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COMMITMENT TO THE 2015 PARIS AGREEMENT ON COASTAL AREA PROTECTION IN LIMITING GLOBAL WARMING

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ABSTRACT This study aims to analyze the commitment to the 2015 Paris Agreement in efforts to protect coastal areas in order to limit global temperature rise. The research focuses on how international climate policies are translated into concrete actions at the national level, particularly in maintaining the sustainability of coastal ecosystems that are highly vulnerable to the impacts of climate change. The research employs a qualitative method with a normative juridical approach and literature study, by analyzing international documents, legal frameworks, and relevant scientific sources. The results show that the commitment to the Paris Agreement has encouraged various countries to develop mitigation and adaptation policies related to climate change, including coastal protection. These implementations are reflected in mangrove rehabilitation programs, ecosystem based coastal management, and the strengthening of environmental regulations. However, the implementation still faces several challenges, such as limited funding, weak inter-institutional coordination, and low public awareness regarding the importance of coastal environmental protection. In conclusion, the commitment to the 2015 Paris Agreement plays a crucial role in limiting global temperature rise through the protection of coastal areas. Strong collaboration between governments, communities, and the private sector is needed to enhance the effectiveness of policy implementation, ensuring that climate control objectives and environmental sustainability can be optimally achieved.

KEYWORDS: *Paris Agreement 2015, climate change, coastal protection, mitigation and adaptation*

1. INTRODUCTION

The 2015 Paris Agreement represents a significant milestone in global climate governance, aiming to limit the increase in global temperature to well below 2°C while pursuing efforts to restrict it to 1.5°C above pre-industrial levels. This international commitment reflects a collective effort by states to address climate change through both mitigation and adaptation strategies. However, the success of these commitments depends not only on global agreements but also on their implementation at national and local levels. In this context, translating international obligations into effective domestic legal frameworks becomes a crucial aspect of ensuring the achievement of global climate targets (UNFCCC, 2015).

Coastal regions worldwide hold strategic importance in the implementation of the Paris Agreement, as they are among the most vulnerable areas to climate change impacts. Rising sea levels, coastal erosion, biodiversity loss, and the degradation of vital ecosystems pose serious threats to environmental sustainability and human livelihoods. Among these ecosystems, mangroves play a particularly important role as natural carbon sinks and coastal protection systems. Their ability to absorb carbon dioxide and reduce the impact of coastal hazards highlights their significance in both climate mitigation and adaptation efforts. Therefore, the protection and sustainable management of coastal ecosystems have become essential components of global climate strategies (IPCC, 2021).

In response to these challenges, countries have developed various policy instruments to fulfill their commitments under the Paris Agreement. One of the key mechanisms is the formulation of Nationally Determined Contributions (NDCs), which outline national targets for emission reduction and climate adaptation. In addition, instruments such as carbon pricing mechanisms and coastal ecosystem rehabilitation programs have been introduced to support environmental sustainability. These measures demonstrate the integration of climate commitments into national legal and policy frameworks, particularly in addressing the vulnerabilities of coastal areas (World Bank, 2019).

However, despite the existence of these frameworks and policy instruments, the implementation of climate commitments in coastal regions remains complex and often faces significant challenges. Limited financial resources, insufficient cross-sectoral coordination, weak institutional capacity, and low public awareness regarding climate change continue to hinder effective policy implementation. These challenges not only affect the achievement of emission reduction targets but also reduce the effectiveness of adaptation efforts aimed at protecting coastal ecosystems. As a result, there is a need for a more comprehensive understanding of how global commitments are translated into practical actions and how these actions contribute to coastal protection (UNEP, 2022).

Based on this background, this study aims to analyze the implementation of the Paris Agreement within national legal frameworks across different countries and to evaluate its effectiveness in protecting coastal areas as part of global efforts to limit temperature rise. By focusing on coastal protection, this research seeks to provide a deeper understanding of the relationship between global climate commitments and national policy implementation, as well as to identify key factors that influence their effectiveness in addressing climate change impacts (Hinkel et al., 2010).

2. METHOD

This study adopts a qualitative research design with a normative juridical approach to examine the implementation of the Paris Agreement in coastal area protection and its role in limiting global warming. This approach is appropriate as the research focuses on legal frameworks, policy analysis, and governance mechanisms at international, national, and local levels. The study primarily relies on secondary data, which include international legal instruments, national regulations, policy documents, institutional reports, and academic literature. Key sources consist of official publications from the Intergovernmental Panel on Climate Change, United Nations Framework Convention on Climate Change, United Nations Environment Programme, and the World Bank. These sources provide comprehensive insights into climate change trends, adaptation strategies, and policy implementation frameworks.

This research employs two main approaches: the statutory approach and the conceptual approach. The statutory approach analyzes relevant legal instruments related to climate change mitigation and coastal management, including international agreements and national policies.

Meanwhile, the conceptual approach explores theoretical frameworks such as climate governance, ecosystem-based adaptation, and sustainable coastal development, which are essential for understanding the broader context of coastal protection.

Through this methodological framework, the study seeks to provide a comprehensive and critical assessment of how international climate commitments are translated into concrete actions in coastal areas, as well as to propose policy recommendations for strengthening coastal resilience and climate governance.

3. RESULT AND DISCUSSION

a. Implementation of the Paris Agreement Commitment in Coastal Area Protection.

The results of this study demonstrate that the commitment to the 2015 Paris Agreement has played a pivotal role in reshaping global governance frameworks related to climate change mitigation and adaptation. This agreement establishes a legally and politically binding international

framework that encourages countries to collectively limit global temperature rise to well below 2°C above pre-industrial levels, while pursuing efforts to limit it to 1.5°C. This target is particularly relevant for coastal regions, which are highly sensitive to even small increases in global temperature due to their direct exposure to sea-level rise, coastal flooding, saltwater intrusion, and the increasing intensity of extreme weather events. As such, the Paris Agreement has significantly elevated the urgency of integrating coastal protection into broader climate policy agendas.

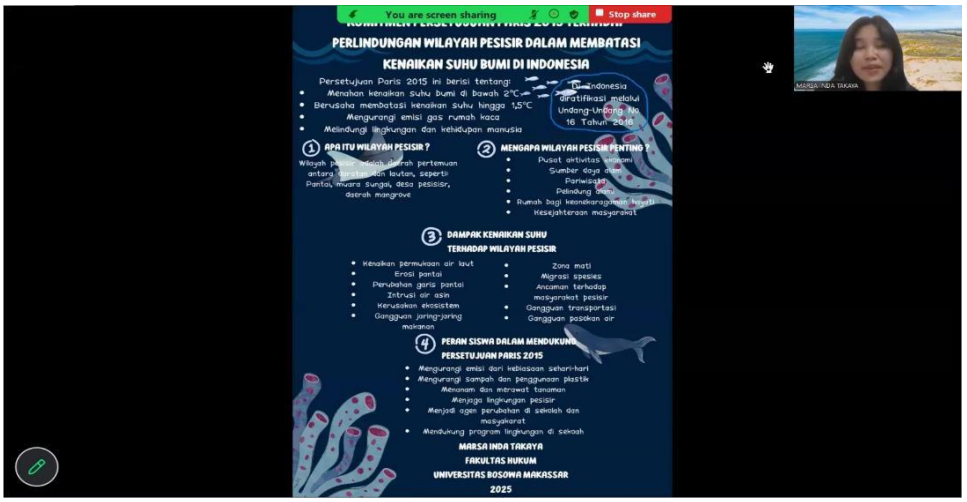


Figure 1.documentation of the 2015 Paris Agreement presentation PKM International VIII (2026)

The implementation of this commitment is reflected in the incorporation of climate change strategies into national development frameworks, particularly through *Nationally Determined Contributions* (NDCs). These nationally driven commitments serve as the primary mechanism through which countries outline their mitigation and adaptation actions, including those targeting coastal resilience. Coastal areas are widely recognized as critical zones requiring immediate intervention, given their ecological, economic, and social importance. According to the Intergovernmental Panel on Climate Change (IPCC), coastal systems are among the most vulnerable to climate-related hazards, necessitating integrated, adaptive, and science-based policy responses that combine environmental protection with socio-economic considerations (IPCC, 2019). Therefore, the Paris Agreement has indirectly strengthened coastal governance by encouraging countries to mainstream climate considerations into coastal planning and management.

In practice, one of the most prominent approaches adopted in coastal protection is the ecosystem-based approach, which emphasizes the conservation and restoration of natural ecosystems as a means to address climate change. This includes large-scale mangrove restoration, coral reef conservation, and seagrass ecosystem protection. These ecosystems are categorized as *blue carbon ecosystems* due to their exceptional capacity to absorb and store carbon dioxide from the atmosphere. Mangroves, in particular, are recognized for their high carbon sequestration potential, with studies indicating that they can store significantly more carbon per unit area than

many terrestrial forests. This makes them not only crucial for mitigation efforts but also highly valuable in achieving national emission reduction targets (UNEP, 2020). Furthermore, the protection of these ecosystems contributes to biodiversity conservation and supports the livelihoods of coastal communities.

Beyond mitigation, ecosystem-based approaches also serve as highly effective adaptation strategies. Mangrove forests, for instance, function as natural buffers that reduce wave energy, prevent coastal erosion, and minimize the impact of storm surges. Similarly, coral reefs act as offshore barriers that dissipate wave force, thereby protecting coastal infrastructure and human settlements. Empirical research has demonstrated that *nature-based solutions* can significantly enhance coastal resilience while offering cost-effective alternatives to engineered infrastructure such as seawalls and breakwaters (Narayan et al., 2016). In addition, these approaches generate co-benefits, including fisheries support, tourism opportunities, and improved ecosystem services, which are essential for sustainable coastal development.

However, despite these advancements, the implementation of the Paris Agreement commitments in coastal protection remains uneven across different regions. One of the major challenges is the disparity between developed and developing countries in terms of financial capacity, technological access, and institutional readiness. Developing countries, which often have extensive coastlines and high vulnerability, face significant barriers in mobilizing the necessary resources to implement large-scale adaptation and mitigation measures. According to the World Bank (2021), the financial requirements for coastal adaptation far exceed the current levels of international climate finance, highlighting a substantial funding gap that limits the effectiveness of policy implementation.

In addition to financial constraints, institutional and governance challenges also hinder effective implementation. Coastal management is inherently complex and involves multiple sectors, including fisheries, tourism, urban development, and environmental protection. In many cases, these sectors operate independently, resulting in fragmented and sometimes conflicting policies. The lack of coordination and integration across sectors reduces policy coherence and undermines the overall effectiveness of coastal protection efforts. This issue is particularly pronounced in countries where governance structures are decentralized or where institutional capacity is limited.

Furthermore, the role of local communities is increasingly recognized as a critical factor in the success of coastal protection initiatives. Community-based approaches ensure that local knowledge, needs, and priorities are incorporated into policy design and implementation. Studies have shown that inclusive governance and active stakeholder participation significantly improve the sustainability and effectiveness of environmental policies (Bennett et al., 2019). Without meaningful community engagement, ecosystem restoration projects are more likely to fail due to lack of

ownership, maintenance, and long-term commitment.

It has successfully increased global awareness and encouraged policy innovation in coastal management. Nevertheless, its overall effectiveness remains contingent upon the ability of individual countries to translate commitments into concrete actions. Addressing financial gaps, strengthening institutional coordination, and enhancing community participation are essential steps toward improving the implementation of coastal protection strategies. Therefore, a more integrated, inclusive, and evidence-based approach is required to ensure the long-term resilience and sustainability of coastal areas in the face of ongoing climate change.

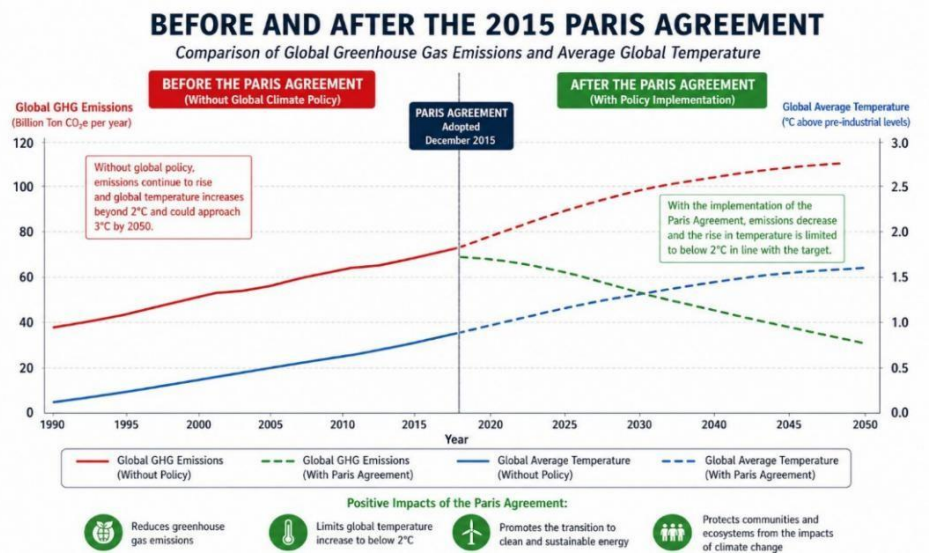
b. Comparison of Coastal Area Conditions Before and After the 2015 Paris Agreement

Prior to the adoption of the Paris Agreement in 2015, coastal area management was generally characterized by fragmented and sectoral approaches. Policies were primarily focused on economic utilization rather than environmental sustainability, resulting in increasing degradation of coastal ecosystems such as mangrove deforestation, coral reef damage, and coastal erosion. In addition, the absence of a unified global framework limited coordinated international efforts to address climate-related coastal risks (Nicholls & Cazenave, 2010).

Furthermore, before 2015, coastal areas were not fully recognized as strategic components in climate mitigation and adaptation policies. The role of coastal ecosystems as carbon sinks and natural protective barriers was often underestimated, leading to insufficient integration of coastal protection into national climate strategies. As a result, vulnerability to sea-level rise and extreme weather events continued to increase, particularly in developing countries with limited adaptive capacity (Hinkel et al., 2014).

Following the adoption of the Paris Agreement, a significant shift in global policy orientation can be observed. Coastal protection has increasingly been incorporated into national climate frameworks, particularly through adaptation planning and resilience-building strategies. Countries have begun to emphasize ecosystem-based management, recognizing the importance of natural systems in reducing climate risks and supporting sustainable development.

To illustrate this shift, the comparison between pre- and post-2015 conditions is presented in the following figure.



Source: Processed from Intergovernmental Panel on Climate Change (2021–2023).

Figure 2. Comparison of greenhouse gas emissions and global temperatures before and after the 2015 Paris Agreement

As shown in Figure 2, coastal protection efforts before 2015 exhibited relatively slow progress, reflecting limited policy integration and low prioritization. In contrast, the period after 2015 demonstrates a more noticeable increase in coastal management initiatives, including ecosystem restoration and climate adaptation programs. This trend indicates a growing global commitment to strengthening coastal resilience. However, despite these improvements, coastal areas continue to face significant pressures. Sea-level rise, climate variability, and ongoing human activities such as coastal urbanization and resource exploitation remain major challenges. This suggests that while the Paris Agreement has enhanced policy attention, its implementation outcomes are still evolving and require further strengthening (Hoegh-Guldberg et al., 2018).

In conclusion, the Paris Agreement has contributed to a positive shift in coastal protection policies by promoting more integrated and adaptive approaches. Nevertheless, achieving substantial environmental outcomes will depend on consistent implementation, stronger institutional capacity, and sustained global cooperation.

c. Challenges in Implementing Global Commitments

The implementation of global commitments under the Paris Agreement faces complex and multidimensional challenges at both international and national levels. Although the agreement provides a comprehensive framework for climate mitigation and adaptation, translating these commitments into concrete actions remains a significant issue. A major challenge lies in the gap between ambitious global targets and the actual implementation capacity of individual countries. This gap is particularly evident in developing countries, which often experience structural limitations in financial resources, technological access, and institutional readiness.

One of the most critical barriers is the limitation of financial resources to support climate-related programs, especially in coastal areas. Coastal protection requires substantial investment in ecosystem restoration, climate-resilient infrastructure, and long-term adaptation planning. However, the availability of international climate finance remains insufficient compared to the growing needs. In many cases, accessing funds from global mechanisms is also constrained by administrative and technical requirements, further limiting their utilization (United Nations Framework Convention on Climate Change [UNFCCC], 2021)

In addition to financial constraints, institutional capacity and governance issues significantly affect policy implementation. Coastal management inherently involves multiple sectors, including fisheries, tourism, infrastructure, and environmental protection. However, these sectors often operate independently, resulting in fragmented policies and weak coordination. This lack of integration reduces policy coherence and limits the overall effectiveness of coastal protection strategies (Pelling et al., 2015). Strengthening institutional frameworks and improving inter-agency coordination are therefore essential to enhance implementation outcomes.

Another important challenge is the limited participation of local communities in climate policy processes. Community involvement plays a crucial role in ensuring the sustainability and effectiveness of adaptation strategies, particularly those based on ecosystem approaches. However, in many cases, local communities are not adequately involved in decision-making processes, leading to a lack of ownership and reduced long-term commitment. Factors such as limited access to information, low awareness, and socio-economic constraints further hinder meaningful participation (Adger et al., 2005).

Finally, the evolving nature of climate change itself presents an ongoing and unpredictable challenge. Despite various mitigation efforts, global temperature rise and sea-level increase continue to accelerate, intensifying risks for coastal areas. This indicates that current global efforts are still insufficient to fully address climate threats. As a result, coastal regions remain highly vulnerable to hazards such as erosion, flooding, and saltwater intrusion. Therefore, more integrated, adaptive, and inclusive policy approaches are required to strengthen the effectiveness of global commitments and ensure long-term coastal resilience.

d. Effectiveness of Global Efforts in Limiting Global Temperature Rise

The effectiveness of global efforts in limiting temperature rise, as outlined in the Paris Agreement, largely depends on the successful implementation of comprehensive climate mitigation strategies. These strategies include reducing greenhouse gas emissions as well as enhancing carbon sequestration through natural ecosystems. Scientific assessments indicate that achieving the 1.5°C target requires rapid and substantial emission reductions in the coming decades, highlighting the

urgency of effective global action (Hoegh-Guldberg et al., 2018). In practice, many countries have adopted mitigation policies such as transitioning to renewable energy and reducing reliance on fossil fuels. However, global emission levels remain relatively high and have not yet demonstrated a consistent downward trend. This suggests that the overall effectiveness of current global efforts is still limited and requires stronger implementation, improved policy coherence, and enhanced international cooperation (Rogelj et al., 2016).

In addition to emission reductions, nature-based solutions have emerged as an important complementary strategy in climate mitigation. Coastal ecosystems, particularly mangroves, play a significant role as *blue carbon ecosystems* due to their high capacity to absorb and store carbon. Studies show that mangrove forests can sequester substantial amounts of carbon in both biomass and sediment, making them an effective natural mechanism for reducing atmospheric carbon concentrations (Alongi, 2012).

To further illustrate this role, the following figure presents an example of a mangrove ecosystem in coastal areas as part of climate mitigation strategies.

Figure 3. Mangrove ecosystem in the coastal area of Makassar City (2024)

As shown in Figure 3, mangrove ecosystems not only function as natural barriers protecting coastal areas from erosion and wave impacts, but also contribute significantly to carbon sequestration. This makes mangroves an important component of nature-based mitigation strategies. However, their contribution remains complementary and cannot substitute the primary need for direct emission reductions at the global level.

In conclusion, the effectiveness of global efforts in limiting temperature rise depends on the synergy between emission reduction and enhanced carbon sequestration. Integrated and consistent policy implementation, supported by strong international collaboration, is essential to achieve the long-term goals of the Paris Agreement.

4. CONCLUSION

Based on the findings, this study concludes that the 2015 Paris Agreement represents a key milestone in global climate governance, particularly in strengthening coastal area protection as part of efforts to limit global temperature rise. The agreement provides a universal framework that drives the integration of mitigation and adaptation strategies into national policies, including through NDCs and various policy innovations such as carbon pricing, green economy initiatives, and coastal ecosystem restoration programs.

The study shows that implementation of the Paris Agreement has positively contributed to coastal protection, especially through increased adoption of ecosystem-based approaches. Mangroves, coral reefs, and seagrass beds function as natural coastal defenses while also serving as significant blue carbon ecosystems, offering dual benefits for climate mitigation and adaptation as well as socio-economic improvement for coastal communities.

However, its effectiveness remains constrained by several challenges, including limited climate finance, weak institutional coordination, fragmented governance structures, and low levels of community participation. These factors reduce policy coherence and hinder optimal implementation at the local level.

Comparatively, post-2015 developments indicate a shift from fragmented and sectoral coastal management toward more integrated and resilience-based approaches, although progress remains gradual and insufficient relative to the pace of climate change. This highlights the need for stronger implementation and sustained action.

In conclusion, the effectiveness of the Paris Agreement in limiting global temperature rise and strengthening coastal protection depends on improved financing, institutional capacity, cross-sectoral coordination, and inclusive governance. Stronger collaboration between governments, private sector, and local communities is essential to ensure that global commitments are effectively translated into concrete and sustainable actions at all levels.

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