



State Responsibility and Adaptive Governance in Extreme Climate Change: Indonesia–Portugal Comparison

Bakari Arabi*¹, Khairuddin²

¹Lecturer in Law, Department of Law & Criminology,
Royal Docks School of Business and Law, University of East London, United Kingdom

²Sekolah Tinggi Agama Islam Syekh Abdur Rauf Aceh Singkil, Indonesia

*Corresponding Author Email: B.Arab@uel.ac.uk

Article History:

Submitted: January 5, 2025 | Revised: July 22, 2025 | Accepted: October 2, 2025 | Published: December 30, 2025

Citation (APA Style):

Arabi, B., & Khairudin. (2025). State Responsibility and Adaptive Governance in Extreme Climate Change: Indonesia–Portugal Comparison. *Justitia Nova: Indonesian Journal of Modern Law*, 1(2), 16–30.

Abstract

Extreme climate change has intensified pressures on environmental governance, requiring states to reconceptualize state responsibility beyond traditional compliance-based regulation toward preventive and adaptive governance obligations. However, existing scholarship has largely focused on domestic legal frameworks or sectoral adaptation policies, with limited comparative socio-legal analysis on how state responsibility is operationalized across jurisdictions with different institutional capacities and climate vulnerability profiles. This study addresses this gap by comparatively examining Indonesia and Portugal to explain how legal frameworks and institutional governance structures shape the implementation of climate-related state responsibility under escalating environmental risks. Using a socio-legal comparative approach, the study combines doctrinal analysis of environmental and climate governance with qualitative interpretation of institutional practices and policy responses to climate risks. The analysis focuses on Portugal's climate adaptation system within the European Union's multi-level governance architecture, emphasizing how legal norms are translated into governance practice in contrast with Indonesia's environmental governance context. The findings show that differences in climate governance outcomes are driven less by formal legal provisions and more by variations in institutional integration, policy coherence, and enforcement capacity. Portugal demonstrates a more consolidated and preventive governance model characterized by cross-sectoral coordination and embedded adaptation planning, while Indonesia reflects an evolving yet fragmented governance structure with limited integration of climate risk data into decision-making processes. The study contributes by developing the concept of adaptive state responsibility, conceptualizing state responsibility as an interaction between legal obligation, institutional capacity, and climate risk governance in comparative environmental law.

Keywords:

Climate Governance; State Responsibility; Climate Adaptation; Environmental Law



1. Introduction

Extreme climate change has become one of the most pressing challenges in contemporary environmental law and governance, fundamentally reshaping how states conceptualize responsibility, regulatory obligation, and ecological risk management. Unlike conventional environmental problems that are territorially bounded and sector-specific, climate change operates as a systemic and transboundary phenomenon that disrupts traditional doctrines of sovereignty and jurisdiction. In this context, state responsibility is increasingly understood not only as attribution of wrongful acts under international law, but also as encompassing preventive obligations, adaptive governance duties, and long-term commitments to environmental sustainability and intergenerational justice (Pangestu et al., 2025; Weinger, 2025). This normative transformation reflects the gradual reorientation of environmental law toward anticipatory governance, in which states are expected to manage uncertainty rather than merely respond to harm after its occurrence. Such a shift also indicates that environmental law is evolving from a reactive liability-based framework into a preventive and resilience-oriented governance system.

The urgency of this transformation is reflected in the asymmetric impacts of climate change across jurisdictions. Indonesia experiences heatwaves, ecosystem degradation, sea-level rise risks, and resource stress, while Portugal faces intensified storms, flooding, coastal erosion, and infrastructure vulnerability. These differences demonstrate that climate change produces uneven spatial and socio-economic burdens, despite being driven by globally shared emission systems. More importantly, these asymmetries reveal differences in institutional readiness and legal capacity to translate climate risks into actionable governance responses. Prior studies emphasize that effective climate governance requires multi-level coordination, policy coherence, and adaptive institutional frameworks; however, implementation gaps remain particularly pronounced in developing contexts where fragmented governance structures and limited enforcement capacity constrain regulatory effectiveness (Novita, 2021; Muhammad et al., 2025; Abdillah et al., 2025). This condition raises a critical doctrinal question regarding whether existing legal constructs of state responsibility are sufficiently capable of addressing differentiated vulnerability and unequal adaptive capacity.

From a doctrinal legal perspective, the concept of state responsibility in climate governance is undergoing significant conceptual expansion. Traditional international legal frameworks were primarily concerned with attribution of wrongful acts and compensation for transboundary harm. However, climate change challenges this paradigm by introducing cumulative, diffuse, and long-term harm that cannot be easily attributed to single acts or actors. As a result, contemporary environmental law increasingly recognizes duties of due diligence, prevention, and precaution as core obligations of states. This expansion reflects the recognition that climate-related harm requires anticipatory legal governance rather than ex post liability mechanisms. Furthermore, emerging jurisprudence and climate litigation practices have strengthened the juridification of environmental governance by transforming regulatory inaction into justiciable claims of state responsibility (Gupta et al., 2025; Varma et al., 2025; van Beek et al., 2025). Nevertheless, doctrinal expansion has not been matched by systematic comparative analysis of how these obligations are implemented across different governance systems.



Despite the rapid growth of scholarship on climate governance and state responsibility, three critical gaps remain. First, comparative socio-legal studies that systematically examine how state responsibility is operationalized across Global South and Global North jurisdictions remain limited, particularly in relation to climate adaptation governance. Second, existing literature tends to separate legal doctrine from institutional performance, resulting in fragmented analyses that fail to capture how legal norms translate into administrative and policy outcomes. Third, the relationship between adaptive environmental governance and enforceable legal accountability remains under-theorized, especially in contexts where legal systems differ significantly in institutional maturity and regulatory capacity. These gaps collectively indicate the need for an integrated analytical framework that links legal doctrine, governance structures, and implementation capacity in a unified comparative perspective.

This study addresses these gaps through a comparative socio-legal analysis of Indonesia and Portugal. Indonesia represents a jurisdiction characterized by high climate vulnerability, fragmented institutional coordination, and uneven enforcement capacity in environmental governance. In contrast, Portugal reflects a more consolidated governance system embedded within a supranational regulatory architecture that emphasizes preventive adaptation, institutional integration, and policy coherence. This contrast provides a structured basis for examining how different legal and institutional configurations shape the operationalization of state responsibility under extreme climate conditions. The study is guided by three research questions: (1) how state responsibility is conceptualized and operationalized in climate governance frameworks in both jurisdictions; (2) how adaptive governance mechanisms differ in institutional design, coordination, and implementation; and (3) how institutional capacity influences climate accountability and adaptation outcomes.

The novelty of this study lies in its reconceptualization of state responsibility as an adaptive governance obligation rather than a static liability doctrine. Rather than treating state responsibility as a purely reactive legal mechanism, this study positions it as a dynamic governance framework that integrates preventive regulation, institutional coordination, and resilience-building strategies. By developing a comparative socio-legal framework, this research contributes to environmental law scholarship by linking doctrinal evolution with empirical governance realities across two structurally different legal systems. Ultimately, the study advances a more integrated understanding of climate governance in which legal responsibility, institutional design, and adaptive capacity are treated as interdependent dimensions of environmental regulation under conditions of escalating climate uncertainty.

2. Literature Review

Climate change governance has evolved into a central field of inquiry within environmental law, extending beyond technical environmental management toward questions of legal accountability, institutional responsibility, and transnational regulatory ordering. Contemporary scholarship increasingly conceptualizes climate governance as a multi-level and polycentric system in which states, international institutions, and non-state actors interact in shaping responses to climate risks (Weinger, 2025; Zulu et al., 2025). Within this framework,



governance is not limited to policy coordination but also concerns the legal structuring of obligations, compliance mechanisms, and enforcement pathways across jurisdictions. In Indonesia, climate governance has been integrated into national environmental policy through multi-risk governance and resilience-oriented planning; however, empirical studies indicate persistent gaps between normative design and implementation capacity, particularly in translating climate risk information into binding legal and planning instruments (Novita, 2021; Abdillah et al., 2025). This gap highlights a broader issue in environmental law scholarship: the difficulty of linking governance architecture with legally enforceable responsibility in practice.

A key theoretical development in climate law literature is the expansion of state responsibility beyond traditional doctrines of transboundary harm. Classical environmental law relied on identifiable, causally traceable damage; however, climate change introduces cumulative, diffuse, and systemic harm that challenges conventional thresholds of attribution and causation. As a result, contemporary scholarship increasingly reframes state responsibility through due diligence, prevention, and precautionary obligations (Pangestu et al., 2025; Gupta et al., 2025). The Earth system governance perspective further strengthens this shift by situating legal responsibility within planetary boundaries and ecological thresholds, thereby redefining harm in systemic terms rather than bilateral relations. In parallel, Lemaire (2025) advances the “climate atrocity” framework, which extends state accountability into morally charged and structurally grounded forms of environmental harm recognition. Collectively, these developments signal a clear doctrinal transition from reactive liability toward anticipatory governance obligations, although their operational translation across jurisdictions remains underexplored.

Despite these theoretical advances, a critical gap persists in how such expanded notions of state responsibility are operationalized within judicial and institutional settings. Climate litigation has emerged as a key mechanism for enforcing environmental accountability, where courts increasingly engage with climate science, regulatory adequacy, and governmental inaction (van Beek et al., 2025). However, existing literature reveals uneven doctrinal coherence across jurisdictions, particularly between Global North and Global South contexts. Varma et al. (2025) emphasize that while climate litigation in developing countries is growing, it remains constrained by institutional capacity, access to justice, and legal uncertainty. In Indonesia, litigation practices have begun to incorporate environmental rights-based arguments, yet judicial enforcement of climate obligations remains limited and inconsistent (Sulistiawati, 2024; Pinilih & Rahmansyah, 2023). This indicates that litigation functions more as an emerging normative signal than as a fully institutionalized accountability mechanism.

Another structural dimension in the literature concerns the relationship between global governance frameworks and domestic legal systems. Weinger (2025) identifies a persistent “scalar mismatch” between global climate norms and national implementation capacity, where scientific authority and international expectations exceed domestic legal and institutional readiness. This mismatch generates systemic implementation gaps, particularly in jurisdictions with fragmented governance structures. Zafar (2025) further highlights how geopolitical and economic asymmetries shape the uneven distribution of climate obligations, reinforcing global



inequality in environmental governance outcomes. These insights suggest that state responsibility cannot be understood in isolation from global political economy and governance hierarchies, making comparative legal analysis essential for understanding differential implementation trajectories. Environmental governance literature also provides analytical tools for assessing institutional responses to climate risks. The DPSIR framework offers a structured model for linking environmental pressures to institutional responses, yet its legal integration remains limited in comparative legal studies (Roy & Dvořáková Lišková, 2025). Similarly, participatory governance theory emphasizes multi-actor involvement as a key determinant of adaptive capacity (Zulu et al., 2025). In Indonesia, however, adaptive governance structures remain weakly coordinated across sectors, with limited integration between environmental agencies, planning institutions, and subnational governments (Muhammad et al., 2025; Abdillah et al., 2025). In contrast, European governance literature shows stronger institutional consolidation and policy integration, particularly in Mediterranean adaptation strategies involving water governance and spatial planning (Vinagre et al., 2025). Nevertheless, most studies treat these cases separately, without systematically analyzing how governance design translates into legally enforceable responsibility frameworks.

Finally, the literature increasingly recognizes that climate governance is shaped by intersecting legal, ethical, and economic dimensions. Climate justice scholarship emphasizes distributive equity, vulnerability, and historical responsibility as core normative foundations of climate regulation (Rida, 2025). At the same time, corporate governance and financial regulation play growing roles in shaping climate risk management and disclosure regimes (Ellili, 2025). However, despite the growing interdisciplinarity of climate governance research, there remains a lack of integrated comparative frameworks that connect doctrinal developments in state responsibility with institutional governance performance across structurally different legal systems. This fragmentation represents a key limitation in current scholarship. Accordingly, this study addresses this gap by developing a socio-legal comparative framework that systematically connects legal doctrine, institutional capacity, and governance implementation in Indonesia and Portugal under conditions of extreme climate change.

3. Methodology

This study adopts a doctrinal-normative legal approach combined with a comparative socio-legal framework to examine the construction and operationalization of state responsibility under extreme climate change in Indonesia and Portugal. The doctrinal component is used to systematically analyze legal norms, statutory frameworks, and regulatory principles governing environmental protection and climate governance in both jurisdictions. In parallel, the socio-legal dimension is employed to assess how these legal norms are implemented within institutional, administrative, and governance structures shaped by climate risks. This dual approach is necessary because state responsibility in climate governance cannot be adequately understood through legal texts alone, but must also be evaluated in terms of institutional capacity, policy execution, and governance effectiveness. This integration strengthens the analytical link between legal doctrine and real-world governance performance.



The comparative design follows a most-different systems approach, selecting Indonesia and Portugal as two jurisdictions with contrasting climatic conditions and governance structures. Indonesia is characterized by high exposure to hydrometeorological risks, including heat stress, flooding, and ecological degradation, alongside relatively fragmented institutional coordination in environmental governance. Portugal, in contrast, experiences climate risks such as storms, coastal erosion, and flooding, but operates within a more consolidated governance framework supported by supranational regulatory integration. The selection of these cases is analytically justified by their structural divergence in institutional capacity and environmental risk profiles, which enables a systematic comparison of how state responsibility is operationalized under different governance conditions. This design allows for the identification of both convergences and divergences in legal reasoning, institutional arrangements, and adaptation strategies. Data collection is based exclusively on secondary legal and documentary sources, including national legislation, policy frameworks, international environmental agreements, governmental reports, and peer-reviewed academic literature on climate governance and environmental law. In the Indonesian context, the analysis focuses on environmental and climate-related regulatory frameworks as well as disaster risk governance policies. In the Portuguese and European context, the study examines national adaptation strategies within the broader framework of European Union climate governance and environmental regulation. These legal materials are triangulated with scholarly literature and institutional reports to ensure contextual depth and analytical consistency in assessing governance performance and legal implementation gaps.

The analytical technique employed is qualitative content analysis with a structured thematic coding approach. The coding categories include state responsibility, climate adaptation, institutional coordination, enforcement mechanisms, and governance capacity. This is followed by a comparative legal interpretation process aimed at identifying patterns of similarity, divergence, and institutional effectiveness across both jurisdictions. The analysis is not limited to descriptive comparison but extends to evaluating how legal norms are operationalized within governance systems, particularly in relation to adaptation effectiveness and accountability structures. Through this methodology, the study constructs a socio-legal comparative framework that connects legal doctrine with institutional governance outcomes under conditions of extreme climate uncertainty.

4. Results and Discussion

4.1. Extreme Climate Change and Emerging Environmental Risks in Indonesia and Portugal

The findings of this study indicate that extreme climate change has fundamentally reconfigured environmental governance priorities in both Indonesia and Portugal, albeit through different institutional trajectories and risk profiles. While Indonesia is increasingly exposed to heatwaves, prolonged dry seasons, urban heat accumulation, and ecological degradation, Portugal faces more frequent extreme precipitation events, winter storms, coastal erosion, and infrastructure stress. Despite these contextual differences, both jurisdictions reveal a shared pattern: climate change is no longer merely an environmental issue, but a structural governance challenge that directly tests the capacity of legal systems to operationalize state responsibility, institutional coordination, and adaptive regulatory design. This convergence reflects a broader



global trend in which environmental risks are increasingly reframed as issues of regulatory preparedness and legally structured climate governance. In Indonesia, climate-induced environmental risks are most visible in urban and coastal areas, where rising temperatures have intensified public health pressures, reduced water availability, and disrupted agricultural productivity. However, the central issue is not merely environmental exposure, but the weak translation of legal mandates into coordinated governance action across institutional levels. Although Indonesia has adopted multilevel climate governance arrangements involving national ministries, regional governments, and environmental agencies, the implementation of climate adaptation policies remains uneven and institutionally fragmented (Muhammad et al., 2025). This fragmentation is reflected in weak coordination between sectoral planning systems and environmental risk governance. Abdillah et al. (2025) similarly emphasize that urban resilience strategies in Indonesia are constrained by institutional siloing and limited integration of climate risk data into policy planning processes. As a result, climate adaptation remains largely reactive rather than structurally embedded within development planning frameworks, indicating a gap between normative environmental law and its operational effectiveness.

From a legal perspective, Indonesia's environmental governance is formally anchored in national environmental and meteorological legislation, which establishes state obligations to ensure environmental sustainability, climate monitoring, and disaster preparedness. However, the findings suggest a persistent gap between normative legal obligations and their enforceability within administrative and planning systems. Climate-related regulatory instruments are not yet fully translated into binding obligations for climate-resilient spatial planning or preventive environmental risk governance. Consequently, environmental governance tends to prioritize post-disaster response rather than anticipatory legal protection. This reflects a broader structural limitation in transforming environmental law into an adaptive governance instrument capable of addressing systemic climate risks through preventive legal mechanisms. Furthermore, policy coordination between national and subnational governments remains a critical weakness in Indonesia's climate governance architecture. Several subnational jurisdictions lack adequate technical capacity, institutional infrastructure, and climate data integration systems to support evidence-based environmental decision-making. This results in uneven implementation of climate resilience strategies across regions and reinforces disparities in environmental protection outcomes. Novita (2021) argues that Indonesia's environmental governance system remains in a transitional phase, where institutional maturity has not yet matched the increasing complexity of climate risks. The findings of this study reinforce this argument by demonstrating that institutional fragmentation functions as a structural barrier to the operationalization of state responsibility in climate adaptation governance.

In contrast, Portugal demonstrates a more consolidated and institutionally integrated approach to climate adaptation governance, shaped significantly by its alignment with European Union environmental policy frameworks. Although Portugal is also exposed to severe climate-related hazards—including coastal storms, flooding, and infrastructure stress—its governance response is characterized by stronger policy coherence and institutional coordination. The occurrence of extreme weather events such as Storm Kristina and Storm Leonor has further highlighted both vulnerabilities and adaptive capacity within its governance system. Importantly, Portugal's

climate governance framework benefits from EU-level regulatory harmonization, which strengthens the legal integration of preventive environmental principles into national planning and regulatory systems (Barrella et al., 2025). Empirically, Portuguese climate governance increasingly integrates environmental adaptation into spatial planning, infrastructure regulation, and water resource management. Vinagre et al. (2025) demonstrate that coordination between water governance institutions and urban planning authorities has become a central mechanism for strengthening climate resilience, particularly in Mediterranean regions exposed to hydrological stress. This integrated governance model enables more anticipatory and coordinated responses to flood risks and coastal vulnerability. Unlike Indonesia, where adaptation remains largely sectoral, Portugal exhibits a more systemic approach in which environmental governance is embedded within broader territorial and infrastructural planning frameworks, reflecting a higher degree of policy–law coherence in climate adaptation governance.

Nevertheless, Portugal is not exempt from structural limitations. Coastal erosion, aging infrastructure systems, and regional disparities in adaptive capacity continue to pose significant governance challenges. However, compared to Indonesia, Portugal demonstrates a higher degree of institutional readiness and regulatory integration in addressing climate risks. This difference suggests that the effectiveness of environmental governance is not solely determined by exposure to climate hazards, but also by the degree of legal-institutional integration and the capacity to convert climate obligations into enforceable governance instruments. In this sense, Portugal illustrates a more mature model of adaptive environmental governance, while Indonesia reflects an evolving system still undergoing institutional consolidation under increasing climate pressure.

4.2. State Responsibility and Environmental Legal Obligations

The findings of this study demonstrate that state responsibility in climate governance is undergoing a significant normative expansion, shifting from a narrow obligation of environmental regulation toward a broader duty of preventive governance, risk management, and rights-based environmental protection. In both Indonesia and Portugal, environmental law formally positions the state as the primary guarantor of ecological protection. However, the extent to which this responsibility is operationalized differs substantially, reflecting variations in legal enforceability, institutional integration, and the incorporation of climate risk into public law decision-making processes. In Indonesia, state responsibility for environmental protection is constitutionally grounded in the principle of public welfare and ecological sustainability, and operationalized through national environmental legislation. This framework establishes obligations relating to pollution control, environmental preservation, and sustainable resource management. However, the findings indicate that these obligations remain predominantly administrative in character rather than fully juridified within enforceable legal mechanisms. In practice, climate governance is still largely policy-driven, with limited transformation into justiciable duties that can be systematically reviewed by judicial institutions. Pangestu et al. (2025) note that although economic instruments such as carbon valuation are increasingly introduced, their implementation remains fragmented and lacks consistent legal enforceability across sectors.



A central issue identified is the weak operationalization of environmental accountability mechanisms. State responsibility is predominantly triggered *ex post*, particularly after environmental disasters, rather than *ex ante* through preventive compliance frameworks. This indicates a structural gap between normative environmental law and its enforcement in climate risk governance. Moreover, climate litigation remains underdeveloped as an accountability mechanism. Sulistiawati (2024) highlights that judicial engagement with climate claims in Indonesia is still limited, reflecting constraints in judicial capacity and uncertainty regarding the justiciability of climate-related disputes. Consequently, environmental governance continues to rely heavily on executive discretion rather than judicially enforceable standards of climate responsibility.

From a constitutional perspective, environmental protection is increasingly linked to fundamental rights, particularly the rights to health, livelihood, and ecological sustainability. Pinilih and Rahmansyah (2023) argue that climate change should be framed as a constitutional issue due to its impact on rights realization. This study reinforces that view but finds that the absence of explicit constitutional climate obligations limits the judiciary's ability to directly enforce state responsibility. As a result, Indonesia's model of environmental accountability remains fragmented across administrative, constitutional, and policy domains without a unified enforcement structure. In contrast, Portugal demonstrates a more consolidated model of state responsibility shaped by its integration into the European Union's multi-level environmental governance system. Within this framework, environmental obligations are not merely policy commitments but are embedded within binding supranational regulatory structures that operationalize precautionary principles, environmental assessment duties, and preventive governance obligations. This creates a more coherent legal architecture in which state responsibility is operationalized through both national law and EU directives.

Empirically, Portugal's climate governance reflects a preventive rather than reactive legal orientation. Environmental obligations are systematically integrated into spatial planning, infrastructure regulation, and disaster risk governance, ensuring that state responsibility functions across the entire policy cycle. This contrasts with Indonesia's fragmented approach, where legal obligations often fail to translate into coordinated preventive action. The Portuguese model therefore illustrates a stronger alignment between legal norms, institutional coordination, and enforcement mechanisms in climate governance. Nevertheless, Portugal also faces structural constraints, particularly in regional disparities, fiscal limitations, and long-term infrastructure resilience. However, compared to Indonesia, Portugal demonstrates a higher degree of legal coherence in translating environmental obligations into enforceable governance outcomes. This suggests that the effectiveness of state responsibility in climate governance depends not only on the existence of legal norms, but more critically on institutional integration, enforcement capacity, and access to judicial or quasi-judicial mechanisms for environmental claims.

Overall, the findings indicate that state responsibility in climate governance is evolving toward a hybrid model combining administrative regulation, constitutional principles, and transnational environmental law. Indonesia represents a transitional system where legal norms increasingly



recognize climate obligations but remain weakly enforceable in practice. Portugal, in contrast, reflects a more institutionalized model in which state responsibility is structurally embedded within a multi-level governance system supported by supranational legal enforcement mechanisms. This divergence underscores that legal institutionalization is the key determinant of effective climate governance and environmental accountability.

4.3. Environmental Governance, Institutional Coordination, and Adaptive Regulation

Adaptive environmental governance in the context of climate change cannot be understood merely as the implementation of sectoral regulations, but rather as an integrated institutional system involving state agencies, technocratic institutions, and societal actors. In this framework, the effectiveness of climate adaptation depends on the degree of institutional coordination, cross-sectoral policy integration, and adaptive capacity in managing complex and dynamic ecological risks. Existing literature emphasizes that effective climate governance is strongly shaped by the coherence between environmental agencies, urban planning institutions, disaster risk management bodies, and local governments (Roy & Dvořáková Lišková, 2025; Weinger, 2025). Without such integration, environmental regulation tends to remain fragmented, reactive, and structurally unable to function as an anticipatory legal governance system. In Indonesia, the findings indicate persistent institutional fragmentation in climate adaptation governance. Although the national legal framework provides a normative foundation for environmental protection and climate response, policy implementation is often characterized by weak inter-agency coordination. Abdillah et al. (2025) highlight that urban resilience governance in Indonesia continues to face challenges in multi-risk integration and planning coherence. This study confirms that environmental governance structures frequently operate in isolation from infrastructure planning and regional development policies, resulting in low levels of policy synchronization and weak horizontal governance integration.

A critical issue underlying this fragmentation is the inadequate integration of climate data into spatial planning and sub-national decision-making processes. Many local governments lack the technical capacity to operationalize meteorological data, risk modelling, and climate forecasting within planning instruments. Consequently, climate adaptation policies tend to remain reactive rather than preventive, indicating that scientific knowledge has not been fully institutionalized within legal and planning frameworks. This supports Novita's (2021) argument that Indonesia's environmental governance remains in a transitional institutional phase where coordination mechanisms are still underdeveloped. Moreover, governance inefficiencies in Indonesia are not purely administrative but also reflect structural policy prioritisation. Economic development objectives often dominate environmental considerations, creating tension between short-term growth imperatives and long-term ecological sustainability. As a result, environmental protection measures are frequently subordinated to investment-driven urban expansion. This indicates that governance fragmentation is reinforced by political economy constraints that limit the operational strength of environmental law as a regulatory instrument (Hussain & Zhou, 2025).

In contrast, Portugal demonstrates a more advanced model of adaptive environmental governance characterized by stronger institutional integration and cross-sectoral coordination.



Environmental agencies, urban planning institutions, and water management authorities operate within a more coherent governance architecture. Vinagre et al. (2025) emphasize that such integration is essential for addressing hydrological and climate-related risks in Mediterranean regions. Portugal therefore reflects a more systemically coordinated governance model in which environmental, spatial, and infrastructural planning are institutionally aligned. Furthermore, Portugal benefits from the European Union's supranational regulatory framework, which embeds climate adaptation into binding governance instruments. This enhances policy coherence and strengthens the integration of preventive principles into national planning systems. However, despite this institutional advancement, Portugal continues to face structural challenges related to regional disparities in adaptive capacity and fiscal constraints in long-term climate infrastructure investment.

Another important dimension is participatory governance. Zulu et al. (2025) emphasize that effective climate adaptation requires meaningful engagement of civil society and local actors. In Indonesia, participatory mechanisms remain largely consultative, limiting the incorporation of local knowledge into formal governance processes. This reduces the responsiveness and inclusiveness of climate adaptation policies, indicating that participation has not yet evolved into co-governance structures. By contrast, Portugal demonstrates a more institutionalized participatory governance model in which local authorities and stakeholders are systematically integrated into planning and implementation processes. This strengthens policy legitimacy and improves adaptation outcomes at the local level. Nevertheless, both countries still face challenges in balancing centralized authority with decentralized governance structures.

Comparatively, the key divergence between Indonesia and Portugal lies in the degree of institutional integration and governance coherence. Indonesia's climate governance remains characterized by fragmentation, sectoral silos, and weak inter-agency coordination, whereas Portugal exhibits a more integrated and horizontally coordinated governance system supported by EU-level institutional frameworks. This analysis demonstrates that the effectiveness of adaptive environmental governance depends not only on legal frameworks, but critically on institutional coordination capacity, policy coherence, and the extent to which governance systems internalize climate risk as a cross-sectoral legal obligation.

4.4. Climate Justice, Global Governance, and Transnational Responsibility

Climate change increasingly raises critical questions not only regarding governance effectiveness, but also concerning distributive justice, vulnerability, and global responsibility. The findings of this study indicate that climate governance must be understood within a broader normative and legal discourse on fairness, historical responsibility, and international accountability. From a climate justice perspective, developing countries such as Indonesia experience disproportionate climate impacts despite contributing relatively lower cumulative greenhouse gas emissions compared to industrialized nations. This structural asymmetry reinforces the argument that climate governance should integrate principles of equity, differentiated responsibility, and intergenerational justice. Rida (2025) emphasizes that climate adaptation frameworks must incorporate ethical dimensions to ensure fair protection for vulnerable populations. This study finds that although both Indonesia and Portugal



acknowledge climate vulnerability within their governance discourse, the translation of justice-oriented principles into operational policy remains limited, fragmented, and uneven across governance levels. In Indonesia, climate vulnerability is particularly concentrated among coastal populations, low-income urban communities, and agriculture-dependent households. These groups face heightened exposure to sea-level rise, heat stress, and livelihood instability. However, climate adaptation policies tend to prioritize large-scale infrastructure development and macro-level resilience strategies, while social protection mechanisms and community-based adaptation remain limited. This indicates a structural imbalance between technical adaptation approaches and distributive justice-oriented governance design. As a result, environmental governance in Indonesia demonstrates weak integration between vulnerability mapping and policy targeting, leading to limited responsiveness to localized socio-economic inequalities.

Portugal, by contrast, also faces significant climate justice challenges, particularly related to regional disparities and coastal vulnerability. However, its governance framework demonstrates a more advanced integration between environmental adaptation and social policy instruments. Within the European governance architecture, climate resilience is increasingly framed as a cross-sectoral policy domain linking environmental protection with social cohesion and redistribution mechanisms (Barrella et al., 2025). This integrated model enhances the state's capacity to address both ecological risk and social inequality simultaneously, although disparities in regional adaptive capacity remain a persistent challenge. At the global governance level, climate justice is further shaped by institutional fragmentation and uneven implementation capacity across states. Weinger (2025) conceptualizes this as a “scalar mismatch,” referring to the misalignment between global climate commitments and domestic governance capabilities. This study confirms that international climate regimes often face significant implementation gaps at the national level. Indonesia continues to experience constraints in institutional capacity, regulatory enforcement, and inter-agency coordination, whereas Portugal benefits from stronger supranational support through the European Union's integrated climate governance framework. This creates a structural divergence in the ability to operationalize global climate obligations into domestic legal and policy action.

The findings also support Lemaire's (2025) argument regarding the emergence of climate accountability as a developing domain of global environmental law. The increasing frequency and severity of climate-related disasters have intensified demands for stronger state responsibility and transnational accountability mechanisms. The “climate atrocity” concept reflects an evolving normative shift in which extreme climate harms are increasingly understood as failures of governance, legal protection, and institutional responsibility across multiple scales. Overall, the findings demonstrate that effective climate governance requires more than regulatory compliance or technical adaptation strategies. It requires the integration of institutional coordination, enforceable legal responsibility, preventive governance principles, and justice-oriented policy frameworks. Although Indonesia and Portugal follow different governance trajectories, both cases highlight a shared imperative: strengthening multi-level legal accountability and adaptive governance capacity to address increasingly unequal and complex climate risks.

5. Conclusion

This study addressed how extreme climate change reshapes environmental governance and state responsibility in Indonesia and Portugal, with a specific focus on the legal-institutional capacity for climate adaptation. The findings demonstrate that although both countries face increasing climate risks—ranging from heatwaves, drought, and environmental degradation in Indonesia to storms, flooding, and coastal vulnerability in Portugal—their governance responses differ significantly in terms of institutional coordination, regulatory integration, and adaptive capacity. Indonesia's environmental governance is formally supported by environmental protection and meteorological frameworks, yet remains constrained by fragmented implementation, limited inter-agency coordination, and weak integration of climate risk data into planning systems. This structural fragmentation results in a predominantly reactive governance model that limits anticipatory climate risk management. In contrast, Portugal shows a more integrated governance structure shaped by European Union climate frameworks, enabling stronger coordination between environmental, urban planning, and disaster risk institutions, although structural vulnerabilities in coastal infrastructure and financing remain.

In answering the research problem, this study confirms that state responsibility in climate governance cannot be limited to formal regulatory compliance, but must be understood as a broader legal obligation encompassing preventive environmental protection, disaster risk reduction, and intergenerational justice. The comparative analysis demonstrates that state responsibility is increasingly operationalized through governance capacity and institutional coordination rather than solely through statutory recognition. Accordingly, this study contributes to environmental law and comparative governance scholarship by developing an analytical framework that links climate risk exposure, institutional coordination, and the operationalization of state responsibility in two different legal systems. The study further argues that climate justice should be treated as an integral dimension of state responsibility, particularly in addressing asymmetries of vulnerability between and within jurisdictions.

Despite these contributions, this study has several limitations. First, the analysis is based primarily on normative and doctrinal legal interpretation supported by secondary data, without extensive empirical fieldwork in both jurisdictions. Second, the comparative scope is limited to Indonesia and Portugal, which may restrict the generalizability of the findings to other legal systems with different governance structures. These limitations indicate the need for future research to adopt mixed-method and multi-jurisdictional comparative designs to strengthen empirical validity and theoretical generalization. Future research is recommended to incorporate empirical case studies, stakeholder interviews, and broader multi-country comparisons to further validate and refine the proposed analytical framework. Nonetheless, this study provides a foundational contribution to understanding how state responsibility evolves under conditions of accelerating climate uncertainty.

Acknowledgments

The authors thank the University of East London and Sekolah Tinggi Agama Islam Syekh Abdur Rauf Aceh Singkil for academic support. Appreciation is also extended to scholars,



institutions, reviewers, and editors whose insights, publications, and constructive feedback significantly contributed to the development and improvement of this research.

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