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THE DETERMINATION OF STATE BASELINES POST-PEAT ABRASION ON BENGKALIS ISLAND AS INDONESIA'S FOREMOST ISLAND IN TERMS OF INTERNATIONAL LAW OF THE SEA PERSPECTIVE

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Abstract

Coastal abrasion is a growing global concern, particularly for Indonesia, a country with one of the longest coastlines in the world. Abrasion poses significant challenges to coastal ecosystems and the livelihoods of local communities. Bengkalis Island, one of Indonesia's outermost and foremost islands, has experienced intensified abrasion in recent decades. Located in Riau Province and facing the Strait of Malacca, this peat-contoured island serves as a basepoint for Indonesia's archipelagic baselines. This research aims to: (1) analyze the legal implications of peat erosion on Indonesia's baselines post-erosion, and (2) describe the Indonesian government's efforts to address the issue. This normative legal research examines the synchronization between national regulations and international standards regarding peatland conservation and erosion mitigation, particularly in strategically important foremost islands. The study reveals two key findings. First, peat abrasion on Bengkalis Island has serious legal implications for determining Indonesia's archipelagic baselines and maritime boundaries under UNCLOS 1982. Abrasion also threatens the island's status as an outermost and foremost island, potentially leading to the loss of Indonesia's rights over natural resources in the area. Failure to protect peat ecosystems may be considered a violation of Indonesia's international obligations to preserve marine and wetland environments under UNCLOS 1982 and the Ramsar Convention. Second, the Indonesian government has implemented legal and technical measures, such as issuing Government Regulation No. 57 of 2016 on Peat Ecosystem Protection and Management, constructing breakwaters, planting mangroves, and implementing the 3R program (Rewetting, Revegetation, and Revitalization) through the Peat and Mangrove Restoration Agency (BRGM). These efforts have shown positive results in reducing erosion rates and protecting coastlines..

Keywords : Abrasion, Bengkalis Island, International Law, Peat

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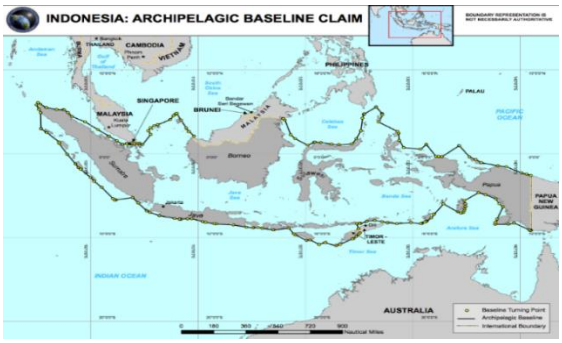
1. INTRODUCTION

Coastal abrasion is a natural phenomenon that has increasingly become a major concern in the global context, especially for archipelagic countries like Indonesia. As a maritime nation with the second-longest coastline in the world, Indonesia faces serious challenges related to abrasion, which can significantly impact coastal ecosystems and the well-being of surrounding communities (Badwi & Abbas, 2019:430). In recent decades, economic development, urbanization, and uncontrolled exploitation of natural resources have intensified coastal abrasion in several regions of Indonesia, one of which is Bengkalis Island (Tampubolon, 2022:36). This island, located in Riau Province, is one of Indonesia's outermost and foremost islands, directly bordering Malaysia, and plays a strategic role in determining Indonesia's archipelagic baselines (Attachment to Presidential Decree 6/17).

The driving factors of coastal abrasion in Indonesia are highly varied and involve a complex combination of natural dynamics and human intervention. Ocean waves, currents, and coastal infrastructure development are the primary factors triggering changes in the coastline (Muhardi et al., 2021:3). Additionally, global climate change, particularly rising sea levels, has significantly pressured the sustainability of coastal ecosystems, such as the destruction of mangrove habitats and the loss of coastal biodiversity (Muhardi et al., 2021:3). Bengkalis Island, with its unique geographical and topographical conditions, is one of the regions most vulnerable to the impacts of abrasion. Its gently sloping coastal topography and muddy sand substrate make the island highly susceptible to coastal erosion (Sutikno, 2022).

Bengkalis Island is also part of the National Peat Hydrological Unit (KHG), giving it unique peatland characteristics. These peatlands play a crucial role in maintaining the balance of coastal ecosystems but are also vulnerable to damage caused by abrasion and climate change (Attachment to Ministerial Decree 129/2017). According to recent data, the rate of abrasion on Bengkalis Island averages 59 hectares per year, while the sedimentation rate is only 16.5 hectares per year. This indicates a significant reduction in land area, averaging 42.5 hectares annually (Sutikno, 2014:621). If this condition continues, not only will coastal ecosystems be threatened, but Indonesia's territorial sovereignty as well, given that Bengkalis Island is an outermost and foremost island directly bordering Malaysia (Muljono, 2023).



Picture 1. Map of the Archipelago's Base Line

The issue of abrasion on Bengkalis Island also has serious legal implications, particularly concerning the determination of Indonesia's archipelagic baselines. These baselines serve as

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the foundation for measuring territorial seas, exclusive economic zones, and other maritime boundaries (Article 46, UNCLOS 1982). If abrasion continues, changes in the coastline could affect the determination of archipelagic baselines, ultimately reducing Indonesia's maritime zones. This would undoubtedly impact Indonesia's sovereignty and maritime rights in the future (Johan, 2009:45).

Several previous studies have discussed the threat of coastline changes due to rising sea levels and abrasion. For example, Michael J. Strauss, in his research titled *"The Future of Baselines as the Sea Level Rises: Guidance from Climate Change Law,"* examines the legal implications of rising sea levels on the baselines of archipelagic states (Strauss, 2019:2). Clive Schofield, in his book *"Holding Back the Waves? Sea-level Rise and Maritime Claims,"* also discusses how rising sea levels can affect a country's maritime claims (Schofield, 2013:593). Additionally, A.H.A. Soons, in his journal article *"The Effects of a Rising Sea Level on Maritime Limits and Boundaries,"* analyzes the impact of rising sea levels on maritime boundaries (Soons, 1990:37). However, these studies focus more on global implications and do not specifically address the case of abrasion on small outermost and foremost islands like Bengkalis Island.

Unlike previous studies, this research will focus more on the implications of abrasion on Bengkalis Island as one of Indonesia's outermost and foremost islands with unique peatland characteristics. This study will examine how abrasion on Bengkalis Island could affect the determination of Indonesia's archipelagic baselines and its legal implications from the perspective of international maritime law. Thus, this research is expected to contribute new insights into understanding the impact of abrasion on Indonesia's maritime sovereignty, particularly in small outermost and foremost island regions.

Based on this background, this research aims to analyze the implications of coastal abrasion on Bengkalis Island for determining Indonesia's archipelagic baselines from the perspective of international maritime law. The study will examine how coastline changes due to abrasion could affect the determination of Indonesia's maritime boundaries and the potential legal implications of such changes. Additionally, this research will explore efforts that can be made to mitigate the impacts of abrasion and maintain Indonesia's territorial sovereignty in international border areas.

2. RESEARCH METHOD

This research is classified as normative legal research. It aims to examine the level of legal synchronization by analyzing the extent to which national regulations in Indonesia align with international standards and policies regarding peatland conservation and abrasion mitigation, particularly in strategically positioned outermost and foremost islands. The data collection technique employed is documentation study, which involves a literature review. The findings are then explained descriptively by connecting relevant theories.

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3. RESULT AND DISCUSSION

Legal Implications on State Baselines Following Peat Abrasion of Bengkalis Island as Indonesia's Outermost and Foremost Island

Indonesia, as an archipelagic state, utilizes archipelagic baselines to determine its maritime boundaries, including territorial seas, Exclusive Economic Zones (EEZs), and continental shelves. The determination of these archipelagic baselines is regulated under Article 47 of the United Nations Convention on the Law of the Sea (UNCLOS) 1982, which provides a specific legal framework for archipelagic states like Indonesia (UNCLOS, 1982: Article 47). Unlike normal baselines, which are regulated under Article 5 of UNCLOS 1982 (based on the low-water line), archipelagic baselines allow Indonesia to draw straight lines connecting the outermost points of its outermost islands and drying reefs, provided certain conditions are met (UNCLOS, 1982: Article 47).

First, the length of the baselines must not exceed 100 nautical miles, except for up to 3% of the total number of baselines, which may extend up to a maximum of 125 nautical miles. Second, the water-to-land ratio between the area of the waters and the land within the archipelagic baselines must range from 1:1 to 9:1. This means the area of the waters must not exceed nine times the area of the land. Third, the baselines must connect the outermost points of the outermost islands and drying reefs. Fourth, the archipelagic baselines must not cut through the territorial sea of another state (UNCLOS, 1982: Article 47).

Bengkalis Island is one of Indonesia's outermost and foremost islands, geographically facing the Strait of Malacca. The island plays a strategic role in safeguarding the nation's sovereignty and security, particularly in monitoring the highly busy maritime traffic in the Strait of Malacca (Haliyun Na'im, 2023). However, the island also faces serious challenges in the form of abrasion, which is a consequence of environmental degradation of peatlands, leading to coastal changes due to abrasion and the movement of sea sand (Sigit Sutikno, 2024).

Abrasion refers to the retreat of the coastline in coastal areas vulnerable to activities occurring both on land and at sea. Activities such as mangrove deforestation, sand mining, as well as natural phenomena like high waves and tidal fluctuations, contribute to coastal erosion (Abda, 2019: 1). Coastal areas are highly dynamic zones with interconnected ecosystems.

Essentially, abrasion is caused by two main factors: natural factors such as tidal fluctuations, sea waves, and storms, and human factors such as rapid population growth, settlement, and activities in coastal areas that exploit natural resources like fisheries, land, water, and infrastructure development to meet the needs of local communities (Sigit Sutikno, 2023).

The causes of abrasion on Bengkalis Island are closely related to the factors mentioned above. Given the island's peatland topography, which is geographically connected to the open sea and directly borders the Strait of Malacca, abrasion on the island is influenced by the strong wave energy from the Strait of Malacca in the northern coastal area of Bengkalis Regency, sea level rise, high rainfall intensity, the physical condition of Bengkalis Island's peatland

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coastline, and the destruction of mangrove/coastal vegetation due to human activities such as logging, conversion to fishponds, and palm oil plantations (Koichi Yamamoto, 2023).

Muhammad Indra Budiman, ST, MT, Head of the Water Resources Division at the Public Works and Spatial Planning Office of Bengkalis Regency, in an interactive dialogue titled "Negeri Junjungan Menyapa" on Monday, August 26, 2024, revealed that coastal abrasion is caused by strong wave currents and the decline in mangrove forests. He explained that abrasion in Bengkalis Regency occurs in three main areas: Bengkalis Island, Rupat Island, and the Sumatran coast (Muhammad Indra Budiman, 2024).

On Bengkalis Island, the most severe abrasion occurs in Bantan District, stretching 24.5 kilometers. Eight villages are severely affected, namely Jangkang, Deluk, Selatbaru, Teluk Papal, Bantan Air, Bantan Sari, Bantan Timur, and Muntai Barat, with the total length of abrasion reaching 42 kilometers. Most of this area, approximately 41.5 kilometers, is in critical condition, while mitigation efforts have only covered 5.5 kilometers (Muhammad Indra Budiman, 2024).

In addition, in Bengkalis District, severe abrasion is also found in two villages, Simpang Ayam and Prapat Tunggal, which face the Strait of Malacca and Tanjung Jati. Other villages affected by abrasion, such as Sebauk, Pangkalan Batang, Pedekik, Wonosari, and Sekodi, have an affected area of approximately 31 kilometers, with 21 kilometers in critical condition. However, mitigation efforts in this area have only covered 0.55 kilometers (Muhammad Indra Budiman, 2024).

Picture 2. Comparison of location conditions before and after abrasion in Prapat Tunggal Bengkalis village, August 2023 – May 2024

Similarly, Koichi Yamamoto emphasized the importance of understanding the dangers of abrasion occurring on Bengkalis Island. In his latest research presentation, Koichi Yamamoto stated that the abrasion on Bengkalis Island is no longer occurring from the sea toward the land but rather as landslides from the land toward the sea, a phenomenon referred to as *Bog-Burst* (Koichi Yamamoto, 2023).

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Picture 3. Real report of abrasion due to bog burst. Abrasion in Simpang Ayam Village, December 12, 2022

Bog-Burst is a term for peat coastal landslides caused by the failure of peatland functions. This is triggered by deforestation, land-use changes, and extensive canalization for drainage in plantation development (Koichi Yamamoto, 2023). Although the Bog-Burst phenomenon has occurred in several countries such as Shetland in the UK and Ireland, where it has been classified as a minor disaster and not an international issue, the Bog-Burst phenomenon causing peat coastal landslides on Bengkalis Island is significantly different and highly concerning due to the potential complexity of problems that may arise in the future (Koichi Yamamoto & Sigit Sutikno, 2023).

This is based on the fact that continuous abrasion can lead to serious ecological impacts, including declining fish populations, disruptions to marine food chains, and damage to wildlife in the surrounding areas. Additionally, coastal abrasion can increase the risk of seawater intrusion into coastal areas and groundwater, threatening freshwater resources and agriculture (Abda, 2019: 1).

The retreat of the coastline due to abrasion results in the loss of land for small islands. The impact of coastal erosion is far more dangerous because it is related to the small size of the land, meaning that the retreat of the coastline can lead to the complete submergence of an island (Sodik, 2018: 22). Given that Bengkalis Island is not just one of Indonesia's small islands but also an outermost and foremost island (Sodik, 2018: 22), it is used as a base point for drawing archipelagic baselines to determine maritime boundaries in accordance with the 1969 Agreement between the Government of Malaysia and the Government of the Republic of Indonesia concerning the Delimitation of the Continental Shelf in the Strait of Malacca and the South China Sea (Agreement, 1969). Therefore, the issue of abrasion on Bengkalis Island must be taken more seriously.

Under Article 47 of UNCLOS 1982, if abrasion causes the coastline to retreat by 1 kilometer, the outermost and foremost point used to draw the baseline will also shift. This change will reduce Indonesia's territorial sea, EEZ, and continental shelf. For example, if the outermost and foremost point of Bengkalis Island shifts inland, the baseline connecting that point will also shift, potentially affecting maritime boundary agreements with Malaysia and Singapore (UNCLOS, 1982: Article 47).

Furthermore, changes in baselines can trigger maritime boundary disputes with neighboring countries, especially if such changes affect areas previously considered part of

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Indonesia's EEZ or continental shelf. Therefore, Indonesia must proactively monitor and adjust its baselines in accordance with the dynamics of coastal changes due to abrasion. These steps must be supported by accurate scientific data and a clear legal framework to ensure compliance with UNCLOS 1982 (UNCLOS, 1982: Article 47).

In response to this, to fulfill its legal obligations under UNCLOS 1982, Indonesia has submitted information on base points, baselines, and maritime boundaries with various neighboring countries to the United Nations Secretary-General. Other technical processes, such as verifying the number of islands and coastline length, are ongoing due to the rapidly changing conditions of the sea and seabed. The number of islands lost due to abrasion or those that emerged after tsunamis must be continuously verified (Kemaritiman, 2021: 20).

The status of Bengkalis Island as Indonesia's outermost and foremost island is also threatened by peat abrasion. According to Article 121 of UNCLOS 1982, an island must meet the criteria of being a naturally formed area of land surrounded by water and remaining above water at high tide (UNCLOS, 1982: Article 121). If abrasion causes the loss of part or all of Bengkalis Island's land, its status as an outermost and foremost island could be threatened. Losing this status would have serious legal implications, as outermost and foremost islands play a crucial role in determining Indonesia's EEZ and continental shelf boundaries (Sodik, 2018: 22).

For example, if Bengkalis Island no longer meets the criteria of an island, Indonesia's claim to the surrounding waters could be reduced, which in turn would affect Indonesia's rights to natural resources in that area (Sodik, 2018: 22). Changes in coastlines due to natural disasters are difficult to predict accurately. Changes in coastal areas can occur in many ways. However, potential scenarios can be examined. The first situation to address is when base points and baselines shift (retreat) inland, and the second is when base points and baselines located on islands, rocks, and low-tide elevations disappear (Sefrioui, 2017: 8).

When the baselines of coastal states retreat inland without overlapping maritime claims, the coastal state will lose part of its territory, and the baselines used to measure maritime zones will shift inland. Similarly, unilaterally established maritime zone boundaries will also retreat in the same manner as the baselines (Sefrioui, 2017: 8). Consequently, the legal status of maritime zones will change: part of the territorial sea directed inland will become internal waters, and part of the territorial sea will become an EEZ. As a result, part of the EEZ will become high seas. This has implications for sovereign rights: innocent passage, freedom of navigation, fishing rights, and others (Sefrioui, 2017: 8).

If a coastal state has a maritime boundary agreement with an opposite or adjacent state, this has two implications: first, if the boundary agreement divides the EEZs of both states, the retreat of the coastline will only increase the EEZs of both states. Thus, the shift in the coastline will not affect the type of zone being delimited (Lisztwan, 2012: 176), provided that the total area of both EEZs does not exceed 400 nautical miles. Second, if the total area exceeds 400 nautical miles after the coastline retreats, a new area of high seas will be created (Lisztwan, 2012: 176).

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Some experts argue that the impact of natural disasters requiring changes to maritime boundaries could lead to renegotiation of maritime boundary agreements based on the principle of equidistance to align with the new geographical reality; reevaluation of the principles of equity and equidistance by international courts and tribunals in resolving boundary disputes; or, finally, the reversion of highly disputed EEZ claims to the status of high seas (Houghton et al., 2010: 813-814). For example, this occurred between Switzerland and Italy (Popham, 2009), two neighboring coastal states. The maritime boundary between these countries shifted due to glacier melting, leading to negotiations for a new boundary agreement between 2008 and 2009 (Sefrioui, 2017: 14).

This shift may have several important consequences. It will create uncertainty in maritime boundaries, which is not appreciated by those aiming to achieve stability in interstate relations. Modifying maritime boundaries periodically will create legal insecurity for states with unstable coastlines. They will have to continually review their maritime boundaries, and this will also create conflict and instability for neighboring states, even those with more stable baselines (Caron, 1990: 640).

In fact, changes in baselines can lead to conflicts between adjacent or opposite coastal states over the exploitation of natural resources (Soons, 1990: 222-223). If this shift in baselines is internationally recognized and implemented, some states will inevitably lose part of their territory, islands, or low-tide elevations and will have to make significant financial efforts to retain those areas (Rayfuse, 2010). On the other hand, by adjusting and correcting baselines, coastal states must consider the costs of adaptation and the time required for the lengthy process of modifying maritime boundaries.

Therefore, an approach to preserving baselines and base points was proposed in 1990 by AHA Soons and followed by other experts (Sefrioui, 2017: 16-17), who argue that coastal states have the right, in the event of baseline shifts inland due to sea level rise, to maintain the outer limits of their territorial seas and EEZs. Following this idea, other experts such as Prescott and Schofield emphasize that some states, like the UK and the Netherlands, consider nautical charts as the sole legal documents defining baselines, meaning that the nautical charts or geographic coordinates of straight baselines submitted to the Secretary-General should remain the legal reference documents regardless of changes in the coastline (Rieley & Lubinaite, 2014).

In addressing these issues, to prevent the degradation of coastal lands, especially Bengkalis Island as an outermost and foremost peatland island, several regulations serve as references for protecting Bengkalis Island as an outermost and foremost peatland island, including: first, the Ramsar Convention on Wetlands. This international treaty aims to conserve wetlands and their resources for future generations. This includes peatlands and other wetland ecosystems (IUCN, 2021). Second, the Convention on Biological Diversity (CBD), which recognizes the importance of peatlands for biodiversity conservation and includes them in its scope (Jaya et al., 2024: 5453). Third, the United Nations Framework Convention on Climate Change (UNFCCC), which encourages states to protect and restore peatlands as part of climate change mitigation strategies (Murdiyarso et al., 2019: 493). Fourth, the International Union for

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Conservation of Nature (IUCN) has issued resolutions and guidelines on the conservation, restoration, and management of peatlands (Warren et al., 2017: 7). Fifth, national laws and policies, where several countries have enacted specific policies to protect peatlands (Fiantis et al., 2023: 1).

Indonesia, as a country with vast peatland areas, has a responsibility to manage these resources sustainably. International law, including treaties regulating climate change, provides an important framework for Indonesia in formulating effective and sustainable peatland management policies (Murdiyarso, 2019). One important aspect of international law is the recognition of the role of peat ecosystems in carbon storage (UNEP, 2022: 115). It is widely known that peatlands have a significant capacity to store carbon, which, if not managed properly, can be released into the atmosphere, contributing to global climate change (UNEP, 2022: 115). Therefore, Indonesia's peatland management policies must be integrated with international commitments to reduce carbon emissions, as stipulated in the Paris Agreement (UNEP, 2022: 115).

Peatland management in Indonesia is regulated by various laws and regulations, as well as public policies issued by several decision-making bodies. These policies aim to balance Indonesia's interests and needs regarding peatlands. This is part of efforts to harmonize and adjust policy frameworks to meet long-term climate targets that are still ongoing (UNEP, 2022: 115). One example of such a policy is Presidential Instruction (Inpres No. 10/2011) issued on May 20, 2011, which regulates the "Moratorium on New Licenses and Improved Governance of Primary Forests and Peatlands." This policy emerged from cooperation between Indonesia and the Kingdom of Norway through a Letter of Intent. The instruction, known as the "Forest Moratorium," effectively imposed a two-year moratorium on new forest concession licenses in primary forests and peatlands (UNEP, 2022: 115).

The impact of the Forest Moratorium shows a significant decline in primary forest loss, from 856,000 hectares in 2012 to 667,000 hectares in 2015. After that, the rate of forest loss continued to decline from 2015 to 2018, with deforestation reported at 440,000 hectares in 2018, slightly below the 2017 figure of 480,000 hectares. In the 2018-2019 period, deforestation reached 462,500 hectares, which then dropped sharply to only 115,500 hectares in the 2019-2020 period, showing a 75.03% decrease (UNEP, 2022: 115).

With a continuous decline over two consecutive years, Indonesia appears to be on track to achieve the forestry sector targets outlined in its Nationally Determined Contributions under the Paris Climate Agreement. In its Long-Term Strategy, Indonesia aims to achieve net-zero emissions in the forestry and other land-use sectors, including peatlands, by 2030 (UNEP, 2022: 115).

Another form of policy in peatland conservation efforts is the issuance of Presidential Regulation (Perpres No. 1/2016). Following COP-21 in Paris in December 2015, the President of Indonesia issued Regulation (Perpres No. 1/2016) to restore 2.4 million hectares of degraded peatlands by establishing the Peatland Restoration Agency (BRG, until the end of 2020). This regulation is in line with stricter Government Regulations (PP No. 57/2016) on the Protection and Management of Peat Ecosystems issued in the same year (UNEP, 2022: 115).

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When the mandate of the Peatland Restoration Agency ended in 2020, some tasks remained incomplete. As a lesson, monitoring the success of peatland restoration involving baselines and consistent indicators started late and is still ongoing. The BRG's mandate was extended to restore 1.2 million hectares of degraded peatlands and rehabilitate more than 600,000 hectares of mangroves. After that, the BRG was renamed the Peatland and Mangrove Restoration Agency (BRGM) and officially established under Presidential Regulation (Perpres No. 120/2020) (UNEP, 2022: 115).

These targets and policies, along with enhanced monitoring systems for forests, peatlands, and fire risks, demonstrate Indonesia's commitment to expanding the protection and restoration of peatlands. Improved understanding of comprehensive peatland restoration, capacity building, and law enforcement will support the achievement of Indonesia's climate commitments in the future (UNEP, 2022: 115).

Considering the hydrological relationship of peatlands, the Indonesian government has legally designated Peat Hydrological Units (KHG) as peatland areas bounded by at least two water bodies, which will serve as the basis for peatland management under Regulation No. 57 of 2016. Indonesia stipulates that at least 30% of each KHG must be allocated for conservation. Under the latest regulation (Permen LHK No. 10/2019), if a KHG has more than 30% conservation area and at least one peat dome peak, existing plantations are only permitted to operate until the end of their concession period (UNEP, 2022: 115).

Under Article 192 of UNCLOS 1982, states have an obligation to protect and preserve the marine environment. Peatland damage that exacerbates coastal abrasion can be seen as a failure by Indonesia to fulfill this obligation (UNCLOS, 1982: Article 192). Additionally, the Ramsar Convention on Wetlands (1971) emphasizes the importance of protecting peat ecosystems as part of wetlands with high ecological value. Indonesia, as a party to the Ramsar Convention, has an obligation to protect and manage peat ecosystems sustainably (UNCLOS, 1982: Article 192).

Failure to protect peatlands could result in international sanctions and damage to Indonesia's reputation in global environmental forums. For example, if Indonesia fails to protect the peat ecosystems on Bengkalis Island, this could be seen as a violation of international obligations under the Ramsar Convention and UNCLOS 1982 (UNCLOS, 1982: Article 192). Therefore, peatland abrasion also affects international law related to ocean and environmental management. For instance, the International Law of the Sea (UNCLOS 1982) allows states to control and manage their maritime zones, including the coastal areas of states (UNCLOS, 1982: Article 192).

The Indonesian Government's Efforts in Addressing Abrasion Issues on Bengkalis Island

Bengkalis Island, located in Riau Province, is one of Indonesia's outermost and foremost islands with strategic importance both in terms of defense and ecosystem. As an island directly bordering the Strait of Malacca, Bengkalis Island is vulnerable to abrasion caused by ocean waves and human activities. Abrasion not only threatens the sustainability of the island's peat ecosystem but also impacts the lives of local communities and Indonesia's national interests.

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In the context of international maritime law, Bengkalis Island plays a crucial role in determining Indonesia's baselines and exclusive economic zone (EEZ). Therefore, efforts to address abrasion on Bengkalis Island are not only a national responsibility but also part of Indonesia's obligations as a party to the United Nations Convention on the Law of the Sea (UNCLOS) 1982.

UNCLOS 1982 provides an international legal framework that regulates the rights and obligations of states in managing marine and coastal areas. As a party to the convention, Indonesia is obligated to protect and preserve the marine environment (Article 192) and to prevent, reduce, and control marine pollution (Article 194). The principles of sustainable development and the precautionary principle under UNCLOS are also relevant to efforts to address abrasion on Bengkalis Island. These principles emphasize that the utilization of natural resources must consider the regenerative capacity of ecosystems and the needs of future generations.

The Indonesian government's efforts, such as peatland rehabilitation and mangrove planting, align with these principles. However, their effectiveness still needs improvement, particularly in terms of monitoring and evaluation to ensure that these efforts are truly sustainable. At the national level, Indonesia has incorporated the principles of UNCLOS into its domestic laws, such as Law No. 27 of 2007 on the Management of Coastal Areas and Small Islands. This law emphasizes the importance of sustainable coastal management, community participation, and ecosystem conservation. Article 3 of the law stipulates that the management of coastal areas and small islands must be based on sustainability, taking into account principles such as the utilization of natural resources not exceeding their regenerative capacity and ensuring that such utilization does not compromise the needs of future generations.

Under the framework of Law No. 23 of 2014, local governments are granted the authority to manage small islands within their jurisdictions. However, in practice, the management of these islands often faces challenges, particularly on Bengkalis Island as one of Indonesia's outermost and foremost islands. The central government, responsible for the outermost and foremost islands from the coastline to the sea, tends to provide minimal attention to issues such as abrasion threatening Bengkalis Island. As a result, local governments face difficulties in securing the necessary funding for effective management (Interview with Dr. Eng. Sigit Sutikno, Head of the Center for Peatland and Disaster Studies, July 12, 2024).

Consequently, despite the delegation of authority, managing Bengkalis Island remains a significant challenge, requiring greater attention and support from the central government, as well as more effective solutions in terms of funding and abrasion mitigation. To date, the Indonesian government has undertaken several efforts to address abrasion by implementing various strategic measures to tackle peat abrasion issues on outermost and foremost islands like Bengkalis Island. One of the main initiatives is the rehabilitation and restoration of damaged peatlands through the Peatland and Mangrove Restoration Agency (BRGM) (Interview with Rahmah Wati Putri, St., M.Si, Head of Infrastructure and Regional Affairs, July 13, 2022).

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This program includes the replanting of native vegetation and rewetting of peatlands to prevent fires and further degradation. Additionally, the government has constructed seawalls and protective structures along the coast to reduce the impact of abrasion, aiming to shield coastal areas from worsening marine erosion. Monitoring and law enforcement against illegal activities that damage peat ecosystems, such as illegal logging and unauthorized land clearing, have also been intensified. These efforts are accompanied by increased education and awareness among local communities about the importance of peatland conservation through training and the promotion of sustainable agricultural practices.

To support peat restoration, the Indonesian government has also collaborated with various international institutions and other countries in research, funding, and technology transfer. The development of sustainable community-based economies, such as ecotourism and forest-based products that do not harm peat ecosystems, is also encouraged. The government has implemented a continuous monitoring and evaluation system to ensure the effectiveness of restoration and conservation efforts, using data from monitoring to refine and improve peat management strategies.

These efforts are based on various legal sources, including Government Regulation (PP) No. 57 of 2016 on Amendments to Government Regulation No. 71 of 2014 on the Protection and Management of Peat Ecosystems, as well as Ministerial Regulation No. P.16/MENLHK/SETJEN/KUM.1/2/2017 on Technical Guidelines for Peat Ecosystem Restoration. Simultaneously, to avoid more severe abrasion threats, considering the topography and geography of Bengkalis Island, the local government has taken steps to address and anticipate abrasion by constructing breakwaters, although this construction is carried out gradually due to the high cost of Rp 27,000,000 per meter (Interview with Rahmah Wati Putri, St., M.Si, Head of Infrastructure and Regional Affairs, July 13, 2022).

This construction is carried out under the direction of the central government through the Ministry of Public Works and Housing via the Sumatera River Basin Office located in Pekanbaru. Each year, the office constructs breakwaters, and in 2022, Bengkalis received funding allocations for five villages, including areas around Pantai Raja Kecik and Bantan Air. The central government's focus on breakwater construction is due to Bengkalis' geographical location directly facing the Strait of Malacca, making sustainable management crucial to avoid significant impacts on Bengkalis Island's landmass. Due to the high construction costs, the Bengkalis regional budget cannot cover all expenses at once, so construction is carried out in stages.

The construction of detached breakwaters has had varying impacts on shoreline changes in different villages. In Teluk Pambang, Pambang Baru, and Pambang Pesisir villages, accretion occurred with an average shoreline advance of 32.79 meters and a rate of change of 15.66 meters per year during the 2016-2018 period. This indicates that the breakwater structures successfully retained sedimentation and expanded the land area in these regions. Meanwhile, in Pambang Baru village, during the 2020-2022 period, significant accretion occurred with an average shoreline advance of 86.03 meters and a rate of change of 31.60

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meters per year, making it the location with the largest shoreline advance (Kurniawan, E., Sutikno, S., & Yusa, M., 2023).

However, not all locations experienced accretion. In Bantan Timur village, significant erosion (shoreline retreat) occurred with an average retreat of 42.20 meters and a rate of change of 15.50 meters per year during the 2020-2022 period. This shows that despite the construction of breakwaters, this area remains vulnerable to abrasion. In Muntai village, there were variations in shoreline changes, with an average shoreline advance of 25.98 meters during the 2018-2020 period, but also erosion with an average retreat of 20.93 meters (Kurniawan, E., Sutikno, S., & Yusa, M., 2023).

In Bantan Air village, the results were quite encouraging, with significant accretion during the 2020-2022 period, with an average shoreline advance of 85.32 meters and a rate of change of 31.33 meters per year. However, there was also erosion with an average retreat of 13.62 meters. Meanwhile, in Teluk Papal village, accretion occurred with an average shoreline advance of 32.02 meters during the 2016-2018 period, although there was also erosion with an average retreat of 20.96 meters. Overall, the construction of detached breakwaters on the northern coast of Bengkalis Island has had a positive impact in protecting the shoreline from abrasion and increasing land area through accretion. However, the effectiveness of breakwater structures varies by location, depending on local geographical and environmental conditions (Kurniawan, E., Sutikno, S., & Yusa, M., 2023).

In addition to breakwaters, the government has also encouraged community awareness to plant mangroves as an additional solution. The Environmental Agency has conducted socialization, although there is no certainty regarding its implementation alongside law enforcement to prevent misuse in mangrove management (Interview with Rahmah Wati Putri, St., M.Si, Head of Infrastructure and Regional Affairs, July 13, 2022). On Bengkalis Island, local communities have independently planted mangroves to prevent abrasion, although the results have not been optimal due to many plants not surviving. To address this issue, the local government continues to coordinate with the central government and proposes the necessary budget allocations.

BRGM implements the 3R program (Rewetting, Revegetation, and Revitalization) to restore peat and mangrove ecosystems, which also serve as protection against abrasion. However, various challenges remain, including a lack of mentoring in mangrove planting programs and the ongoing social and economic impacts of abrasion. The success of this program heavily depends on the participation of local communities and sustained support from the government. Although steps have been taken, the effectiveness of these efforts still needs to be improved to achieve the desired results in addressing abrasion issues on Indonesia's outermost and foremost islands.

In line with this, Bengkalis Regency has implemented several regional regulations aimed at addressing abrasion and maintaining the balance of peat ecosystems in its coastal areas. Bengkalis Regency Regulation No. 5 of 2018 on the Protection and Management of the Regional Environment serves as the legal foundation for protecting and managing the environmental ecosystem in Bengkalis Regency. This regulation outlines several key points.

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Its primary objective is to protect and manage the environment in Bengkalis Regency. The approach involves regulating and monitoring activities that have the potential to disrupt environmental balance. This protection encompasses aspects of natural resources, business oversight, and waste management.

The regulation also provides clear definitions of important terms such as the environment, natural resources, and environmental management. The environment is defined as a natural system consisting of physical, biological, and social components that interact with each other. Natural resources are defined as natural elements that can be utilized by humans. Environmental management refers to efforts to regulate and monitor activities that have the potential to disrupt natural balance. Obligations are also outlined in this regulation. The Bengkalis Regency government is responsible for regulating and monitoring activities that have the potential to damage the environment. Business operators must ensure that their activities do not harm the environment by complying with environmental permit procedures. Meanwhile, the community also plays an active role in environmental protection by adhering to established regulations.

Sanctions are imposed as a means of enforcing the rules. Violators may be subject to fines or legal action in accordance with the stipulated provisions. This aims to deter violations and ensure compliance with the regulations. The regulation concludes with explanations and additional provisions aimed at strengthening environmental protection and management in Bengkalis Regency. It is hoped that this regulation will prevent environmental damage and improve the overall quality of life for the community in the region.

These initiatives reflect Bengkalis Regency's commitment to addressing abrasion challenges and maintaining the sustainability of peat ecosystems in its coastal areas, in line with national and international legal frameworks. In addition, the Bengkalis Regency government has enacted Bengkalis Regency Regulation No. 1 of 2022 on the Regional Spatial Plan for Bengkalis Regency 2022-2024. The regional spatial planning aims to establish Bengkalis as one of the national economic growth areas based on the agricultural, fisheries, tourism, industry, and oil and gas sectors, with an environmentally conscious approach.

This regulation also includes a systematic plan for coastal sustainability through mangrove conservation, peat ecosystem protection and management, and the rehabilitation of protected forests. All of these are included in the Bengkalis Regency Spatial Plan. The definition of coastal and small island management is outlined in Article 1, Paragraph 1 of Law No. 1 of 2014 on Amendments to Law No. 27 of 2007 on the Management of Coastal Areas and Small Islands (hereinafter referred to as PWPPK) as the coordination of planning, utilization, monitoring, and control activities over coastal and small island resources carried out by the central and local governments, across sectors, between terrestrial and marine ecosystems, and between science and management in an integrated manner to improve community welfare.

Furthermore, Article 1, Paragraph 2 states that coastal areas are transitional zones between terrestrial and marine ecosystems, influenced by changes occurring both on land and at sea. According to Law No. 26 of 2007, spatial planning encompasses not only the planning

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of space utilization but also the utilization and control of space utilization. In the context of disasters, spatial planning is expected to help mitigate the impacts of natural disasters, including abrasion. In other words, the planning, utilization, and control of regional and urban spatial planning should consider natural disaster factors, especially in cities and areas located in disaster-prone regions, to mitigate negative environmental impacts.

One of the policies in the Bengkalis Regency Spatial Plan is the development of environmentally, culturally, and disaster-conscious regions. The primary goal of national development is to achieve equitable community welfare. This is reflected in every policy implementation by the government, which always prioritizes community welfare. The assessment of coastal damage is part of the planning for coastal protection and security to safeguard communities living along the coast from threats such as waves, tidal flooding (rob), erosion, abrasion, and to protect public facilities.

The Indonesian government's efforts in addressing abrasion issues on Bengkalis Island demonstrate a strong application of preventive principles. The government has taken various preventive measures, such as constructing coastal protection infrastructure, restoring peat ecosystems, and implementing coastal management policies aimed at preventing further damage to the coastal environment and ensuring the island's sustainability. Although challenges remain, this approach highlights the importance of taking action before the impacts of damage become more severe, in line with the precautionary principle.

4. CONCLUSION

The legal implications of peat abrasion on Bengkalis Island are significant, particularly concerning the determination of archipelagic baselines and Indonesia's maritime boundaries under UNCLOS 1982. The abrasion threatens Bengkalis Island's status as an outermost and foremost island, which could result in Indonesia losing its rights to natural resources in the surrounding waters. Furthermore, the failure to protect peat ecosystems in coastal areas may be considered a violation of Indonesia's international obligations to preserve the marine environment and wetlands, as stipulated in UNCLOS 1982 and the Ramsar Convention. In response, the Indonesian government has taken various legal and technical measures to address the issue. Legally, the government has issued regulations such as Government Regulation No. 57 of 2016 on the Protection and Management of Peat Ecosystems. Technically, efforts include the construction of breakwaters, mangrove reforestation, and the implementation of the 3R program (Rewetting, Revegetation, and Revitalization) through the Peatland and Mangrove Restoration Agency (BRGM). These efforts have shown positive results in reducing the rate of abrasion and protecting the coastline of Bengkalis Island.

5. REFERENCES

Anwar,Khaidir, 2014, '*Hukum Laut Internasional*', Justice Publisher Badan Penerbitan Fakultas Hukum Universitas Lampung . ISBN : 978-602-1071-29-8.

Badan Pembinaan Hukum Nasional. 2008. *Laporan Tim Naskah Akademik Tentang Zona Tambahan Indonesia*. Kementrian Hukum dan HAM Republik Indonesia: Jakarta.

Multidisciplinary Indonesian Center Journal (MICJO)
Journal page is available to
https://e-jurnal.jurnalcenter.com/index.php/micjo
Email: admin@jurnalcenter.com

Badan Pembinaan Hukum Nasional.2008. *Pokok-Pokok Haluan Negara Bidang kelautan Negara Republik Indonesia Tahun*.2008. Kementrian Hukum dan HAM Republik Indonesia. : Jakarta.

Badan Perencanaan Pembangunan Daerah Kabupaten Bengkalis. 2022. *Profil Pembangunan Kabupaten Bengkalis Tahun 2022* : Bengkalis.

Birnie, Patricia. Alan B., dan Catherine R. 2009. *International Law And The Environment*. New York: Oxford University Press. ISBN 978–0–19–876422–9.

Cribb, Robbert & Michele Ford. 2009. *Indonesia Beyond The Water's Edge: Managing An Archipelagic State.* Singapore, ISEAS Publishing. ISBN 978-981-230-981-5

Darwis, Muhammad. 2015. *Hukum Laut Dalam Konsepsi Hukum Indonesia. Pekanbaru*. SUSKA Press. ISBN 978-602-283-073-3

Deputi Pemantapan Nilai-Nilai Kebangsaan. 2020. *Modul Pemantapan Nilai-Nilai Kebangsaan LEMHANNAS RI: Implementasi Nilai-Nilai Kebangsaan Yang Bersumber Dari Wawasan Nusantara*. Lembaga Ketahanan Nasional Republik Indonesia: Jakarta.

Deputi Sumber Daya Maritim. 2021. *Menata Ruang Laut Indonesia*, Kementerian Koordinator Bidang Kemaritiman Dan Investasi Republik Indonesia: Jakarta. 45 Hal. Isbn 978-602-73674-5-6.

Haljan, D. 2013. *Separating Powers: International Law before National Courts.* Belgium: T.M.C Asser Press. ISBN 978-90-6704-858-3Karwur, Denny. 2016. *Hukum Pesisir Di Indonesia (Pengelolaan Kawasan Perbatasan Dan Wilayah Pesisir Dan Pulau-Pulau Kecil).* Manado: Sam Ratulangi University.

Koesrianti. 2021. *Kedaulatan negara menurut Hukum Internasional*, Surabaya: Airlangga University Press. ISBN:9786024737849.

Muhaimin. 2020. *Metode Penelitian Hukum*. Mataram: Mataram University Press. ISBN: 978-623-7608-48-6.

Narwati, E., & Camelia, A. I. 2020. *Kedaulatan Negara Atas Wilayah Laut. dalam : Dinamika Hukum Agraria Indonesia* : *Dalam Rangka Memperingati 70 Tahun Guru Kami, Prof. Dr.Sri Hajati, S.H.,M.S.* Kencana, Jakarta. ISBN 978.623.218.713.9

Oppenheim, L. 1905. *International Law, Vol. 1 A Treatise*. London: Longmans Green and CO. Doi:10.1093/Law/9780582302457.001.0001

Palupi, Dwi, A. 2022. *Buku Ajar Hukum Laut Internasional*. Padang. Badan Penerbit Universitas Bung Hatta. ISBN 978-623-5797-06-9.

Purwanti, A. 2020. *Metode Penelitian Hukum Teori Dan Praktek.* Surabaya. Cv. Jakad Media Publishing.

Satuan Kerja Dinas Lingkungan Dan Kehutanan Provinsi Riau. 2019. *Laporan Kinerja Tugas Pembantuan Restorasi Gambut Provinsi Riau Tahun 2018*, Kementrian Lingkungan Hidup Dan Kehutanan Republik Indonesia: Pekanbaru.

Soehino. 1986. *Ilmu Negara*, Yogyakarta. Liberty Yogyakarta.

Soekanto, Soerjono dan Sri Mamudji, 2018, *Penelitian Hukum Normatif suatu Tinjauan Singkat,* Jakarta : Rajawali Press.

United Nations Environment Programme. *Global Peatlands Assessment: The State of the World's Peatlands*. Nairobi: United Nations Environment Programme, 2022. ISBN: 978-92-807-3991-6.

Wattimena, J. A. Y. 2022. *Hukum Internasional Mengenai Pengaturan Pulau Terluar Di Indonesia*, Bandung : Penerbit Widina Media Utama. Isbn: 978-623-459-048-7

Multidisciplinary Indonesian Center Journal (MICJO)
Journal page is available to
https://e-jurnal.jurnalcenter.com/index.php/micjo
Email: admin@jurnalcenter.com

Ariadno, M. K. 2008. Kedudukan Hukum Internasional Dalam Sistem Hukum Nasional. *Indonesian Journal Of International Law,* Mada Vol.1 Nomor 3 September - December.

Arif. 2018. "The Management of Indonesia's Outermost and foremost Small Islands as A National Strategic Region Based On Eco Marine Tourism". *Talenta Conference Series: Agricultural & Natural Resources (Anr)Volume 1 Issue 2.* Universitas Sumatera Utara

Badwi, N., Baharuddin, I. I., & Abbas, I. (2019, April). Abrasion hazard mitigation efforts on the coast of maros regency of South Sulawesi, Indonesia. In 1st International Conference on Advanced Multidisciplinary Research (ICAMR 2018) Atlantis Press.

Ciptadi, A. W. 2016. "Sailing The Calm And Rough Seas: The Influence Of Wealth And Sovereignty In Southeast Asian Maritime Disputes". *Thesis*. Master Of Arts In Security Studies (Far East, Southeast Asia, The Pacific). Naval Postgraduate School, Monterey California.

Dai dkk, 2020. Recognition of peat depositional environments in coal: A review. *International Journal of Coal Geology* of *Elsevier B.V,* vol.219. DOI : 10.1016/j.coal.2019.103383

Darusman,Y.M. 2018. The Influence Of The 1982 International Convention On The Law Of The Sea Against The Indonesian Ocean Territory. *Jurnal Cita Hukum (Indonesian Law Journal).* Vol. 6 Nomor 2. Pp.343-360, DOI: 10.15408/Jch.V6i2.8687 343

Fiantis, D. (2023). Mapping peat thickness and carbon stock of a degraded peatland in west sumatra, indonesia. Soil Use and Management, 40(1). https://doi.org/10.1111/sum.12954

Firdaus. 2014. "Kedudukan Hukum Internasional Dalam Sistem Peran Nasional Indonesia". *Fiat Justicia Jurnal Ilmu Hukum* Vol.8 Nomor 1, Januari-Maret.

Gaveau, D., Descals, A., Salim, M., Sheil, D., & Sloan, S. (2021). Refined burned-area mapping protocol using sentinel-2 data increases estimate of 2019 indonesian burning. Earth System Science Data, 13(11), 5353-5368. https://doi.org/10.5194/essd-13-5353-2021

Jackson, J. H. 1992. Status Of Treaties In Domestic Legal Systems: A Policy Analysis. *American Journal Of International Law*, *86*(2), 310-340.

Jaya, A. (2024). Agroforestry as an approach to rehabilitating degraded tropical peatland in indonesia. Journal of Degraded and Mining Lands Management, 11(2), 5453-5474. https://doi.org/10.15243/jdmlm.2024.112.5453

Johan, Eva. 2009. 'Pengukuran Lebar Laut Teritorial Menggunakan Garis Pangkal Menurut UNCLOS 1982 Dan Penerapannya Dalam Hukum Indonesia', *Jurnal Dinamika Hukum* Vol. 9 Nomor 1 Januari,.

Juniyanti dkk. 2020. 'Perubahan penggunaan dan tutupan lahan, serta faktor penyebabnya di Pulau Bengkalis, Provinsi Riau (periode 1990-2019)', *Journal of Natural Resources and Environmental Management* 10(3): 419-435. DOI : 10.29244/jpsl.10.3.419-435.

Kammerhofer, J. (2009). Kelsen – which kelsen? a reapplication of the pure theory to international law. *Leiden Journal of International Law*, 22(2), 225-249. https://doi.org/10.1017/s0922156509005809

Multidisciplinary Indonesian Center Journal (MICJO)
Journal page is available to
https://e-jurnal.jurnalcenter.com/index.php/micjo
Email: admin@jurnalcenter.com

Karlina, W. R., & Viana, A. S. 2020. Pengaruh naiknya permukaan air laut terhadap perubahan garis pangkal pantai akibat perubahan iklim. *Jurnal Komunikasi Hukum (Jkh)*, *6*(2), 757-586.

Leatemia, J. (2011). Pengaturan Hukum Daerah Kepulauan. *Mimbar Hukum-Fakultas Hukum Universitas Gadjah Mada*, *23*(3).

Lestari, Maria,M. 2018. Arti Penting Delimitasi Perairan Pedalaman Setiap Pulau Di Indonesia. *Legality*, Vol.25,Nomor1, Maret 2017-Agustus 2017, hlm. 69-77. ISSN: 2549-4600, Mahatma, R. dkk, 2021. Burrowing Fauna Of Bengkalis Intertidal Flats Impacted By Peatland Erosion With Particular Reference To Crabs And Mudskippers. *Jurnal Enggano Vol. 6, Nomor 2 : 212-222*

Lestari, Maria. M , & Melda, K. 2019. The Importance of Internal Waters Delimitation to Secure State Sovereignty: A Case of Archipelagic State of Indonesia?. *Pertanika J. Soc. Sains. & Hum. 27 (3): 2055 - 2065*. e-ISSN 2231-8534.

Moorhead, M. 2018. Legal implications of rising sea levels. *Commonwealth Law Bulletin*, *44*(4). London

Muhardi, M., Marto, A., Fauzi, M., Sujatmoko, B., Habibillah, M., & Syarwan, M. (2021). Identification of Coastal Damage Along the Coast of Riau. Lowland Technology International, 23(3).

Murdiyarso, D., Lilleskov, E., & Kolka, R. (2019). Tropical peatlands under siege: the need for evidence-based policies and strategies. Mitigation and Adaptation Strategies for Global Change, 24(4), 493-505. https://doi.org/10.1007/s11027-019-9844-1

Nabilla, M, L dkk, 2021. Analysis Of Coastline Changes On The Potential Of Mangrove Forests On Bengkalis Island, Riau Province. *Asian Journal of Aquatic Sciences, Vol 4, Issue (2):163-170.*

Paine, J. (2013). Kelsen, legal normativity, and formal justice in international relations. *Leiden Journal of International Law*, 26(4), 1037-1053. https://doi.org/10.1017/s092215651300054x

Pribadi, M, A. dkk. 2020. Metode Pengukuran Aliran Air Tanah Di Lahan Gambut. *Jurnal Teknik, Volume 14*,pp 163 - 169.

Redjo, S. I., dan As' ari, H. 2017. Pengelolaan Pemerintah dalam Pengaturan Pulau-Pulau Kecil Terluar Indonesia. *Jurnal Agregasi: Aksi Reformasi Government dalam Demokrasi*, Vol.5 No.2 ; e-ISSN : 2579-3047

Riyanto, S. 2021. 'Kedaulatan Negara Dalam Kerangka Hukum Internasional Kontemporer', *Yustisia*, Fakultas Hukum Universitas gajah Mada Vol.1 Nomor 3 September - 5 Desember

Sarah, S. dkk 2022. Government's Efforts To Minimize The Threat Of Coastline Changes On The North Coast Of Bengkalis Island. *jurnal PAMATOR,Vol.15*,Nomor1; DOI: 21107/pamator.v15i1.1426010.

Schofield, C. 2013. Holding Back the Waves?: Sea-level Rise and Maritime Claims. In O. C. Ruppel, C. Roschmann, & K. Ruppel-Schlichting (Eds.), *Climate Change: International Law and Global Governance: Volume I: Legal Responses and Global Responsibility* (1st ed., pp. 593–614).NomosVerlagsgesellschaftmbH. http://www.jstor.org/stable/j.ctv941w8s.23

Shalihah, F. 2016. Eksistensi Konsep Negara Kepulauan (The Archipelagis State) Dalam United Nation Convention On The Law Of The Sea (UNCLOS) 1982 Terhadap Kedaulatan Wilayah Perairan Perbatasan Indonesia. *Prosiding Seminar Bersama*.

Multidisciplinary Indonesian Center Journal (MICJO)
Journal page is available to
https://e-jurnal.jurnalcenter.com/index.php/micjo
Email: admin@jurnalcenter.com

Program Studi Ilmu Hukum Fakultas Ilmu Sosial Dan Ilmu Politik Universitas Maritim Raja Ali Haji Dengan Fakultas Hukum Universitas Islam Riau. Tanjung pinang. ISBN. 978-602-60097-1-5

Siburian, H. Y., Rifardi, R., & Tanjung, A. 2020. The Effect of Changes in The Shoreline of The Sea Law Implementation in West Rangsang Subdistrict, Kepulauan Meranti District. *Jurnal Perikanan dan Kelautan*, *25*(1), 53-63.

Sitabuana, T., Redi, A., & Felicia, S. (2020). The norm dispute resolution through mediation. *Advances in Social Science, Education and Humanities Research*. https://doi.org/10.2991/assehr.k.200515.093

Spijkers, O. 2018. Intergenerational Equity and the Sustainable Development Goals, Sustainability, 10, 3836. ; DOI : 10.3390/su10113836

Strauss, M. J. (2019). The Future of Baselines as the Sea Level Rises: Guidance from Climate Change Law. *The Journal of Territorial and Maritime Studies*, *6*(2), 27–43. https://www.jstor.org/stable/26912749

Sutikno, S. 2014. 'Analisis Laju Abrasi Pantai Pulau Bengkalis dengan Menggunakan Data Satelit', Conference: Pertemuan Ilmiah Tahunan (PIT) XXXI HATHI, Padang. DOI:10.13140/RG.2.1.2074.5766.

Sutikno, S. 2022. 'Hydrological Conditions And The Bog-Burst Occurance Along The Peat Coast Of Bengkalis Island On December 2022', *LOKAKARYA*, Bencana longsor pantai gambut Pulau Bengkalis, Jepang.

Sylvina Rusadi, 5, May, 2024, Implementing Good Environmental Governance to Manage Coastal Abrasion in Bengkalis Regency, *Indonesia International Journal of Sustainable Development and Planning* Vol. 19, No. pp. 1911-1919

Talumantak. 2018. Penegakan Hukum Terhadap Pulau-Pulau Terdepan Indonesia Untuk Keutuhan Wilayah Negara Kesatuan Republik Indonesia. *Lex Et Societatis Vol. VI/Nomor 10/Des/2018.*

Tampubolon, H. (2022, February). Shoreline change cause of abrasion in Bantan district Bengkalis Island as the outstanding beach area. In Proceedings of the Second International Conference of Construction, Infrastructure, and Materials: ICCIM 2021, 26 July 2021, Jakarta, Indonesia (pp. 35-48). Singapore: Springer Nature Singapore.

Venn, A. 2019, 'Managing global warming: An Interface of Technology and Human Issues', *Social justice and climate change*, University of Bristol Law School, Bristol, United Kingdom.

Xue, G. Julia. Dkk. 2013. Climate Change Challenges and the Law of the Sea Responses. In O. C. Ruppel, C. Roschmann, & K. Ruppel-Schlichting (Eds.), Climate Change: International Law and Global Governance: Volume I: Legal Responses and Global Responsibility (1st ed., pp. 549–592).NomosVerlagsgesellschaftmbH. http://www.jstor.org/stable/j.ctv941w8s.22

Yamamoto, K. dkk. 2019. Coastal peat failure in the tropical coastal peatlands in Riau, Indonesia. *Conference: EGU General Assembly* Vienna, Austria; DOI:10.13140/RG.2.2.29565.92648

Pemerintah Indonesia, 1945. *Dasar Negara Republik Indonesia Tahun 1945*. Jakarta.

Pemerintah Indonesia, 2008. *Peraturan Pemerintah Nomor 37 Tahun 2008 Tentang Perubahan Atas Peraturan Pemerintah Nomor 38 Tahun 2002 Tentang Daftar Koordinat Geografis Titik Titik Garis Pangkal Kepulauan Indonesia.* Jakarta

Multidisciplinary Indonesian Center Journal (MICJO)
Journal page is available to
https://e-jurnal.jurnalcenter.com/index.php/micjo
Email: admin@jurnalcenter.com

Pemerintah Indonesia, 2021. *Peraturan Pemerintah Republik Indonesia Nomor 21 Tahun 2021 Tentang Penyelenggaraan Penataan Ruang Tentang Perubahan Atas Peraturan Pemerintah Nomor 62 Tahun 2010 Tentang Pemanfaatan Pulau Pulau Kecil Terluar.* Jakarta.

Pemerintah Indonesia. 2014. *Republik Indonesia No 1 Tahun 2014 Tentang Perubahan Atas Nomor 27 Tahun 2007 Tentang Pengelolaan Wilayah Pesisir Dan Pulau-Pulau Kecil*. Jakarta

Pemerintah Indonesia. 2016. *Nomor 57 Tahun 2016 tentang Perubahan atas Peraturan Pemerintah Nomor 71 Tahun 2014 tentang Perlindungan dan Pengelolaan Ekosistem Gambut*. Jakarta

Peraturan Mentri. 2017. *Keputusan Mentri 129 tahun 2017 tentang penetapan Peta Kesatuan Hidrologis Gambut Nasional.* Jakarta.

President, 2005. *Peraturan presiden 78 Tahun 2005 Tentang Pengelolaan PPKT.* Jakarta.

President. 2017. *Keputusan Presiden Republik Indonesia Nomor 6 Tahun 2017 Tentang Penetapan Pulau-Pulau Kecil Terluar.* Jakarta.

United Nations, 1982. *United Nations Convention On The Law Of The Sea 1982.* Momtego bay, Jamaika.

United Nations. 1971. *The Ramsar Convention – Convention On Wetlands 1971*. Ramsar, Iran

https://kbbi.kemdikbud.go.id/. diakses Tanggal 25 Oktober 2022

https://www.jstor.org/JSTOR Home. Diakses tanggal 27 maret 2023

https://indonesia.go.id/kategori/keanekaragaman-hayati/3323/presiden-jokowi-mencemplung-laut-demi-mangrove?lang=1

Sejarah| Dinas Komunikasi Informatika dan Statistik Kabupaten Bengkalis (bengkaliskab.go.id).https://diskominfotik.bengkaliskab.go.id/web/statis/sejarah/3 ,diakses tanggal 25 oktober 2022

www.ppk-kp3k.kkp.go.id/direktori-pulau/index.php/public_c/pulau_info/291, diakses 25 oktober 2022