Climate Displacement and Legal Gaps: Advancing Human Rights and Digital Environmental Governance in Indonesia

Mohammad Hazyar Arumbinang[1]*

[1] Faculty of Law, Universitas Muhammadiyah Yogyakarta, Yogyakarta, Indonesia

Abstract. Climate-induced displacement represents a growing challenge in Indonesia, where rising sea levels, extreme weather, and environmental degradation threaten the livelihoods and habitats of millions. Despite the intensifying nature of this crisis, Indonesia lacks a coherent legal framework to address the human rights and governance implications of climate-induced migration. This manuscript investigates the legal deficiencies that leave climate-displaced communities vulnerable and explores how digital governance tools can support anticipatory governance and legal protection. Two core research questions guide the inquiry: What are the key legal deficiencies in protecting individuals displaced by environmental and climate-related events in Indonesia? and how can digital innovations enhance anticipatory governance and support legal protections for climate migrants? Through normative and doctrinal legal analysis, supported by a review of statutory law, international human rights obligations, and digital governance initiatives, this study identifies critical gaps in both environmental and migration law. It also demonstrates how technologies such as digital civil registries, early warning systems, and environmental data platforms can be leveraged to enhance state responsiveness, community participation, and institutional accountability. The findings underscore the need for an integrated legal and digital policy response to ensure that climate-induced displacement does not lead to further injustice but becomes an opportunity for rights-based, adaptive governance.

1 Introduction

Climate change is increasingly acknowledged as both an environmental crisis and a significant legal and human rights issue. A significant consequence is climate-induced displacement, impacting millions globally, especially in developing nations susceptible to sea-level rise, extreme weather events, and environmental degradation. Indonesia, an archipelagic nation with more than 17,000 islands and a populace heavily reliant on natural resources, is at the forefront of this crisis [1]. Coastal erosion, tidal inundation, salinization of agricultural land, and exacerbating droughts are compelling communities to abandon their residences, frequently without definitive legal standing or institutional assistance [2].

*Corresponding author: mohammad.hazyar@umy.ac.id

Notwithstanding the magnitude and immediacy of the issue, Indonesia presently lacks a definitive legal framework to acknowledge, safeguard, and administer the rights of individuals and communities displaced by climate-induced events. This absence creates a legal void and exacerbates the vulnerability of those most impacted by environmental change.

The Indonesian legal framework provides limited and disjointed provisions for displacement situations, primarily through disaster management legislation, environmental protection laws, and overarching human rights protections. Law No. 24 of 2007 on Disaster Management addresses emergency response and rehabilitation but fails to recognize displacement as a long-term legal matter necessitating sustainable solutions. Environmental protection legislation, such as Law No. 32 of 2009, emphasizes pollution regulation and ecosystem management, yet it does not explicitly consider the socio-legal ramifications of forced migration resulting from ecological degradation. Currently, migration and population legislation continue to focus on economic or administrative classifications, such as internal migration, cross-border labor mobility, or civil registration, while neglecting the specific vulnerabilities and legal requirements of individuals displaced by climate change. Consequently, individuals displaced by gradual climate events or recurring disasters frequently become overlooked by administrative frameworks and legal rights, resulting in insufficient access to suitable housing, social protection, civil documentation, or land entitlements [3].

This legal invisibility sharply contrasts with Indonesia's international obligations. As a signatory to the International Covenant on Civil and Political Rights (ICCPR), the International Covenant on Economic, Social and Cultural Rights (ICESCR), and the ASEAN Human Rights Declaration, Indonesia is obligated to uphold, safeguard, and ensure the rights to life, health, housing, education, and an adequate standard of living [4]. These rights are significantly compromised when individuals are displaced without legal acknowledgment or support systems. Furthermore, the developing global consensus regarding the connection between climate change and human rights evident in the UN Human Rights Council resolutions and the 2022 acknowledgment by the UN General Assembly of the right to a clean, healthy, and sustainable environment imposes a normative obligation on states to implement proactive governance strategies that avert harm and safeguard the most vulnerable populations. Nonetheless, the practical execution of these obligations regarding climate displacement poses a challenge, especially in the lack of a legal definition for climate migrants or a unified institutional response [2].

The absence of legal clarity also affects land tenure and community rights. Numerous communities in Indonesia that are particularly susceptible to climate-induced displacement such as those residing in small islands, low-lying coastal areas, and forest margins inhabit land through customary or informal agreements that lack formal recognition by state law [5]. Upon displacement, these communities frequently lack legal documentation to substantiate their land claims, thereby complicating resettlement, compensation, or restitution initiatives. In the absence of a legal framework to safeguard their rights, displaced individuals encounter heightened vulnerability to landlessness, statelessness, and impoverishment. The lack of a guiding framework results in arbitrary, inconsistent, and occasionally coercive relocation practices that neglect community preferences, cultural connections to land, and long-term sustainability.

The academic discourse on climate-induced displacement in Indonesia is expanding yet remains disjointed. Current research predominantly examines the environmental and sociological aspects of vulnerability, adaptation, and resilience. Research has investigated the effects of sea-level rise in Java, Kalimantan, and the Riau Islands, along with the socio-economic ramifications of migration induced by disasters [1]. Nonetheless, insufficient focus has been directed towards the legal and institutional aspects of displacement, as well as the systemic inadequacies that hinder the state's capacity to safeguard displaced populations.

Likewise, although Indonesian legal literature has explored environmental degradation, human rights obligations, and disaster governance, it has seldom investigated the particular nexus of displacement, climate justice, and legal frameworks. Furthermore, there is a significant lack of analysis regarding how digital governance innovations could facilitate the legal recognition, protection, and integration of climate-displaced individuals [6].

This manuscript's novelty resides in its dual emphasis on legal reform and digital integration, articulated through a rights-based framework for climate governance. It draws upon international legal principles, Indonesian constitutional and statutory law, and evolving digital governance practices to advocate for a more cohesive response to climate displacement. It presents the notion of "anticipatory legal governance," characterized as the proactive application of legal and digital instruments to identify, safeguard, and empower populations vulnerable to displacement prior to the onset of crises [7]. This methodology contests reactive, post-disaster responses and promotes a framework that integrates early warning, legal acknowledgment, community involvement, and digital inclusion.

This study utilizes a qualitative legal research methodology, focusing on doctrinal analysis of Indonesian environmental, disaster, and human rights law, supplemented by international legal instruments, case studies, and policy documents. It further analyzes current and developing digital governance instruments, including environmental data platforms, mobile registration systems, and e-government portals, as mechanisms that can enhance legal protections. The methodology is based on a rights-oriented framework, emphasizing human dignity, participation, and justice in the analysis. This manuscript critically examines the legal and institutional obstacles to safeguarding climate-displaced individuals and investigates how digital tools can address these deficiencies, thereby contributing to academic discourse and practical policy formulation amid increasing environmental threats.

This study is directed by two primary inquiries. What are the primary legal shortcomings in safeguarding individuals displaced by environmental and climate-related events in Indonesia? Secondly, in what ways can digital innovations improve anticipatory governance and bolster legal protections for climate migrants? These inquiries are both descriptive and normative, seeking to identify legal deficiencies while also suggesting avenues for reform and integration. The subsequent section will tackle the initial inquiry by analyzing the existing legal framework regarding displacement, emphasizing its deficiencies, inconsistencies, and absence of a rights-based perspective. The ensuing discourse will focus on the function of digital governance in bridging these gaps and facilitating a more accountable, inclusive, and adaptive response to the human consequences of climate change.

2 Legal Gaps in Protecting Climate-Displaced Persons in Indonesia

The legal framework regulating displacement in Indonesia is marked by fragmentation, ambiguity, and insufficient normative coherence, especially concerning populations displaced by environmental and climate-related occurrences. Despite the rising prevalence and intensity of climate-induced disasters, such as coastal erosion, tidal flooding, landslides, and extended droughts, the Indonesian legal framework has not yet established a cohesive body of law that addresses displacement as a distinct legal issue with implications for human rights [7]. Current legislative frameworks regard displacement as a transient or incidental consequence of broader environmental or disaster events, rather than as a complex legal status necessitating thorough regulation, acknowledgment, and safeguarding [8]. This limited perspective compromises the rights of displaced individuals and hinders the state's capacity to establish effective, proactive governance strategies in response to increasing climate threats.

The principal national instrument is Law No. 24 of 2007 on Disaster Management, which regulates emergency response, rehabilitation, and reconstruction during natural disasters. The law requires the protection of impacted communities but primarily views displacement as a logistical issue rather than a human rights or long-term governance matter [9]. Displacement resulting from gradual climate phenomena, such as sea-level rise or desertification, lacks legal acknowledgment, and there is no rights-based framework for individuals compelled to vacate their residences due to cumulative environmental degradation. As a result, individuals and communities who relocate not due to a specific disaster event but in reaction to progressively deteriorating environmental conditions, such as diminishing agricultural productivity or saltwater intrusion, do not meet the legal criteria for disaster victims and are consequently ineligible for the protections and services provided by law.

The lack of legal integration between environmental law and migration law exacerbates this issue. Indonesia's Law No. 23 of 2014 on Local Government and Law No. 6 of 2014 regarding Villages acknowledge the rights of communities to local autonomy; however, they fail to address the rights of individuals compelled to relocate [9]. Furthermore, the legal framework governing civil registration, essential for obtaining housing, education, and healthcare, lacks explicit provisions to address the requirements of displaced individuals who may lose documentation, addresses, or legal status during migration. This disparity is especially harmful in rural and island communities, where customary tenure systems and informal settlements prevail and are not consistently acknowledged by national administrative frameworks. Displaced communities encounter substantial legal obstacles in securing compensation, resettlement aid, or access to essential services [8].

A subsequent legal shortcoming resides in the insufficient execution of Indonesia's constitutional and international human rights commitments. Article 28H of the Indonesian Constitution affirms the right to a good and healthy environment and the right to live in physical and spiritual well-being; however, these rights are not consistently converted into enforceable legal protections for individuals impacted by environmental displacement. Despite Indonesia's ratification of significant international human rights treaties such as the ICCPR, ICESCR, and the Convention on the Rights of the Child, these instruments have not been adequately integrated into national legislation concerning displacement. Indonesia has not embraced the Guiding Principles on Internal Displacement, which, although non-binding, provide a thorough normative framework for safeguarding the rights of displaced individuals concerning security, housing, livelihood, and involvement in decision-making processes that impact them [6].

The lack of procedural rights diminishes legal protection for displaced individuals, hindering their ability to seek redress or engage meaningfully in decisions concerning relocation and resettlement. No specific administrative or judicial mechanism exists for environmentally displaced individuals to appeal forced evictions, contest the loss of land rights, or seek state assistance. Resettlement typically transpires via ad hoc government initiatives that are often reactive, poorly coordinated, and devoid of transparent criteria, oversight, and participation. Relocation efforts are often commenced without adequate consultation with impacted communities, contravening the principles of free, prior, and informed consent, leading to secondary displacements, land tenure conflicts, and loss of livelihoods [10].

Institutional fragmentation further exacerbates legal inadequacy. Management of displacement is the responsibility of various ministries and agencies, including the National Agency for Disaster Countermeasure (BNPB), the Ministry of Environment and Forestry (KLHK), the Ministry of Agrarian Affairs and Spatial Planning (ATR/BPN), and the Ministry of Social Affairs. Each functions under distinct mandates and with minimal coordination, leading to redundant responsibilities, bureaucratic stagnation, and policy discrepancies. Although BNPB is pivotal in emergency response, it lacks the legal authority

and long-term planning capability to address climate migration or permanent relocation [11]. The Ministry of Environment has predominantly concentrated on mitigation and conservation policies, neglecting the social ramifications of environmental degradation, such as displacement. This institutional fragmentation results in isolated policies that fail to tackle the complex dimensions of climate-induced displacement, encompassing environmental, social, legal, and economic aspects [4].

A significant shortcoming is the absence of legal frameworks to address land and property rights in relation to displacement. Indonesia's land tenure system is intricate and beset by administrative difficulties, especially for communities lacking formal land titles. Climate-induced displacement, particularly in rural or coastal regions, frequently results in affected populations losing access to land without established systems for compensation or restitution. The Basic Agrarian Law (UUPA) acknowledges customary (*adat*) land rights; however, the processes for their registration and protection are complex and inconsistently enforced. Displaced communities often encounter difficulties in obtaining alternative land or housing, particularly in urban regions where informal settlements are vulnerable to eviction without due process [12]. The lack of land security intensifies socio-economic vulnerabilities and perpetuates cycles of poverty and marginalization.

Moreover, Indonesia lacks a specific legal classification for climate-induced migrants. In contrast to refugees or asylum seekers, who receive protections under international law, climate-displaced individuals do not possess a clearly defined legal status that would activate particular state responsibilities. The term "internally displaced persons" (IDPs) is occasionally employed in policy discussions, yet it lacks formal recognition in Indonesian law concerning environmental displacement. To address this gap, Indonesia could develop an operational typology that distinguishes between *sudden-onset* and *slow-onset* climate displacement. Sudden-onset displacement arises from acute disasters such as tsunamis, volcanic eruptions, or flash floods, which require immediate humanitarian and relocation responses under the Disaster Management Law.

In contrast, slow-onset displacement results from progressive environmental degradation such as sea-level rise, drought, or saltwater intrusion necessitating anticipatory governance mechanisms, land-use planning, and long-term social protection. This differentiation would enable policymakers to assign appropriate legal mandates: emergency-based interventions for rapid events, and preventive, rights-based planning for gradual processes. Embedding such distinctions into Indonesian migration and environmental governance frameworks could facilitate more coherent protection standards and guide the development of specific legal instruments recognizing climate-induced displacement as a distinct category within national law [13]. This exclusion hinders the formulation of targeted policies, budgetary allocations, and protective measures. It also compromises the establishment of dependable data systems and monitoring frameworks, as displaced individuals are not consistently tracked, registered, or documented within national systems. In the absence of a legal classification, these individuals remain unrecognized by the law and are excluded from developmental planning and resource distribution.

Despite the existence of legal instruments, enforcement is still inadequate. Corruption constrained institutional capacity, and insufficient legal awareness among local officials and community members hinder effective implementation. Environmental impact assessments are frequently evaded or distorted, and relocation initiatives are devoid of legal protections and accountability. Furthermore, displaced communities exhibit a deficiency in legal literacy, often lacking awareness of their rights and the means to obtain legal remedies. Legal aid services are inequitably allocated and inadequately financed, with a scarcity of attorneys and civil society organizations dedicated specifically to climate-induced displacement. This implementation gap exacerbates the disparity between formal legal recognition and tangible protection in practice [14]. The aggregate impact of these legal shortcomings is the systematic

marginalization of climate-displaced individuals in Indonesia. In the absence of legal recognition, they are marginalized from formal protective systems and frequently confined to informal or precarious living situations. In the absence of procedural rights, they are deprived of voice and agency in determining their future. In the absence of institutional coordination, they encounter administrative voids and experience erratic support. In the absence of access to justice, their grievances remain unaddressed, perpetuating cycles of vulnerability and exclusion.

Rectifying these deficiencies necessitates more than legislative reform; it requires a fundamental transformation in the comprehension and management of displacement. Climate-induced displacement should be reconceptualized not only as a consequence of environmental change but as a legally and morally significant issue necessitating proactive, rights-based governance. This entails acknowledging displaced individuals as rights holders rather than passive victims and formulating legal frameworks that validate their rights to protection, participation, and dignity. This entails transcending sectoral methodologies and establishing cohesive legal frameworks that connect environmental law, human rights, disaster management, land governance, and migration policy [13].

This legal transformation must be proactive rather than reactive. As climate effects escalate, legislation must adapt to tackle displacement proactively rather than reactively. This involves identifying vulnerable populations, implementing relocation protocols, protecting land rights, and incorporating procedural safeguards into resettlement planning. The subsequent section of this manuscript will examine how digital governance instruments, including civil registries, early warning systems, and environmental monitoring platforms, can bolster this anticipatory legal framework by improving accountability, transparency, and participation.

3 Harnessing Digital Governance for Environmental Accountability and Rights Realization

Although Indonesia's legal framework for managing climate-induced displacement is still nascent, the digital age offers novel prospects for improving governance capabilities and legal safeguards via technological advancements. Digital tools can enable a transition from reactive to anticipatory governance by enhancing environmental monitoring, optimizing public services, refining data-driven policymaking, and fostering participatory mechanisms that empower marginalized communities. In scenarios where legal institutions are disjointed or ineffective, digital platforms can function as a unifying element, facilitating interagency collaboration, data-driven planning, and public scrutiny. For efficacy, these digital solutions must be incorporated within a normative framework that prioritizes human rights and guarantees that technological innovation complements rather than replaces the legal obligations of the state [13].

The primary strength of digital governance is its ability to produce, distribute, and evaluate data pertaining to environmental issues and displacement. The lack of precise, timely, and disaggregated data in Indonesia has consistently obstructed effective policymaking regarding environmental risks and population displacement. Digital environmental monitoring systems, including satellite-based land-use tracking, climate modelling, and real-time hazard detection, offer detailed insights into climate risk, allowing authorities to pinpoint communities at significant risk of displacement. By amalgamating these data systems with population registries and geospatial information, policymakers can predict which regions are prone to out-migration due to gradual changes such as drought, coastal erosion, or salinization, enabling the formulation of pre-emptive relocation plans or resilience strategies [15].

Early warning systems exemplify a domain where digital tools can significantly enhance governance results for vulnerable communities. Indonesia has invested in various early warning systems for tsunamis, volcanic eruptions, and floods, many of which utilize mobile phone alerts, public display systems, and online dashboards. Nevertheless, these systems frequently focus on immediate disaster risk rather than prolonged environmental displacement. Broadening the parameters of early warning systems to encompass climate-induced migration risks, such as thresholds for groundwater depletion or cumulative sea-level rise, would enable authorities to proactively involve communities prior to the inevitability of displacement. When integrated into legal frameworks for planned relocation, early warnings may activate pre-established legal protections, including compensation packages, housing assurances, or access to social services, thus facilitating anticipatory protection [2]. Digital civil registration and identity systems possess considerable potential to improve the rights of displaced individuals. In numerous instances, individuals compelled to migrate due to climate-induced hazards lose their legal identity documents, or their displacement renders them outside formal administrative jurisdictions. Displaced individuals lacking legal identity encounter significant obstacles in obtaining state assistance, education, healthcare, or justice.

Digital identity systems, especially those associated with biometric technologies and decentralized cloud storage, can offer secure, portable, and verifiable documentation of citizenship, familial connections, and entitlements. The current e-KTP (electronic ID card) infrastructure in Indonesia provides a fundamental basis for these protections; however, its implementation must be broadened to encompass mobile, marginalized, and remote populations that are particularly vulnerable to climate-induced displacement. Digital identity systems must be regulated by stringent data protection and human rights standards to prevent surveillance, discrimination, or exclusion [14].

In addition to administrative capabilities, digital tools can also improve the participatory aspects of displacement governance. A prevalent criticism of relocation initiatives in Indonesia is the insufficient community involvement and the hierarchical approach to decision-making. Digital participation platforms, including community mapping applications, online consultation forums, and feedback channels, empower affected communities to express their priorities, report grievances, and collaboratively design resettlement plans. Crowdsourced data platforms such as *PetaBencana* (Disaster Map) have effectively illustrated the feasibility of participatory environmental monitoring in Indonesia, utilizing social media and open-source mapping tools to collect citizen reports of floods and disasters in real time. These participatory models could be broadened to encompass wider contributions to governance related to displacement, including land selection for resettlement, infrastructure planning, and oversight of service delivery [10].

Digital technologies provide opportunities to enhance transparency and accountability in governance processes that have traditionally lacked oversight. Public-facing dashboards can monitor the allocation of relocation funds, the progress of resettlement initiatives, or the execution of legal obligations to displaced populations. Blockchain-based land registries can offer immutable records of land ownership and transfers, safeguarding displaced individuals from land theft or fraudulent appropriation. Legal aid services can be digitized and made available through mobile platforms, allowing displaced individuals to obtain legal counsel, submit complaints, or access information regarding their rights. In isolated or underserved regions, digital legal empowerment initiatives can mitigate the access-to-justice disparity, especially when supplemented by human assistance from paralegals or community legal workers [3].

Nonetheless, the implementation of digital governance instruments necessitates the incorporation of essential safeguards and ethical considerations. Technological determinism, the belief that technology alone can solve intricate social and legal issues, should be eschewed. Digital tools' efficacy is contingent upon the institutional frameworks within

which they function. If foundational legal norms are feeble or enforcement is deficient, technology may exacerbate existing inequalities or engender novel forms of exclusion. Biometric identity systems may inadequately identify individuals lacking complete documentation, whereas data platforms might gather sensitive information without sufficient consent or security measures. Likewise, inadequately designed early warning systems can lead to false alarms or information fatigue, undermining public trust.

A rights-based approach to digital governance is crucial for mitigating these risks. This encompasses the codification of data protection principles, algorithmic transparency, and digital inclusion within legal and policy frameworks. The current regulatory framework for data protection in Indonesia, recently established by the Personal Data Protection Law, serves as a foundation but necessitates additional refinement and stronger enforcement mechanisms. Particular emphasis must be placed on preventing digital systems from perpetuating existing structural inequalities, including gender disparities in digital access and the marginalization of indigenous and remote communities. Digital tools should be collaboratively designed with the communities they aim to serve, taking into account local languages, cultural norms, and socio-economic conditions [14].

Moreover, the institutional adoption of digital innovations must be strategically synchronized with comprehensive legal reforms. Digital tools should not supplant legal protections but rather enhance the legal system's ability to fulfill its obligations. Environmental monitoring data should be permissible in judicial proceedings to hold polluters or negligent agencies accountable. Civil registration systems must activate legal rights under social protection legislation. Participatory platforms must be connected to formal planning and complaint resolution systems [3]. This alignment necessitates interministerial coordination, legal harmonization, and investment in digital literacy and capacity development among government officials, legal practitioners, and civil society stakeholders. Digital governance regarding climate-induced displacement can facilitate cross-border collaboration and the establishment of norms at both regional and international levels. Given that climate risks surpass national borders, regional frameworks may be essential for enabling data exchange, resource aggregation, and policy alignment. Indonesia has the potential to assume a leadership position within ASEAN to promote a regional framework on climate mobility, bolstered by interoperable digital systems for early warning, civil registration, and humanitarian response. Indonesia's experience with rights-based digital governance innovations in international forums could serve as a model for other developing nations facing analogous challenges.

Ultimately, digital tools should be regarded as facilitators rather than replacements for democratic, lawful, and humane governance. When meticulously crafted and based on established norms, they can facilitate Indonesia's shift from a disjointed, reactive framework of displacement governance to a proactive, coordinated system that prioritizes the dignity and rights of the most impacted individuals. The challenge encompasses not only technological innovation but also political will, legal reform, and institutional transformation. Digital governance will not eradicate the risks associated with climate-induced displacement; however, it can guarantee that those compelled to relocate are not simultaneously subjected to legal invisibility and systemic exclusion.

4 Conclusion

The increasing occurrence of climate-induced displacement in Indonesia reveals significant deficiencies in the legal and institutional framework, as existing systems do not sufficiently safeguard those most at risk from environmental hazards. This study verifies that Indonesia's current regulatory frameworks concerning disaster law, environmental protection, and human rights are disjointed and inadequate in addressing the complex, gradual, and often

imperceptible dynamics of climate change. The lack of a clear legal definition or statutory recognition of climate-displaced populations leaves affected communities in a precarious situation, lacking assured access to justice, participation, or restitution. This study has shown that digital governance possesses considerable potential to address critical enforcement and coordination deficiencies in response to the second research question. Digital instruments, such as environmental risk mapping, biometric civil registration, and participatory platforms, can enhance anticipatory governance, ensure equitable access to services, and empower communities to actively participate in adaptation and relocation planning. When integrated into an inclusive and rights-oriented legal framework, digital technologies can enhance the safeguarding of legal identity, promote cross-jurisdictional coordination, and guarantee transparency in state-led initiatives.

Nonetheless, digital innovation cannot replace legal accountability. In the absence of normative foundations based on human dignity, environmental justice, and equitable development, technological solutions may unintentionally perpetuate social exclusion or replicate systemic inequalities. Data governance, digital inclusion, and legal interoperability are crucial prerequisites for ensuring that technology upholds, rather than infringes upon, the rights of individuals displaced by climate change. This research advocates for a dual-pathway strategy: extensive legal reform to acknowledge and safeguard climate-induced displacement as a unique issue, and targeted investment in inclusive, accessible digital infrastructure. This dual strategy must be bolstered by interministerial cooperation, community-oriented planning, and continuous capacity enhancement to synchronize national policies with local conditions. Indonesia has the potential to establish a pioneering model of climate mobility governance that combines digital tools with a human rights-based legal framework, which could serve as a reference for other nations in the Global South confronting analogous challenges. Ultimately, securing justice for climate-displaced communities transcends a legal or technical obligation; it constitutes a moral imperative. By implementing legally based digital governance, Indonesia can advance towards a more resilient, equitable, and inclusive approach to the climate crisis.

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