasr Khater., The Return of State Finances: Effectiveness of The New Paradigm in Enforcing of Law on Corruption Crimes Cases, *Jurnal Hukum,* 41, no.4, 2025, page.34.

[2] International Energy Agency., *CO_2 emissions in 2023*, Paris, IEA, 2024.

[3] World Energy Council., *Energy and climate trends in Southeast Asia*, London: World Energy Council, 2024.

[4] Samuel S. Myers, Matthew R. Smith, Sarah Guth, Christopher D. Golden, Bapu Vaitla, Nathaniel D. Mueller, Alan D. Dangour, and Peter Huybers., Climate change and global food systems: potential impacts on food security and undernutrition, *Annual review of public health,* Vol.38, 2017, page.261.

Thailand, and Malaysia experiencing substantial increases in carbon emissions in recent years, thereby positioning the region as both highly vulnerable to and responsible for climate mitigation efforts.[5]

The complexity of the climate change challenge has prompted the international community to develop various mitigation mechanisms through the international legal framework. The Kyoto Protocol marked a pivotal milestone by introducing market-based mechanisms like emissions trading, Joint Implementation, and the Clean Development Mechanism (CDM) to promote efficient emission reductions.[6] The 2015 Paris Agreement under the UNFCCC strengthened prior frameworks by establishing a global pledge to limit temperature rise to well below 2°C above pre-industrial levels, pursuing 1.5°C. This consensus-driven accord emphasizes nationally determined contributions (NDCs) for collective mitigation.[7]

The implementation of these commitments is further strengthened through international cooperation mechanisms stipulated in Article 6 of the Paris Agreement. This provision allows countries to utilize market-based instruments, including carbon trading (carbon markets), to achieve the emission reduction targets set out in their Nationally Determined Contributions (NDCs).[8] Since the agreement on implementing regulations for Article 6 at COP26 in Glasgow in 2021, the global carbon market has experienced rapid development and become an increasingly important policy instrument in climate change mitigation efforts.

In a regional context, ASEAN has a strategic position in the global climate change mitigation agenda. This region is not only experiencing rapid economic growth but also having extensive natural ecosystems such as tropical forests, mangroves, and peatlands, serving as carbon sinks.[9] Therefore, carbon markets are increasingly seen as an important economic instrument to mobilize climate finance and support the transition to a low-carbon economy in the region.

As the urgency of climate change mitigation increases, ASEAN countries are starting to develop carbon market policies as part of their national decarbonization strategies. Singapore, for example, has been a pioneer by implementing a carbon

[5] Tutun Zalsa Bela., Pengaturan Perdagangan Bursa Karbon di Indonesia Serta Perbandingan Pengaturan Perdagangan Bursa Karbon Dengan New Zealand, *Mahkamah: Jurnal Riset Ilmu Hukum,* Vol.2, no.2, 2025, page.18. See too, Ministry of Environment and Forestry of the Republic of Indonesia., *Indonesia national greenhouse gas inventory report 2023*, Jakarta, KLHK, 2023; Global Carbon Project., *Global carbon budget 2024*, Exeter: Global Carbon Project, 2024.

[6] United Nations Framework Convention on Climate Change., *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, Kyoto, 1997.

[7] Adinda Nolura Ayuningsih, Melly Aini Oktaviani, Angell Chandra, Nadra Athyah, Putri Dwi Manda M., Zania Citra, and Sholnia Delvita Sulaiman., Ratifikasi Paris Agreement Dan Pengaplikasian National Determined Contribution (NDC) Indonesia, *JISIP UNJA (Jurnal Ilmu Sosial Ilmu Politik Universitas Jambi),* Vol.7, no.1, 2023, page.63; United Nations Framework Convention on Climate Change, *Paris Agreement*, Paris, 2015.

[8] Shi, Yu Zhang, Y. T. Chen, and Colin W. K. Chen., A Study on Carbon Reduction to Prevent Climate Change by Futures and Options Trading in ASEAN, *IOP Conference Series: Earth and Environmental Science,* Vol.373, nol.1, 2019, page.12023. See too, United Nations Framework Convention on Climate Change., *Article 6 of the Paris Agreement: Rules, modalities and procedures*, Glasgow Climate Pact, 2021.

[9] Asian Development Bank., *Carbon markets in Asia and the Pacific: Opportunities for regional cooperation*, Manila, Asian Development Bank, 2023.

tax since 2019 and plans to increase the tariff to around S$80 per ton of carbon by 2030.[10] Indonesia established the Economic Value of Carbon framework via Presidential Regulation Number 110 of 2025 on Carbon Economic Value Implementation. This regulation provides the legal foundation for national carbon pricing, trading mechanisms, and emission controls to meet NDCs.[11]

The development of these regulations experiences dynamics continuously up to the most recent period. In 2023, Indonesia launched the national carbon exchange, IDXCarbon, as a domestic carbon trading platform. In 2025, this platform began to open access to international transactions, enabling integration with the global carbon market in accordance with the international cooperation mechanism outlined in Article 6 of the Paris Agreement.[12] Furthermore, the Indonesian government strengthened the regulatory framework through Presidential Regulation Number 110 of 2025, aiming to increase the transparency of the national carbon registry system, strengthen carbon trading governance, and expand the integration of domestic carbon market mechanisms with the international carbon trading system.[13]

At the regional level, ASEAN countries have also begun developing cooperation to promote carbon market harmonization. The important initiative is, among others, the development of the ASEAN Common Carbon Framework (ACCF), aiming to enhance the interoperability of carbon trading systems among ASEAN countries, strengthen environmental integrity, and enhance the region's competitiveness in the global low-carbon economy.[14] The ACCF represents an important step toward regional regulatory harmonization because it seeks to establish common standards for carbon market governance while facilitating cross-border cooperation. However, existing regional initiatives remain predominantly oriented toward technical interoperability and market efficiency. Comparatively less attention has been devoted to the normative dimensions of carbon market governance, particularly the protection of indigenous peoples, equitable benefit-sharing, procedural participation, and ecological justice. This imbalance raises important questions regarding whether the emerging regional carbon market framework is sufficiently capable of ensuring that climate mitigation objectives are pursued

[10] Singapore Ministry of Finance., *Singapore carbon tax policy and trajectory toward 2030*, Singapore, Government of Singapore, 2022.

[11] Adinda Nolura Ayuningsih, Melly Aini Oktaviani, Angell Chandra, Nadra Athyah, Putri Dwi Manda M., Zania Citra, and Sholnia Delvita Sulaiman., Ratifikasi Paris Agreement Dan Pengaplikasian National Determined Contribution (NDC) Indonesia, *JISIP UNJA (Jurnal Ilmu Sosial Ilmu Politik Universitas Jambi),* Vol.7, no.1, 2023, page.63.

[12] Indonesia Stock Exchange., *IDXCarbon market development report*, Jakarta, IDXCarbon, 2025.

[13] Boqiang Lin, and Chenchen Huang., Analysis of Emission Reduction Effects of Carbon Trading: Market Mechanism or Government Intervention? *Sustainable Production and Consumption,* no.33, 2022, page.30.

[14] Nicola Borri, Yukun Liu, Aleh Tsyvinski, and Xi Wu., *Inefficiencies of Carbon Trading Markets*, New Haven, Cornell University, 2024, page.34. See too, ASEAN Secretariat., *ASEAN common carbon framework: Regional progress report*, Jakarta, ASEAN Secretariat, 2025.

alongside social and environmental justice.[15]

However, in practice, the implementation of carbon markets across ASEAN continues to face significant regulatory challenges. Carbon-based projects, particularly in the forestry and land use sectors, frequently generate disputes over land rights, equitable benefit-sharing, community participation, and the recognition of indigenous peoples. In addition, fragmented carbon registry systems and inconsistent legal safeguards create the risk of unequal distribution of environmental and economic benefits. These shortcomings demonstrate that carbon market governance extends beyond technical market regulation and requires legal frameworks capable of integrating environmental effectiveness with ecological justice, human rights protection, and regulatory legitimacy.[16]

On the other hand, academic studies on carbon markets in the ASEAN region still tend to focus on economic aspects and general climate policy. Studies specifically linking ecological justice frameworks to the development of regional carbon market regulations are still relatively limited. Furthermore, some previous study focuses on policy frameworks covering the period from 2021 to 2023 and has not fully considered recent regulatory developments, such as the opening of international access to IDXCarbon in 2025 and the progress in the implementation of ASEAN Common Carbon Framework (ACCF).[17] Based on the identified research gap, this study seeks to answer the following research questions.

1. To what extent do the existing carbon market legal frameworks in ASEAN countries accommodate the principles of ecological justice?
2. What are the main legal shortcomings in the current ASEAN carbon market regulations concerning the protection of indigenous peoples' rights and equitable benefit-sharing?
3. What legal reforms are needed to strengthen ecological equity in the developing ASEAN carbon market?

Based on these conditions, there is a need to conduct a more comprehensive legal analysis of the development of carbon markets in the ASEAN region by emphasizing the ecological justice dimension in its regulatory framework. Accordingly, this study comparatively evaluates the legal frameworks governing carbon markets in selected ASEAN Member States through the lens of ecological justice to identify normative deficiencies and formulate legal reforms capable of strengthening equitable, transparent, and accountable regional carbon governance.

[15] Schlosberg, David., *Defining environmental justice: Theories, movements, and nature*, Oxford, Oxford University Press, 2007, page.34.

[16] Benjamin J. Richardson., Climate finance and justice: Balancing market mechanisms and social equity, *Climate Policy,* Vol.20 no.8, 2020, page.1036. See too, Heniarti, D. D., and Edi Setiadi., Effectiveness of Countering Acts of Terrorism Within Asean: Challenges and the Path Forward, *Jurnal Hukum Unissula,* Vol.41, no.3, 2025, page.549.

[17] Asian Development Bank., *Southeast Asia climate change outlook 2024*, Manila, Asian Development Bank, 2024.

2. Research Methods

This study employs a normative legal (doctrinal) research methodology to critically evaluate the coherence, consistency, and adequacy of legal norms governing carbon market mechanisms in ASEAN from the perspective of ecological justice. Rather than merely describing legal provisions, the study critically evaluates statutory frameworks, international legal instruments, and legal doctrines to determine whether existing regulations sufficiently accommodate distributive, procedural, recognition, and intergenerational justice within carbon market governance. The analysis therefore focuses on normative interpretation, legal reasoning, and doctrinal evaluation of applicable legal rules rather than empirical observation.[18]

The analytical process was undertaken through systematic legal interpretation, comparative assessment, and doctrinal evaluation. It aimed to identify regulatory convergence and divergence, assess the consistency of legal norms across jurisdictions, and evaluate whether existing legal frameworks adequately incorporate the principles of ecological justice. This approach enables a comprehensive assessment of both the strengths and normative deficiencies of ASEAN carbon market governance.

Normative legal study is carried out through library study, analyzing various legal sources, including primary, secondary, and tertiary sources.[19] The analysis is carried out qualitatively, examining the consistency of legal norms, their compliance with the principles of ecological justice, and the development of carbon market regulations at the national and regional levels. This study employs the statute, comparative, and conceptual approaches. The statute approach examines international agreements, regional instruments, and domestic legislation governing carbon markets, climate change mitigation, and carbon pricing. The analysis focuses on regulatory coherence, legal hierarchy, and consistency between national legal frameworks and international climate obligations, particularly those established under Article 6 of the Paris Agreement.

The comparative approach evaluates the legal frameworks of Indonesia, Singapore, Malaysia, Thailand, and Vietnam. These jurisdictions were selected purposively because they have established the most developed legal or policy frameworks relating to carbon markets within ASEAN, represent different regulatory models, and play significant roles in the region's climate governance. Other ASEAN Member States were excluded because their carbon market regulations remain limited or are still at an early stage of policy development, making meaningful doctrinal comparison difficult.

To strengthen analytical transparency, the comparison was conducted using a

[18] Peter Mahmud Marzuki., *Penelitian Hukum*, Jakarta, Kencana, 2017, page.54.

[19] Soerjono Soekanto, and Sri Mamudji., *Penelitian Hukum Normatif: Suatu Tinjauan Singkat*, Edisi pertama, Jakarta, Raja Grafindo Persada, 2007, page. 55. See too, Soerjono Soekanto., *Penelitian Hukum Normatif Suatu Tinjauan Singkat*, Jakarta, Rajawali Grafindo Persada, 2014, page.32.

common analytical framework comprising six legal indicators: (i) regulatory basis; (ii) institutional arrangements; (iii) measurement, reporting, and verification (MRV) mechanisms; (iv) carbon market or carbon pricing instruments; (v) recognition of indigenous peoples' rights and procedural safeguards, including Free, Prior and Informed Consent (FPIC); and (vi) accountability and benefit-sharing mechanisms. The use of identical indicators across all jurisdictions ensures systematic and consistent comparative legal analysis.

The conceptual approach employs ecological justice as the principal analytical framework for evaluating ASEAN carbon market governance. Ecological justice is operationalized through four normative dimensions, namely distributive justice, procedural justice, recognition justice, and intergenerational justice. These dimensions provide the analytical benchmarks for assessing whether legal frameworks distribute environmental benefits and burdens fairly, facilitate meaningful participation, recognize vulnerable communities and indigenous peoples, and safeguard the interests of future generations.

Primary legal materials consist of international legal instruments, including the United Nations Framework Convention on Climate Change (UNFCCC), the Paris Agreement, and Article 6 implementation decisions, together with ASEAN policy documents and national legislation governing carbon markets in Indonesia, Singapore, Malaysia, Thailand, and Vietnam. Secondary legal materials consist of peer-reviewed journal articles, scholarly books, legal commentaries, and reports published by international organizations, including the International Energy Agency (IEA), the World Bank, the World Resources Institute (WRI), and the Asian Development Bank (ADB). Tertiary legal materials include legal dictionaries, encyclopedias, and academic indexing databases used to clarify legal terminology and concepts.

Legal materials were selected based on four criteria: substantive relevance to carbon market regulation and ecological justice; legal authority and policy significance; regulatory recency to capture contemporary developments; and regional relevance to ASEAN climate governance. This study primarily examines the development of carbon market regulations during the 2015–2026 period, starting with the ratification of the 2015 Paris Agreement and continuing through the latest developments related to carbon market implementation in the ASEAN region. This period was chosen considering that Article 6 of the Paris Agreement serves as the primary legal basis for the development of international carbon trading mechanisms.

However, carbon market developments are highly dynamic, particularly since the agreement on implementing regulations for Article 6 at COP26 in 2021 and various regional harmonization initiatives in ASEAN through 2025–2026. Therefore, several sources used in this study primarily originate from the 2020–2025 period, as it is considered the most relevant in describing contemporary carbon market policy developments.

The analytical framework was also aligned with the study's three research questions. The first research question was addressed through a comparative evaluation of ASEAN carbon market regulations against the principles of ecological

justice. The second was examined by identifying normative gaps relating to indigenous peoples' rights, procedural safeguards, and benefit-sharing mechanisms. The third was answered through doctrinal legal reasoning to formulate normative recommendations for strengthening ecological equity within ASEAN carbon market governance.

As a normative legal study, this study has limitations in capturing the dynamics of carbon market implementation at the practical level. This study primarily focuses on normative analysis of regulatory frameworks and policy documents, thus not including empirical field study on the direct impacts of carbon market policies on local communities or market actors. In addition, because the development of carbon markets in the ASEAN region is still taking place rapidly, some of the latest policies or initiatives emerging after the study period may not have been fully captured in this analysis.

3. Results and Discussion

3.1. The Extent to Which ASEAN Carbon Market Regulations Accommodate Ecological Justice Principles

The carbon market is a market-based policy instrument designed to encourage the reduction of greenhouse gas emissions through economic mechanisms. This system generally operates through a cap-and-trade approach, where the government sets a maximum emissions cap, followed by the trading of emission permits among businesses.[20] Companies that are able to reduce their emissions below the established limit can sell their excess emission permits to other companies that exceed the permitted limit. This approach is considered capable of increasing economic efficiency in reducing emissions because it allows for a more flexible distribution of mitigation costs through market mechanisms. In addition, the carbon trading system also serves to internalize environmental externalities by making carbon emissions a tradable asset within the environmental economic framework.[21]

In environmental law, carbon pricing mechanisms align with the polluter pays principle, obligating polluters to cover remediation costs for environmental harm.[22] This principle features prominently in international instruments like the Rio

[20] World Bank., *State and Trends of Carbon Pricing 2024*, Washington DC, 2024.

[21] Nicholas Stern., *The Economics of Climate Change*, Cambridge, Cambridge University Press, 2007, page.12. See too, Antoine Dechezleprêtre, Daniel Nachtigall, and Frank Venmans., The joint impact of the European Union emissions trading system on carbon emissions and economic performance, *Journal of Environmental Economics and Management,* no.118, 2023, page.102758.

[22] Alif Pratama, and Niken Wahyuning Retno Mumpuni., Analisis Pengaturan Pajak Karbon di Indonesia Ditinjau Dari Prinsip Pencemar Membayar (Polluter Pays Principle) (Studi Komparatif Dengan Negara Singapura), *Jurnal Hukum Lex Generalis,* Vol.6, nol.1, 2025, page.34. See too, Bernard Nainggolan, Agus Joko Pramono, and Stefan Koos., Legal Protection of Intellectual Property for Digital Works by Utilizing Emerging Technologies, *Jurnal Hukum UNISSULA,* Vol.41, no.4, 2025, page.902.

Declaration and is enshrined in Indonesia's Law Number 32 of 2009 on Environmental Protection and Management. Law also functions as a crucial tool to regulate markets and protect rights. In Indonesia, for example, Law Number 4 of 2023 and Financial Services Authority Regulation Number 14 of 2023 govern the operation of carbon exchanges, establishing licensing requirements, oversight procedures, and governance standards to safeguard stakeholder interests and ensure market integrity. However, while the existing carbon market regulations in ASEAN have successfully accommodated the economic and efficiency aspects of environmental law, their alignment with broader ecological justice principles remains limited. As shown in Table 1, these differences highlight the fragmented nature of carbon market regulations across ASEAN member states.

Table 1. The Differences in Carbon Trading Practices among Countries

Country	Regulatory Framework	MRV System	Pricing Mechanism	Institutional Framework
Indonesia	1. Presidential Regulation No. 110 of 2025 on the Implementation of Carbon Economic Value Instruments and National Greenhouse Gas Emission Control. 2. Minister of Environment and Forestry Regulation No. 21 of 2022 on the Procedures for the Implementation of Carbon Economic Value.	Regulated under MOEF Regulation No. 21 of 2022. Covers the National Registry System for Climate Change Control (SRN-PPI), independent verification, and harmonization with international standards.	Carbon tax planned (IDR 30,000/ton CO_2e), with gradual implementation starting from the coal power plant sector. Cap-and-trade mechanism under development.	Ministry of Environment and Forestry, Indonesia Stock Exchange (IDX Carbon)
Malaysia	1. Low Carbon Mobility Blueprint 2021–2030 2. Climate Change Master Plan 2015–2050	Nol integrated national MRV system yet in place.	Utilizes tools such as the Malaysian Carbon Reduction and Environmental Sustainability Tool (MyCREST) and the Low Carbon Cities Framework (LCCF).	Ministry of Natural Resources, Environment and Climate Change; Malaysian Green Technology Corporation
Singapore	1. Carbon Pricing Act 2018 2. Carbon Credits Registry Act 2023 3. Energy Conservation Act	1. GHG Measurement and Reporting Requirements 2. Standardized Verification System	Carbon tax of SGD 25 per ton CO_2e (2024), increasing to SGD 50–80 per ton CO_2e by 2030. Applies to facilities emitting over 25,000 tons	National Environment Agency (NELA)

Country	Regulatory Framework	MRV System	Pricing Mechanism	Institutional Framework
		3. Technology- and Data-Driven Approaches 4. Mandatory Annual Reports for Facilities Above the Emissions Threshold	of CO_2e annually.	
Thailand	No comprehensive carbon law. Governed by regulations of the Thailand Greenhouse Gas Management Organization (TGO).	MRV protocols are managed by TGO, with standards for T-VER projects and independent third-party verification.	No carbon tax in place.	Thailand Greenhouse Gas Management Organization (TGO); Ministry of Natural Resources and Environment
Philippines	National Climate Change Action Plan (NCCAP) 2011–2028	Policy development phase for carbon pricing and MRV. MRV is being developed through the Philippine Greenhouse Gas Inventory Management and Reporting System (PGHGIMRS, since 2018) and the National Integrated Climate	No mandatory carbon pricing mechanism such as carbon tax or ELTS.	Climate Change Commission (CCC)

Country	Regulatory Framework	MRV System	Pricing Mechanism	Institutional Framework
		Change Database Information and Exchange System (NICCDIES).		
Vietnam	1. Law on Environmental Protection 2020 2. Decree No. 06/2022/ND-CP on Greenhouse Gas Emission Reduction 3. National Climate Change Strategy	MRV system in early development, with a focus on the energy and industrial sectors.	No carbon tax in place.	Ministry of Natural Resources and Environment (MONRE); Vietnam Environment Administration
Myanmar	Very limited carbon regulation, incorporated through the Environmental Conservation Law 2012, the Forest Law, and the National Environmental Policy.	No national MRV system; relies on international standards.	No carbon pricing mechanism in place; no concrete plans for an emissions trading system (ETS) or carbon tax.	Environmental Conservation Department

The concept of ecological justice places environmental sustainability and social justice as two inseparable dimensions in climate change policy. In environmental law literature, ecological justice encompasses several main dimensions, namely distributive justice, procedural justice, recognition justice, and intergenerational justice.[23] Intergenerational equity mandates that the present generation preserves natural resources to ensure future generations can meet their needs equally. Principle 3 of the 1992 Rio Declaration explicitly states that development must not compromise future generations' abilities to fulfill their own requirements. This principle underpins sustainable development by balancing current progress with long-term ecological stewardship.[24] In the context of carbon markets, the application of ecological justice principles is crucial because land-based mitigation projects, such as forest conservation, ecosystem restoration, or blue carbon management, often interact directly with customary territories and local communities' living spaces. Therefore, carbon market policies need to ensure community participation in decision-making processes and ensure the equitable distribution of economic benefits.

Current regulatory frameworks in ASEAN countries, such as Indonesia's Presidential Regulation Number 110 of 2025 and Singapore's Carbon Pricing Act, primarily focus on economic instruments and technical mechanisms.[25,26] While these regulations provide a foundation for carbon trading, they fall short in systematically integrating ecological justice principles. For instance, most national regulations have not adequately mandated Free, Prior, and Informed Consent (FPIC) or enforceable benefit-sharing mechanisms for land-based carbon projects. This analysis reveals that ASEAN carbon market regulations have only partially accommodated ecological justice principles.[27] They have succeeded in establishing the foundational infrastructure for carbon trading but remain weak in addressing the social equity and rights-based aspects essential to true ecological justice. This gap highlights the need for deeper normative reforms to ensure carbon markets do not exacerbate existing inequalities while pursuing emission reductions.[28]

3.2. Legal Shortcomings in Protecting Indigenous Rights and Equitable Benefit-Sharing

ASEAN energy-producing nations targeted 23% renewable energy in primary supply by 2025, a sharp increase from 9.4% in 2014. Indonesia, Thailand, and Vietnam drove the largest renewable capacity expansions in 2022, with sustained emission reductions potentially yielding 60% cuts by 2030. Indonesia's robust carbon trading assets further position it as a key player in global climate mitigation.

[23] Gordon Walker., *Environmental Justice: Concepts, Evidence and Politics,* London, Routledge, 2012.
[24] United Nations., *Rio Declaration on Environment and Development, 1992*.
[25] Peraturan Presiden Republik Indonesia Nomor 110 Tahun 2025 tentang Pelaksanaan Instrumen Nilai Ekonomi Karbon dan Pengendalian Emisi Gas Rumah Kaca Nasional.
[26] United Nations., *Rio Declaration on Environment and Development, 1992*.
[27] Decree No. 06/2022/ND-CP (Vietnam).
[28] Elly Kristiani Purwendah., Konsep Keadilan Ekologi Dan Keadilan Sosial Dalam Sistem Hukum Indonesia Antara Idealisme Dan Realitas, *Jurnal Komunikasi Hukum (JKH),* Vol.5, nol.2, 2019, page.139.

The main issues in the implementation of carbon markets are, among others, the potential for land conflicts between mitigation projects and indigenous peoples' rights. Several nature-based carbon projects in Southeast Asia have shown that restricting access to forests or traditional lands can lead to social tensions if not accompanied by adequate consultation mechanisms.[29]

For example, an ecosystem restoration project in Kalimantan that generated international carbon credits sparked debate over local communities' access to forest areas previously used for traditional economic activities. Similar cases have been reported in Sarawak, Malaysia, where indigenous communities such as the Penan and Iban face legal uncertainty regarding their Native Customary Rights (NCR) in carbon conservation projects.[30] This phenomenon shows that carbon markets have the potential to create new forms of ecological inequality if the rights of local communities are not adequately recognized within the national legal framework.

Carbon trading initiatives continue to be widely adopted across numerous nations, especially within indigenous populations. In Indonesia, the Katingan Mentaya Project in Central Kalimantan stands out as the sole prominent example, overseen by PT Rimba Makmur Utama. Nevertheless, the ecological license from the Ministry of Environment (ELRC) was granted only after a five-year lag, in 2013, thereby substantially postponing the initiative's rollout.

Additional complications emerge from Singapore's position as a hub for faith-based finance, which channels investments into agricultural ventures across Kalimantan and Sumatra. Singapore-linked groups engaged in these efforts frequently assert religious liberties, whereas Dayak communities in Kalimantan lament restricted access to ancestral territories absent fair restitution. In Malaysia, tensions have flared in Sarawak's Caribbean zone conflict area. Indigenous groups including the Penan, Iban, and Kenyah have voiced concerns over curtailed traditional entitlements. Persistent disputes surround Native Customary Rights (NCR), as community-led projects encroach upon territories tied to unsettled customary land claims.

Another significant challenge is the differences in Measurement, Reporting, and Verification (MRV) systems across ASEAN countries. MRV systems serve to ensure that claimed emission reductions in carbon projects actually occur and can be scientifically verified.[31]However, not all ASEAN countries have sufficient technical and institutional capacity to operate a credible MRV system. This gap could create the risk of an oversupply of carbon credits or *greenwashing practices*, which could ultimately undermine market confidence in the integrity of the carbon trading

[29] ASEAN Secretariat., *ASEAN Common Carbon Framework Development Report*, Jakarta, ASEAN Secretariat, 2025.

[30] Benjamin K. Sovacool., Decarbonization and Justice, *Energy Policy,* no.3, 2021, page.344.

[31] Marcus Colchester., *Carbon Markets and Indigenous Rights in Southeast Asia*, Forest Peoples Programme, 2022. See too, Asian Development Bank., *Financing the Low-Carbon Transition in Southeast Asia*, Manila, ADB, 2022.

mechanism.

International carbon trading also faces the challenge of legal pluralism, as each country has a different legal classification of carbon credits. Some countries treat carbon credits as environmental commodities, while others categorize them as financial instruments.[32] These differences in classification have the potential to create legal uncertainty in cross-border transactions, particularly in the context of international cooperation under Article 6 of the Paris Agreement. Therefore, harmonization of legal and technical standards is a crucial prerequisite for the development of a regional carbon market in ASEAN.

In practical, although carbon trading can be strengthened through cooperation among stakeholders. However, the diversity of legal traditions across ASELAN presents significant challenges in harmonizing carbon trading regulations. This fragmentation of legal frameworks hinders the development of an integrated and efficient ASEAN carbon market. As evidenced by the differences in regulatory frameworks shown in Table 1, only Singapore has incorporated carbon trading regulations at the statutory level. Currently, there is no integrated carbon trading mechanism across the ASEAN region.

These legal and institutional shortcomings, particularly the weak recognition of indigenous rights, absence of mandatory FPIC, inadequate benefit-sharing mechanisms, fragmented MRV systems, and regulatory fragmentation, collectively demonstrate that current ASEAN carbon market frameworks fail to adequately protect indigenous peoples' rights and ensure equitable benefit-sharing. This situation not only risks exacerbating ecological injustice but also undermines the environmental integrity and long-term legitimacy of regional carbon markets.

3.3. Proposed Legal Reforms for Strengthening Ecological Equity in ASEAN Carbon Markets

Based on the comparative legal analysis presented in the preceding sections, the study identifies several normative deficiencies that limit the capacity of existing ASEAN carbon market regulations to achieve ecological justice. Although the selected jurisdictions have established legal and institutional frameworks for carbon market governance, significant gaps remain in regulatory harmonization, the protection of indigenous peoples' rights, equitable benefit-sharing, and legal accountability. These findings demonstrate that strengthening carbon market governance requires not only expanding market mechanisms but also embedding ecological justice as a fundamental legal principle within regional and national regulatory frameworks.[33]

Accordingly, this study proposes a set of integrated legal reforms aimed at enhancing ecological equity in ASEAN carbon markets. The proposed reforms focus on strengthening regional regulatory harmonization, improving procedural and distributive safeguards, reinforcing institutional accountability, and ensuring that carbon market governance operates consistently with the principles of ecological justice. The following sections discuss each proposed reform in greater detail.

[32] IPCC., Guidelines for National Greenhouse Gas Inventories, Geneva, Geneva, 2019.
[33] Michael A. Mehling, Governing cooperative approaches under the Paris Agreement, *Ecology Law Quarterly,* Vol.46, no.3, 2019, page.769.

3.3.1. Reforming the Normative Framework

The comparative legal analysis demonstrates that ASEAN carbon market governance has progressed considerably through the establishment of national carbon market regulations and regional initiatives such as the ASEAN Common Carbon Framework (ACCF). Nevertheless, the existing regulatory architecture remains fragmented because significant disparities persist in measurement, reporting, and verification (MRV) standards, institutional capacity, and legal safeguards among ASEAN Member States. These differences reduce legal certainty, hinder cross-border carbon transactions, and limit the consistent application of ecological justice principles across the region. Accordingly, strengthening the normative foundation of ASEAN carbon market governance should become the primary legal reform priority.

The ACCF provides an important institutional foundation for regional legal harmonization by promoting common standards for carbon registries, MRV systems, and cross-border carbon trading mechanisms. At present, only Indonesia, Singapore, Thailand, and Vietnam have established facility-level MRV systems, while important differences remain in reporting methodologies, verification procedures, and institutional implementation. Since existing MRV frameworks generally refer to internationally recognized standards, ASEAN possesses a realistic opportunity to develop harmonized regional accreditation systems for third-party verifiers while accommodating national legal and institutional differences. Such harmonization would strengthen legal certainty, improve market credibility, and facilitate regional carbon market integration.

Regional legal harmonization, however, should not be limited to technical market standards. Comparative analysis indicates that ASEAN regulatory frameworks continue to provide uneven protection for indigenous peoples, local communities, and other vulnerable stakeholders affected by carbon market projects. Consequently, ecological justice requires that harmonized regional regulations incorporate minimum legal safeguards, including Free, Prior and Informed Consent (FPIC), transparent benefit-sharing arrangements, meaningful public participation, and accessible grievance mechanisms. Integrating these safeguards into the regional legal framework would ensure that market efficiency develops alongside the protection of environmental and social rights.

Normative reform must also be supported by stronger legal institutions capable of enforcing environmental obligations consistently. In Indonesia, environmental disputes relating to carbon projects continue to be resolved through general judicial mechanisms that may not adequately address the scientific and technical complexity of climate-related litigation.[34] Establishing specialized environmental courts, supported by judges possessing environmental expertise, would strengthen judicial consistency and improve legal certainty in resolving carbon market

[34] Nuria Siswi Enggarani., Independensi Peradilan dan Negara Hukum, *Law and Justice* Vol.3, no.2, 2019, page.89.

disputes. Complementary institutional reforms should also include an independent oversight body or carbon market ombudsman responsible for monitoring regulatory compliance, receiving public complaints, preventing greenwashing, and safeguarding the rights of affected communities.[35]

The effectiveness of normative reform depends upon adequate financial and technical support. Existing regional initiatives, particularly the ASEAN Catalytic Green Finance Facility (ACGF), have created an important mechanism for mobilizing investment in renewable energy, sustainable infrastructure, and low-carbon development.[36] Nevertheless, regional climate finance remains heavily concentrated on mitigation activities, while adaptation financing continues to receive comparatively limited attention despite its importance for vulnerable communities. Future legal reforms should therefore encourage a more balanced allocation of climate finance that simultaneously strengthens carbon market development, environmental resilience, and ecological justice throughout ASEAN.

3.3.2. Strengthening Institutional and Regulatory Governance

The comparative analysis indicates that strengthening ecological justice in ASEAN carbon markets requires not only harmonized regional standards but also effective domestic regulatory governance. Although several ASEAN Member States have introduced legal frameworks for carbon pricing and emissions trading, significant challenges remain in ensuring regulatory accountability, protecting indigenous and local communities, and integrating human rights safeguards into carbon market implementation. Consequently, institutional and regulatory reforms should prioritize transparent governance, inclusive participation, and effective legal oversight alongside market efficiency.

Indonesia has established a comprehensive legal framework for carbon pricing through Presidential Regulation Number 110 of 2025 concerning the Implementation of Carbon Economic Value Instruments and National Greenhouse Gas Emission Control, which provides the legal basis for carbon trading, carbon taxes, and other market-based climate policy instruments.[37] The implementation of the framework is further supported by Law Number 7 of 2021 concerning Harmonization of Tax Regulations, which introduces a phased carbon tax targeting high-emission sectors. Nevertheless, comparative analysis demonstrates that the current regulatory framework continues to emphasize market development while providing only limited protection for indigenous peoples and local communities that may be directly affected by carbon projects.

[35] Tutun Zalsa Bela., Pengaturan Perdagangan Bursa Karbon di Indonesia Serta Perbandingan Pengaturan Perdagangan Bursa Karbon Dengan New Zealand, *Mahkamah: Jurnal Riset Ilmu Hukum,* Vol.2, no.2, 2025, page.19. See too, Adel Bebi Irma., Perdagangan Karbon di Indonesia: Kajian Kelembagaan Dan Keuangan Negara, *Info Artha,* Vol.4, no.1, 2020, page.88.

[36] Asian Development Bank (ADB)., Para Mitra Janjikan $665 Juta Untuk Mendukung Pemulihan Hijau Di ASEAN. *ADB*, November 2, 2021, https://www.adb.org/id/news/partners-pledge-665-million-support-green-recovery-asean.

[37] Agustinus Prajaka Wahyu Baskara., Kerangka Hukum Bursa Karbon di Indonesia: Perkembangan Terkini Dan Tantangan Ke Depan, *Mimbar Hukum,* Vol.35, no.1, 2023, page.48. See too, Elly Kristiani Purwendah., Konsep Keadilan Ekologi Dan Keadilan Sosial Dalam Sistem Hukum Indonesia Antara Idelalisme dan Realitas, *Jurnal Komunikasi Hukum (JKH),* Vol.5, nol.2, 2019, page.139.

To strengthen regulatory legitimacy, Indonesia should integrate ecological justice principles into domestic carbon market governance through a comprehensive Measurement, Reporting, and Verification (MRV) system accompanied by stronger procedural safeguards. Particular attention should be given to the implementation of Free, Prior and Informed Consent (FPIC), enabling indigenous peoples and local communities to participate meaningfully in decision-making concerning projects affecting their territories, livelihoods, and customary rights. Integrating FPIC within Indonesia's carbon governance framework would improve legal certainty while reducing the risks of social conflict, land disputes, and displacement associated with forest-based carbon projects.

Singapore provides a valuable regional benchmark for institutional governance because it has established one of the most comprehensive statutory carbon pricing regimes in ASEAN through the Carbon Pricing Act 2018 and the Carbon Pricing (Amendment) Act 2022.[38] Complementing this legal framework, Singapore introduced a carbon tax in 2019 and subsequently developed Climate Impact X (CIX) as a regional voluntary carbon exchange supervised by the National Environment Agency (NEA), demonstrating a high degree of regulatory preparedness and institutional coordination. [39]

Singapore's experience also illustrates that institutional effectiveness extends beyond domestic regulation. Through bilateral cooperation with Thailand and Vietnam, Singapore has promoted cross-border carbon trading, technology transfer, and regional capacity building, thereby strengthening ASEAN carbon market interoperability.[40] Supported by more than one hundred carbon service providers, Singapore has successfully positioned itself as a regional carbon services and trading hub.[41] Nevertheless, from the perspective of ecological justice, continued expansion of carbon markets should be accompanied by stronger safeguards to ensure that economic efficiency does not outweigh equitable participation and environmental protection.[42]

Additional lessons can be drawn from the European Union Emissions Trading System (EU ETS), which demonstrates how market-based climate instruments may be complemented by social protection mechanisms. Beyond regulating emissions

[38] Ilham Dwi Rafiqi, and Nikmah Mentari., Perbandingan Perdagangan Karbon Di Negara Asean: Sebuah Penelusuran Singkat Dari Sisi Kebijakan, In *Proceedings of Airlangga Faculty of Law Colloquium*, vol.1, 2024; page.56.

[39] Renard Siew., The Untapped Potential of Carbon Credit Trading in ASEAN, FUCRUM Analysis on Southeast Asia, 2023. See too, Jannuar Yeremy, Joshua Irawan, and Mia Wimala., Kajian Penerapan Carbon Tax Pada Industri Konstruksi Di Singapura Dan Indonesia, *RekaRacana: Jurnal Teknil Sipil,* Vol.8, nol.1, 2022, page.42.

[40] James Balzelr., Singapore as a Carbon Servicing Hub for ASEAN: Prospects and Barriers, *Iluminem*, October 5, 2023.

[41] EDB Singapore., Singapore Is Well-Positioned to Become a Carbon Services and Trading Hub for Southeast Asia and the Asia Pacific, *EDB Singapore*, November 5, 2021.

[42] Adila Noor Rakhiemah, Indira Pradnyaswari, and Muhammad Ilham Rizaldi., Toward ASELN's Carbon Neutra Future: How Interoperable Carbon Market Will Make a Difference, ACCEPT II Asean Climate Change and Energy Project, 2024.

through a cap-and-trade system covering a substantial proportion of greenhouse gas emissions, the European Union has established the Social Climate Fund (SCF) to mitigate the distributive impacts of carbon pricing on vulnerable communities.[43] Although implementation challenges remain, including uneven identification of vulnerable groups, limited financial support, and the potential distortion of emission reduction incentives,[44] the European experience demonstrates the importance of integrating market regulation with explicit social justice mechanisms.

Drawing upon these comparative experiences, ASEAN should strengthen institutional and regulatory governance by integrating ecological justice into domestic carbon market regulation, expanding procedural safeguards for affected communities, improving institutional accountability, and ensuring that carbon pricing policies operate alongside equitable benefit-sharing mechanisms. Such reforms would enable ASEAN carbon markets to achieve not only environmental effectiveness and economic efficiency but also greater legal legitimacy and social equity.

3.3.3. Advancing Regional Harmonization

The comparative analysis demonstrates that achieving ecological justice in ASEAN carbon markets ultimately depends on effective regional harmonization rather than isolated national reforms. Although ASEAN Member States have made significant progress in developing domestic carbon market regulations, differences in legal classifications, institutional capacities, and regulatory priorities continue to impede cross-border cooperation and undermine legal certainty. Consequently, regional harmonization should be directed not only toward facilitating carbon trading but also toward establishing common legal standards capable of protecting environmental integrity and social justice across jurisdictions.

One of the principal barriers to regional harmonization arises from political economy dynamics that continue to influence carbon market governance. Carbon finance, while intended to support greenhouse gas emission reductions through market-based mechanisms, may become dominated by large corporations and political elites that possess disproportionate control over financial resources and policy formulation.[45] In such circumstances, carbon markets risk functioning primarily as economic instruments that generate commercial benefits without

[43] Antoline Dechezeprêtre, Daniel Nachtigal, and Frank Velnmans, "The Joint Impact of the European Union Emissions Trading System on Carbon Emissions and Economic Performance," *Journal of Environmental Economics and Management* 118 (March 2023): 102758, https://doi.org/10.1016/j.jeem.2022.102758. See too, Eleanor Scott., U-Turn on EU's Emissions Trading System for Road Transport and Buildings Carries Huge Environmental, Social and Economic Price Tag, Carbon Market Watch, 2025.

[44] Strambo Claudia, Eena Dawkins, and Timothy Sujada., The Impact of the EU Emissions Trading System on Households: How Can the Social Climate Fund Support a Just Transition? *Stockhom*, 2022, page.54. See too, Benjamin Görach, Mirjam Kosch, Nis aus dem Molore, Fabian Pausel, Michaell Jakob, Mchael Pahel, Johannes Brehm, et al., A Fair and Solidarity-Based EU Emissions Trading System for Buildings and Road Transport, Potsdam, 2022.

[45] Qurnia Indah Permata Sari., Analisis Bibliometrik Tentang Perdagangan Karbon Dalam Perspektif Politik: Studi Dari Database Scopus Dan Wos 2020-2024, *Jurnal Peradaban Hijau* Vol.1, no.1, 2024, page.23.

adequately addressing the structural causes of environmental degradation. Corporate actors may rely excessively on purchasing carbon allowances rather than undertaking substantive emission reductions, thereby weakening both market credibility and the realization of ecological justice.

Regional harmonization is further constrained by legal pluralism in carbon market regulation. Carbon credits continue to receive different legal classifications across jurisdictions, being treated variously as commodities, securities, or financial instruments depending on national legal systems.[46] These inconsistencies create legal uncertainty for cross-border transactions and complicate the interoperability of regional carbon markets. Moreover, substantial disparities remain in technical and institutional capacity among ASEAN Member States, particularly regarding the establishment of credible Measurement, Reporting, and Verification (MRV) systems. Limited financial resources and technical expertise may reduce market integrity by increasing the risk of inconsistent verification procedures and the oversupply of carbon credits.[47]

Addressing these challenges requires ASEAN to strengthen regional legal harmonization through common regulatory principles while respecting national legal diversity. Harmonization should extend beyond technical market standards to include shared legal definitions of carbon credits, interoperable registry systems, mutually recognized MRV procedures, and minimum procedural safeguards for affected communities. Such an approach would reduce legal uncertainty, improve regulatory consistency, and strengthen confidence in regional carbon market governance without requiring complete legal uniformity among ASEAN Member States.

These proposed reforms are not merely incremental improvements but represent fundamental normative shifts. They aim to transform the ASEAN carbon market from a primarily economic instrument into a genuine tool for ecological equity. By institutionalizing FPIC, enforceable benefit-sharing, harmonized MRV standards, and stronger accountability mechanisms, these reforms will help ensure that the pursuit of emission reductions does not come at the expense of indigenous rights and vulnerable communities. Implementing these legal reforms is essential to bridge the current justice gaps and realize a more inclusive and sustainable regional carbon market.

[46] Juan Didier Pierre, Reeshabh Shayan Tupsee, and Zakiyyah Bibi Azraa Mungroo., Legal Implications of Control-Based versus Ownership-Based Frameworks in Carbon Market Registries: A Casel Study of the Article 6.4 Mechanism Under the Paris Agreement, *Call for Input 2025 - Ownership of Account Holdings in the A6.4 Mechanism Registry*, 2025.

[47] Winniel Mak., Enhancing the Voluntary Carbon Market: Gaps and Solutions, 2025.

4. Conclusion

This study aims to analyze how the regulatory framework for carbon markets in the ASEAN region is developing and to what extent this framework is able to guarantee the principle of ecological justice. The results of the normative analysis show that although various ASEAN countries have begun to develop carbon market instruments as part of their climate change mitigation strategies, the existing regulatory framework still leaves a number of significant legal gaps.

In relation to the first research question, this study finds that current ASEAN carbon market regulations have only partially accommodated ecological justice principles, with a strong emphasis on economic efficiency but weak integration of distributive, procedural, and recognition justice. Regarding the second research question, the analysis reveals major legal shortcomings, particularly the lack of mandatory FPIC, inadequate benefit-sharing mechanisms, fragmented MRV systems, and regulatory divergence across countries. In response to the third research question, this study proposes concrete legal reforms encompassing regional harmonization, institutional strengthening, and rights-based safeguards. The main contribution of this study lies in its normative legal analysis that bridges the gap between carbon market development and ecological justice frameworks in the ASEAN context, especially by incorporating recent regulatory developments up to 2025.

These findings suggest that strengthening ASEAN carbon market governance requires a more integrated regulatory approach. In the context of developing regional initiatives such as the ASEAN Common Carbon Framework (ACCF), there is an opportunity to mainstream social and ecological justice standards into the design of regional carbon markets. Therefore, policy reforms need to be directed at strengthening regional legal frameworks that require FPIC, enhancing the role of regional human rights institutions in compliance review mechanisms, and developing adaptive regulatory instruments such as regulatory sandboxes to respond to the rapidly evolving dynamics of carbon markets.

This study has several limitations. As normative juridical research, it focuses on legal documents and does not include empirical field studies on the actual implementation and impacts of carbon projects on local communities. Additionally, the rapidly evolving nature of carbon market policies means some very recent developments after 2025 may not be fully captured. Despite these limitations, the findings and proposed reforms offer practical recommendations for ASEAN policymakers to create a more equitable carbon market. Future research could complement this study with empirical investigations and comparative analysis of implementation effectiveness across member states.

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