



Public Participation in Environmental Monitoring: Examining the Gap Between Regulatory Ideals and Implementation Realities

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Abstract

Environmental law enforcement plays a crucial role in ensuring sustainable environmental protection and management in Indonesia. Despite the existence of relatively comprehensive environmental regulations, significant gaps remain between regulatory ideals and implementation realities. This study aims to analyze the factors contributing to the gap between environmental regulation and enforcement, particularly concerning institutional performance, public participation, and legal culture, as well as to examine efforts and solutions to minimize these challenges. The research employs a normative legal research method using statutory, conceptual, and case approaches. Legal materials consist of primary, secondary, and tertiary sources collected through library research and analyzed qualitatively using a juridical-normative approach. The study adopts Lawrence M. Friedman's Legal System Theory to examine environmental law enforcement through the dimensions of legal substance, legal structure, and legal culture. The findings reveal that although Indonesia has established an extensive environmental governance framework, implementation remains constrained by unclear operational regulations, limited institutional capacity, weak inter-agency coordination, inconsistent sanctions, and low public legal awareness. Public participation mechanisms also tend to remain procedural rather than substantive due to limited access to environmental information and inadequate protection for environmental defenders. To address these issues, comprehensive strategies are required, including strengthening institutional capacity, improving regulatory clarity, enhancing coordination among agencies, expanding transparent public participation mechanisms, and promoting environmental legal awareness within society and business sectors. Ultimately, effective environmental governance requires collaborative synergy between the government, private actors, and communities to ensure sustainable environmental protection and legal accountability.

Introduction

Environmental protection and sustainable natural resource management have become increasingly important issues in contemporary governance, particularly in developing countries experiencing rapid economic growth and industrial expansion. As one of the world's megabiodiverse countries, Indonesia possesses extensive forest ecosystems, rich marine resources, abundant mineral reserves, and significant biodiversity that support both economic development and ecological sustainability (Nugroho et al., 2022; Rahman et al., 2024; Suhardi

et al., 2024). However, these environmental assets are continuously exposed to various pressures arising from industrialization, urbanization, infrastructure development, mining activities, agricultural expansion, and population growth (Zahoor et al., 2022; Zeng et al., 2023; Padhiary & Kumar, 2024). Consequently, environmental degradation, pollution, deforestation, biodiversity loss, and climate-related vulnerabilities have emerged as critical challenges requiring effective governance and comprehensive monitoring mechanisms.

Environmental monitoring serves as a fundamental component of environmental governance because it enables the detection, prevention, and mitigation of environmental damage before irreversible consequences occur (Evans & Thomas, 2023; Zhang, 2025; Ramani et al., 2025). Monitoring activities provide information regarding environmental quality, compliance with environmental regulations, and the effectiveness of environmental management policies implemented by government institutions and private actors (Khanam et al., 2023; Puri et al., 2023; Awewomom et al., 2024). Through systematic monitoring, policymakers can identify environmental risks, evaluate regulatory effectiveness, and formulate appropriate interventions to protect ecological systems and public welfare (Ncube & Ngulube, 2024; Awewomom et al., 2024; Digkoglou & Papathanasiou, 2025). Therefore, environmental monitoring should not be viewed solely as a technical or administrative process but rather as an essential mechanism for ensuring accountability, transparency, and sustainability in environmental management.

In modern environmental governance, effective monitoring cannot rely exclusively on state institutions. The complexity of environmental problems, combined with the vast geographical scope of Indonesia, creates significant challenges for government agencies responsible for environmental supervision and law enforcement (Supriatna & Lenz, 2022; Alicia, 2024; Astari et al., 2024). Limitations in human resources, financial capacity, institutional coordination, and technological infrastructure frequently reduce the effectiveness of governmental monitoring activities (Pratiwi et al., 2022; Boufounou et al., 2024; Purnamasari et al., 2025). As a result, broader stakeholder involvement, particularly public participation, has become increasingly important in supporting environmental protection efforts. Public participation enables communities to contribute information, monitor environmental conditions, report violations, and participate in decision-making processes that affect their environment (Li, 2022; Maphanga et al., 2023; Ricciardelli, 2023).

The importance of public participation in environmental governance is internationally recognized through Principle 10 of the Rio Declaration on Environment and Development, which emphasizes access to information, public participation in decision-making, and access to justice in environmental matters (Ruppel & Houston, 2023). These principles establish the foundation of environmental democracy, which promotes inclusive governance and recognizes citizens as active participants rather than passive recipients of environmental policies (Carrick et al., 2023; Hernández et al., 2024; Agyare, 2025). Public involvement is considered crucial because local communities often possess valuable environmental knowledge derived from their direct interaction with natural resources and ecological systems. Such knowledge can complement scientific assessments and governmental monitoring efforts, thereby enhancing the effectiveness of environmental management strategies (Marx et al., 2023; Madkhali et al., 2023; Wang et al., 2024).

In the Indonesian context, public participation has gained increasing legal recognition through various legislative instruments, particularly Law Number 32 of 2009 concerning Environmental Protection and Management. The law explicitly acknowledges the rights of citizens to obtain environmental information, participate in environmental decision-making processes, submit complaints regarding environmental violations, and pursue legal remedies when environmental rights are infringed (Law No. 32 of 2009). These provisions demonstrate

Indonesia's commitment to incorporating participatory approaches within its environmental governance framework. Furthermore, the Indonesian Constitution recognizes the right to a healthy environment as part of broader constitutional protections afforded to citizens (The 1945 Constitution of the Republic of Indonesia). Such legal recognition reflects the growing understanding that environmental protection cannot be achieved effectively without meaningful public engagement (Akerboom & Craig, 2022; Fritz et al., 2024; Khan & Ullah, 2024). Despite the existence of relatively comprehensive legal frameworks, numerous environmental problems continue to occur across Indonesia.

Cases involving water pollution, illegal logging, land degradation, mining-related environmental damage, forest fires, and industrial waste disposal demonstrate persistent weaknesses in environmental monitoring and law enforcement mechanisms (Tiwari, 2023; Donkoh, 2025; Joseph, 2025). One prominent example is the long-standing pollution of the Citarum River, which has been widely recognized as evidence of inadequate environmental supervision despite multiple government intervention programs and restoration initiatives. Similar challenges can be observed in various regions where environmental permits are granted without adequate transparency, environmental impact assessments receive limited public scrutiny, and enforcement actions against environmental violations remain inconsistent (Fontaine et al., 2022; Mungiu, 2023; Boermans et al., 2024).

These conditions indicate that the existence of environmental regulations alone is insufficient to guarantee effective environmental protection. The effectiveness of environmental governance depends largely on how legal provisions are implemented, monitored, and enforced in practice (Steinebach, 2022; Guo, 2023; Fernández et al., 2024). In many instances, public participation mechanisms remain procedural rather than substantive. Communities may be invited to attend consultations or public hearings, yet their concerns and recommendations are often inadequately incorporated into final policy decisions (Mamokhere & Meyer, 2023; Hakiman & Sheely, 2025). Moreover, limited access to environmental information frequently constrains the ability of citizens to participate meaningfully in monitoring activities and decision-making processes.

Another significant challenge relates to the protection of individuals and groups who report environmental violations. Environmental activists, community leaders, and whistleblowers occasionally face intimidation, legal pressure, or social conflict when exposing environmental misconduct by powerful economic actors (Garrick & Buck, 2022; Vandekerckhove, 2023; Zakiy & Satyarini, 2025). Such conditions discourage community participation and weaken public oversight mechanisms that could otherwise contribute significantly to environmental monitoring efforts. Consequently, the gap between legal guarantees of participation and actual participation outcomes remains a persistent concern within Indonesian environmental governance.

Institutional factors further contribute to the complexity of environmental monitoring implementation. Environmental protection responsibilities are often distributed across multiple governmental agencies operating at national, provincial, and local levels (Zeng et al., 2022; Ding et al., 2022; Jiang et al., 2024). While such arrangements may facilitate administrative specialization, they can also create overlapping authorities, fragmented responsibilities, and coordination challenges. Inconsistent enforcement practices and differing institutional priorities frequently reduce the effectiveness of monitoring systems and delay responses to environmental violations. Furthermore, budgetary constraints and shortages of qualified personnel continue to affect the capacity of environmental agencies to conduct regular inspections and comprehensive supervision. The growing influence of economic interests in environmental policymaking also presents significant governance challenges. Indonesia's

development agenda places considerable emphasis on investment promotion, industrial growth, and infrastructure expansion to support economic competitiveness and social welfare. Although these objectives are important, tensions often emerge between economic development priorities and environmental protection requirements (Adanma & Ogunbiyi, 2024; Safarli, 2024). In some circumstances, environmental considerations may receive insufficient attention during policy implementation, leading to weakened monitoring practices and reduced opportunities for public scrutiny. Such conditions raise concerns regarding accountability, transparency, and the capacity of existing institutions to balance economic and environmental objectives effectively.

The persistence of environmental degradation despite extensive regulatory provisions suggests the existence of a substantial gap between normative legal expectations and implementation realities. While environmental laws formally recognize public participation and establish mechanisms for environmental monitoring, practical obstacles continue to limit their effectiveness (Akerboom & Craig, 2022; Kiss et al., 2022; Ogunkan, 2022). Bureaucratic complexity, inadequate institutional capacity, limited public awareness, weak enforcement mechanisms, and insufficient follow-up on community reports collectively hinder the realization of participatory environmental governance. Consequently, understanding the factors that contribute to these implementation challenges is essential for strengthening environmental monitoring systems and enhancing environmental law enforcement in Indonesia.

Public participation represents not merely a supplementary aspect of environmental governance but a fundamental element for achieving sustainable environmental protection. Strengthening participatory monitoring mechanisms can improve transparency, enhance accountability, facilitate early detection of environmental violations, and foster greater public trust in governmental institutions. As environmental challenges become increasingly complex and interconnected, effective collaboration between government agencies, private actors, and local communities will be indispensable for ensuring that environmental governance objectives are translated into meaningful outcomes that protect both present and future generations.

Method

Research Design

This study employs a normative legal research design using a descriptive-analytical approach. Normative legal research focuses on examining legal norms, legal principles, statutory provisions, and legal doctrines governing a particular issue. The selection of this research design is based on the objective of the study, namely to analyze the effectiveness of environmental law enforcement in Indonesia and to examine the gap between regulatory ideals and implementation realities, particularly concerning public participation in environmental monitoring. Rather than measuring social behavior through empirical fieldwork, normative legal research investigates the coherence, adequacy, and implementation of legal norms within the existing legal system.

The descriptive dimension of the research aims to systematically describe the regulatory framework governing environmental protection, environmental monitoring, and public participation in Indonesia. Meanwhile, the analytical dimension seeks to critically assess how these legal provisions operate in practice and to identify the factors contributing to discrepancies between normative expectations and actual implementation. Through this approach, the study not only explains the existing legal framework but also evaluates its effectiveness in addressing contemporary environmental governance challenges.

Research Approaches

To achieve the objectives of the study, several complementary legal research approaches are employed. First, the statutory approach (statute approach) is used to examine the hierarchy and substance of legal norms governing environmental protection and public participation. This approach focuses primarily on Law Number 32 of 2009 concerning Environmental Protection and Management, relevant implementing regulations, and other legislative instruments related to environmental governance and environmental law enforcement. The conceptual approach is utilized to examine and clarify the legal concepts underpinning the study, including environmental law enforcement, environmental monitoring, public participation, legal effectiveness, environmental governance, regulatory compliance, and implementation gaps. Through the examination of legal doctrines and scholarly perspectives, this approach facilitates a deeper understanding of the theoretical and conceptual foundations of participatory environmental governance.

The case approach is applied through the analysis of selected environmental disputes and judicial decisions issued by Indonesian courts. This approach enables the study to evaluate how legal norms are interpreted and applied in concrete cases, particularly those involving environmental violations, public participation, and environmental accountability. Judicial reasoning contained in court decisions provides valuable insights into the practical operation of environmental law and the challenges encountered during its enforcement. Additionally, a comparative analytical perspective is employed when necessary to contrast normative legal standards with implementation realities reflected in government reports, institutional assessments, and documented environmental cases. This comparison assists in identifying inconsistencies between legal objectives and enforcement outcomes.

Sources and Types of Legal Materials

The study relies on three categories of legal materials, namely primary, secondary, and tertiary legal materials. Primary legal materials constitute the principal sources of legal authority and include the 1945 Constitution of the Republic of Indonesia, Law Number 32 of 2009 concerning Environmental Protection and Management, implementing regulations issued by relevant governmental institutions, and judicial decisions related to environmental disputes and environmental law enforcement. These materials serve as the primary basis for assessing the legal framework governing public participation and environmental monitoring. Secondary legal materials consist of scholarly works that provide interpretation, explanation, and critical analysis of legal norms.

These materials include academic books, peer-reviewed journal articles, conference papers, legal commentaries, policy briefs, and research reports addressing environmental law, environmental governance, public participation, environmental justice, and law enforcement effectiveness. Publications produced by governmental agencies, international organizations, and environmental advocacy institutions are also utilized to provide contextual understanding and analytical support. Tertiary legal materials function as supplementary references that facilitate the interpretation of legal terminology and concepts. These materials include legal dictionaries, encyclopedias, legal indexes, bibliographic databases, and other reference sources that assist in clarifying legal definitions and supporting the overall analysis.

Legal Material Collection Techniques

The collection of legal materials is conducted through an extensive library research method. This method involves the systematic identification, selection, classification, and examination of relevant legal sources related to environmental law enforcement and public participation in environmental monitoring. The collection process begins with a review of constitutional

provisions, statutes, government regulations, ministerial regulations, and other relevant legislative instruments. Subsequently, judicial decisions concerning environmental disputes are identified and analyzed through official legal databases, particularly the Supreme Court Decision Directory of the Republic of Indonesia. These decisions are examined to understand patterns of judicial interpretation, legal reasoning, and enforcement outcomes in environmental cases. Furthermore, academic literature is collected through scholarly databases and journal repositories, including Google Scholar, HeinOnline, Scopus-indexed journals, and national scientific publication portals.

To complement legal and academic sources, the study also reviews institutional reports and policy documents issued by relevant organizations, including the Ministry of Environment and Forestry (KLHK), the Indonesian Center for Environmental Law (ICEL), and the Indonesian Forum for the Environment (WALHI). These reports provide empirical context regarding environmental governance practices, enforcement performance, public participation mechanisms, and recurring implementation challenges. All collected legal materials are subsequently organized according to their relevance to the research objectives and categorized based on thematic issues, including environmental monitoring, public participation, institutional capacity, environmental law enforcement, and regulatory implementation.

Legal Material Analysis

The analysis of legal materials is conducted using a qualitative juridical-normative method. This analytical method emphasizes the interpretation, evaluation, and systematic examination of legal norms while assessing their consistency, effectiveness, and implementation within the broader legal system. The analytical process begins with identifying and interpreting legal norms governing environmental monitoring and public participation. These norms are then examined in relation to relevant legal principles and doctrinal perspectives to determine their intended objectives and regulatory functions. Following this stage, the study compares normative legal provisions with practical realities reflected in judicial decisions, government reports, and institutional assessments. This comparison enables the identification of gaps between legal expectations and implementation outcomes. To explain the factors contributing to these gaps, the analysis adopts Lawrence M. Friedman's Legal System Theory, which conceptualizes legal effectiveness through three interrelated dimensions: legal substance, legal structure, and legal culture.

The legal substance dimension examines the adequacy and clarity of environmental regulations and participatory mechanisms. The legal structure dimension evaluates the performance and capacity of institutions responsible for environmental monitoring and law enforcement. The legal culture dimension assesses societal attitudes, compliance behavior, public awareness, and institutional commitment toward environmental protection and legal accountability. Through this analytical framework, the study systematically identifies structural, normative, and cultural obstacles affecting environmental law enforcement and public participation in Indonesia. Ultimately, the analysis provides a comprehensive explanation of the causes underlying the gap between regulatory ideals and implementation realities while contributing to discussions on strengthening participatory environmental governance and improving the effectiveness of environmental law enforcement.

Result and Discussion

This section discusses the gap between regulatory ideals and the realities of environmental law enforcement implementation in Indonesia. Although Indonesia has established a relatively comprehensive legal framework governing environmental protection and management, practical implementation continues to face significant challenges that hinder the effectiveness

of environmental governance. The discussion focuses on the interaction between legal substance, institutional structure, public participation, and legal culture in shaping environmental law enforcement outcomes. By examining the factors contributing to weak implementation, including institutional limitations, inconsistent supervision, fragmented coordination, and low public legal awareness, this section aims to explain why environmental violations continue to occur despite extensive regulatory provisions. Furthermore, the discussion also explores various strategic efforts and solutions that may strengthen environmental governance and minimize the gap between environmental law as formally regulated and environmental law as implemented in practice.

The Gap Between Regulatory Ideals and the Reality of Law Enforcement

Environmental law enforcement in Indonesia reveals a significant paradox between normative legal aspirations and practical implementation. Over the past two decades, Indonesia has developed a relatively comprehensive environmental regulatory framework aimed at ensuring sustainable environmental management and protecting citizens' constitutional right to a healthy environment. Law Number 32 of 2009 on Environmental Protection and Management introduced various regulatory instruments, including environmental permits, environmental impact assessments, administrative sanctions, civil liability mechanisms, criminal penalties, and public participation rights. These provisions demonstrate the legislature's intention to establish an integrated environmental governance system capable of preventing environmental degradation while ensuring accountability among state institutions and private actors. Nevertheless, the persistence of environmental destruction across various sectors suggests that the existence of legal norms alone has not translated into effective environmental protection. Cases of deforestation, illegal mining, forest fires, industrial pollution, and environmental permit violations continue to occur despite the availability of legal instruments intended to prevent such practices.

This condition indicates a substantial discrepancy between environmental law as formally designed and environmental law as implemented in practice (Lazarus, 2023; Owen, 2023). The gap between regulation and implementation cannot be understood solely as a deficiency in legal drafting or regulatory design. Rather, it reflects a broader systemic challenge involving the interaction of legal norms, institutional performance, and societal behavior. In many instances, environmental regulations provide relatively clear obligations for business actors and government agencies; however, implementation remains constrained by weaknesses in monitoring and enforcement mechanisms. Environmental supervision often relies on limited personnel and inadequate technological resources, particularly in regions characterized by extensive natural resource exploitation. Consequently, monitoring activities are frequently reactive rather than preventive, focusing on environmental damage after it has occurred rather than identifying risks before violations emerge. This limitation significantly weakens the preventive function of environmental law, which ideally serves to minimize environmental harm before irreversible ecological damage takes place.

One of the clearest examples of this implementation gap can be observed in the long-standing pollution of the Citarum River. Although environmental regulations require industries to comply with waste management standards and prohibit the discharge of hazardous substances into water bodies, years of inadequate supervision allowed industrial pollution to persist. Government intervention programs and river restoration initiatives have been launched repeatedly, yet environmental degradation remained evident for an extended period. This case illustrates that regulatory effectiveness depends not merely on the existence of legal provisions but also on the capacity of enforcement institutions to ensure compliance. Similar patterns can be identified in cases involving forest and land fires in Sumatra and Kalimantan, where

preventive regulations exist but enforcement frequently occurs only after environmental damage has reached a critical level. Such examples demonstrate that weak monitoring mechanisms undermine the practical effectiveness of environmental legislation and reduce public confidence in regulatory institutions.

From the perspective of Lawrence M. Friedman's Legal System Theory, these challenges reveal weaknesses within the legal structure dimension of environmental governance. Friedman argues that legal effectiveness depends not only on substantive legal rules but also on the institutions responsible for implementing those rules. In the Indonesian context, environmental law enforcement involves a complex network of actors, including the Ministry of Environment and Forestry, regional environmental agencies, environmental investigators, law enforcement authorities, prosecutors, and courts. While this institutional arrangement is intended to facilitate comprehensive environmental governance, it often generates overlapping authority and fragmented responsibilities. Differences in institutional priorities, administrative procedures, and resource allocation frequently create coordination problems that delay enforcement actions and reduce regulatory consistency. As a result, environmental violations may persist despite being formally recognized as unlawful under existing legislation.

Institutional capacity constraints further exacerbate these structural weaknesses. Effective environmental monitoring requires specialized expertise in environmental science, legal investigation, ecological assessment, and technical compliance verification. However, many environmental agencies continue to face shortages of trained personnel, limited laboratory facilities, insufficient monitoring equipment, and inadequate operational budgets. These constraints are particularly problematic given Indonesia's geographical characteristics as a vast archipelagic state with extensive forest areas, mining concessions, coastal ecosystems, and industrial zones. The scale of environmental supervision required frequently exceeds the capacity of available institutions, creating opportunities for violations to occur without detection. Consequently, enforcement efforts often prioritize selected high-profile cases while numerous smaller violations remain unaddressed, contributing to a broader culture of regulatory non-compliance.

Public participation represents another area where a significant gap exists between regulatory ideals and implementation realities. Law Number 32 of 2009 formally recognizes the right of communities to obtain environmental information, participate in environmental decision-making processes, and submit complaints regarding environmental violations. These provisions reflect international environmental governance principles, particularly Principle 10 of the Rio Declaration, which emphasizes access to information, public participation, and access to justice in environmental matters. In practice, however, public participation frequently remains procedural rather than substantive. Communities are often invited to attend consultation meetings or public hearings, yet their concerns may have limited influence on final decisions regarding environmental permits or project approvals. Consequently, participation becomes a formal requirement for regulatory compliance rather than a meaningful mechanism through which communities can shape environmental outcomes.

Several factors contribute to the limited effectiveness of participatory mechanisms. Access to environmental information remains uneven across regions and social groups. Technical documents such as Amdal reports are often difficult for ordinary citizens to obtain or interpret, creating information asymmetries between communities, government agencies, and corporate actors. Second, complaint mechanisms are frequently characterized by slow administrative responses and limited transparency regarding follow-up actions. Communities may report environmental violations but receive little information regarding investigation outcomes or enforcement measures. Third, legal protection for environmental defenders and whistleblowers

remains relatively weak. Environmental activists, journalists, and community leaders who expose environmental misconduct occasionally face intimidation, legal pressure, or social conflict. Such conditions discourage public engagement and weaken the capacity of communities to function as effective partners in environmental monitoring.

The limitations of public participation are closely connected to broader political-economic dynamics within environmental governance. Environmental decision-making frequently occurs within contexts characterized by unequal power relations between affected communities, government institutions, and private investors. Business actors generally possess greater financial resources, technical expertise, and access to decision-makers than local communities. Consequently, participatory processes may be formally inclusive while remaining substantively unequal. This situation reflects concerns associated with regulatory capture theory, which suggests that regulatory institutions may become disproportionately responsive to economic interests rather than public interests. Although environmental regulations are intended to balance development objectives with ecological protection, economic considerations often exert substantial influence over regulatory decisions, potentially reducing the effectiveness of environmental safeguards and limiting opportunities for meaningful public oversight.

In addition to structural and participatory challenges, legal culture constitutes a critical factor influencing environmental law enforcement. Friedman emphasizes that legal culture encompasses societal attitudes, values, and expectations regarding law and legal institutions. In Indonesia, environmental compliance is often shaped by short-term economic incentives rather than long-term sustainability considerations. Many businesses continue to view environmental obligations primarily as administrative requirements necessary for obtaining permits rather than substantive responsibilities aimed at protecting ecological systems. Likewise, public awareness regarding environmental rights and legal remedies remains uneven, particularly in remote or economically marginalized regions. When environmental regulations are not internalized as social norms, compliance tends to depend primarily on external enforcement rather than voluntary commitment. Under such conditions, weak monitoring and inconsistent sanctions significantly reduce the effectiveness of environmental governance.

The inconsistent application of sanctions further contributes to this problem. Environmental legislation provides a range of administrative, civil, and criminal sanctions designed to deter violations and encourage compliance. However, enforcement outcomes frequently vary depending on institutional capacity, political context, and the characteristics of individual cases. In some instances, administrative sanctions are imposed without adequate follow-up to ensure corrective action, while criminal prosecutions may face evidentiary challenges that limit accountability. Such inconsistencies undermine the credibility of environmental law and reduce its deterrent effect. When regulated actors perceive enforcement risks as low or unpredictable, compliance becomes a strategic calculation rather than a legal obligation. Consequently, environmental law loses its capacity to function as an effective instrument of behavioral regulation.

The gap between regulatory ideals and the reality of environmental law enforcement in Indonesia should be understood as a multidimensional governance challenge rather than an isolated regulatory problem. The interaction of weaknesses in legal substance, institutional structure, public participation mechanisms, and legal culture collectively undermines the effectiveness of environmental governance. Therefore, addressing this gap requires a comprehensive and integrated strategy that extends beyond legislative reform. Strengthening monitoring capacity, improving inter-agency coordination, enhancing transparency and public participation, protecting environmental defenders, and fostering a stronger culture of

environmental compliance are all necessary components of a more effective environmental law enforcement system. Without simultaneous improvements across these interconnected dimensions, the discrepancy between environmental law as written and environmental law as practiced is likely to persist.

Factors Contributing to the Gap Between Regulation and Implementation

The gap between regulation and implementation in environmental law enforcement in Indonesia reflects a broader challenge within environmental governance. Although Indonesia has established a relatively comprehensive legal framework through Law Number 32 of 2009 concerning Environmental Protection and Management and various implementing regulations, the practical realization of these legal norms often remains ineffective. This discrepancy demonstrates that the existence of legal provisions alone is insufficient to ensure environmental protection if those provisions cannot be consistently translated into operational practice. The problem does not merely lie in the formulation of legal rules but also in the institutional, structural, and cultural conditions that influence how the law functions in society.

One major factor contributing to this gap is the lack of operational clarity within environmental regulations. Normatively, many legal provisions contain broad principles and general obligations related to environmental protection, sustainability, and public participation (Akerboom & Craig, 2022; Ruppel & Houston, 2023). However, these norms are frequently not accompanied by sufficiently detailed technical guidelines regarding implementation procedures, supervision mechanisms, and enforcement standards. As a result, government agencies and law enforcement officials may interpret regulations differently depending on institutional priorities or administrative discretion. Such ambiguity creates inconsistencies in law enforcement practices across regions and sectors. In some cases, unclear procedural standards also provide opportunities for selective enforcement or legal loopholes that may be exploited by business actors to avoid environmental accountability.

Another significant factor is the limited capacity of environmental law enforcement institutions. Effective environmental enforcement requires multidisciplinary expertise that combines legal knowledge with technical understanding of environmental science, ecological assessment, pollution control, and environmental investigation techniques. In practice, many environmental agencies continue to face shortages of trained personnel, inadequate laboratory facilities, insufficient monitoring equipment, and limited operational budgets. These limitations are particularly problematic considering Indonesia's vast geographical territory and the extensive scale of natural resource exploitation occurring in sectors such as mining, forestry, plantations, and industrial manufacturing. Consequently, supervision activities often become reactive rather than preventive, focusing on environmental damage only after violations have occurred. Such conditions weaken the preventive function of environmental law, which ideally aims to minimize environmental harm before irreversible ecological damage takes place.

Weak inter-agency coordination also significantly contributes to the implementation gap. Environmental governance in Indonesia involves multiple institutions operating at national, provincial, and local levels, including environmental agencies, forestry authorities, law enforcement bodies, licensing institutions, and judicial authorities. While the distribution of authority is intended to facilitate specialization, in practice it frequently generates overlapping responsibilities and fragmented decision-making processes. Differences in institutional priorities, bureaucratic procedures, and administrative interests often hinder effective coordination during environmental supervision and enforcement. As a result, environmental cases may experience delays, inconsistent handling, or even regulatory conflicts between institutions. In some circumstances, this fragmentation creates opportunities for corporations

or other actors to exploit institutional weaknesses in order to avoid legal responsibility or delay enforcement actions.

From the perspective of legal culture, low levels of environmental compliance further widen the gap between regulation and implementation. Lawrence M. Friedman's theory of the legal system emphasizes that the effectiveness of law depends not only on legal substance and institutional structures but also on societal attitudes toward law itself. In Indonesia, environmental regulations are frequently perceived by some business actors merely as administrative requirements necessary for obtaining permits rather than as substantive obligations aimed at protecting ecological sustainability. Compliance therefore tends to be motivated by fear of sanctions rather than internal awareness of environmental responsibility. Public awareness regarding environmental rights and legal remedies also remains uneven, particularly in rural or economically marginalized regions. When environmental values are not fully internalized within social behavior, law enforcement becomes heavily dependent on external supervision mechanisms that are themselves often weak or inconsistent.

The inconsistent application of sanctions further undermines the credibility of environmental law enforcement. Although environmental legislation provides administrative, civil, and criminal sanctions intended to deter violations, enforcement outcomes often vary depending on political considerations, institutional capacity, and evidentiary challenges. In some cases, administrative sanctions are imposed without sufficient monitoring to ensure corrective action, while criminal prosecutions may fail due to difficulties in proving environmental damage or identifying responsible parties. Such inconsistency reduces the deterrent effect of environmental law because violators may perceive enforcement risks as minimal or unpredictable. When sanctions are not implemented firmly and consistently, the law gradually loses its legitimacy as an effective instrument of social control and environmental governance.

Economic and political pressures frequently influence environmental law enforcement processes. Indonesia's development agenda strongly emphasizes investment growth, industrial expansion, and infrastructure development to support economic competitiveness and national development goals. Although these objectives are important, they often create tensions between economic interests and environmental protection. In certain situations, environmental considerations may receive lower priority during licensing processes or project implementation, particularly when large-scale investments are involved. This condition may encourage regulatory leniency and weaken environmental supervision mechanisms. As a result, environmental governance may become more responsive to economic interests than to ecological sustainability and community protection.

To minimize the gap between regulation and implementation, comprehensive and integrated strategic measures are required. Improving the quality of environmental regulations is an essential first step, particularly by ensuring that legal provisions are supported by clear technical guidelines, transparent procedures, and measurable enforcement standards. Regulatory clarity can reduce interpretative inconsistencies and strengthen legal certainty in environmental governance. At the institutional level, strengthening the capacity of environmental law enforcement agencies must become a priority. This includes increasing the number of qualified personnel, providing specialized training in environmental investigation and monitoring, improving technological infrastructure, and allocating adequate operational budgets. Strengthening institutional capacity will enable environmental agencies to conduct more effective supervision and respond more quickly to environmental violations.

Improving inter-agency coordination is equally important. The establishment of integrated monitoring systems, clearer divisions of authority, and stronger communication mechanisms among institutions can reduce bureaucratic fragmentation and improve enforcement

consistency. Coordination between government agencies, law enforcement institutions, and judicial authorities is necessary to ensure that environmental cases are handled efficiently and comprehensively. Strengthening public participation and legal awareness is crucial for enhancing environmental governance. Communities should be provided with easier access to environmental information, transparent complaint mechanisms, and stronger legal protection for environmental activists and whistleblowers. Public education programs regarding environmental rights and responsibilities can also encourage greater societal involvement in environmental monitoring. Through meaningful participation, society can function not only as an object of environmental protection but also as an active partner in ensuring accountability and preventing environmental violations.

Bridging the gap between regulation and implementation requires simultaneous improvements in legal substance, institutional structures, and legal culture. Environmental governance will only become effective when legal norms are supported by capable institutions, consistent enforcement, and strong public commitment toward environmental sustainability. Without comprehensive reform across these interconnected dimensions, the discrepancy between environmental law as written and environmental law as practiced is likely to continue.

Efforts and Solutions to Minimize the Gap

Addressing the gap between regulatory ideals and implementation realities in environmental law enforcement requires a comprehensive approach that integrates legal reform, institutional strengthening, and public empowerment. The persistence of environmental degradation despite the existence of extensive regulatory frameworks demonstrates that environmental governance cannot rely solely on normative legal provisions (Agrawal et al., 2022; Evans & Thomas, 2023; Awewomom et al., 2024). Effective implementation depends on how regulations are translated into practical mechanisms supported by capable institutions, active public participation, and a strong culture of environmental compliance. Therefore, efforts to minimize this gap must be understood as long-term systemic strategies rather than isolated policy interventions.

One of the most important strategies is strengthening collaborative environmental monitoring systems between the government and the public. Environmental protection cannot be carried out effectively through state institutions alone, particularly given Indonesia's vast geographical territory and the complexity of environmental challenges across different sectors. Public participation therefore plays a crucial role in supporting supervision, reporting environmental violations, and monitoring environmental quality at the local level. To facilitate meaningful participation, the government must expand public access to environmental information in a transparent and accessible manner. Information regarding environmental permits, environmental impact assessment documents, pollution data, and monitoring reports should be made easily available to communities through digital platforms and public information systems. Transparency enables communities to understand environmental risks affecting their surroundings and strengthens public oversight over governmental and corporate activities.

In addition to information transparency, the establishment of responsive and accountable complaint mechanisms is essential. Communities frequently encounter difficulties when reporting environmental violations due to complicated bureaucratic procedures, slow administrative responses, and lack of clarity regarding follow-up actions. Such conditions discourage public involvement and weaken trust in environmental institutions. Therefore, complaint systems should be designed to ensure accessibility, legal certainty, and timely institutional responses. The use of digital reporting systems, integrated environmental complaint platforms, and community-based monitoring networks can significantly improve communication between the public and environmental authorities. Moreover, providing legal protection for environmental activists, journalists, and whistleblowers is necessary to ensure

that individuals who expose environmental violations can participate safely without fear of intimidation or retaliation.

Institutional reform also constitutes a fundamental aspect of improving environmental law enforcement effectiveness. Environmental governance requires institutions that possess not only formal authority but also adequate capacity, integrity, and professionalism. In practice, many environmental agencies continue to experience limitations in human resources, technological infrastructure, laboratory facilities, and operational funding. Consequently, monitoring and enforcement activities are often insufficient to address the scale of environmental violations occurring in sectors such as mining, forestry, plantations, and industrial development. Strengthening institutional capacity therefore requires increased investment in environmental supervision systems, technical training for enforcement officials, and the modernization of monitoring technology. Environmental investigators and law enforcement officers should be equipped with multidisciplinary expertise encompassing legal analysis, environmental science, ecological assessment, and forensic investigation techniques. Through stronger institutional capacity, environmental supervision can become more preventive, consistent, and effective.

Improving institutional integrity is equally important in minimizing the implementation gap. Environmental law enforcement may become ineffective when institutions are influenced by political pressure, corruption, or economic interests that compromise regulatory objectivity. Therefore, transparency and accountability mechanisms within environmental agencies must be strengthened to ensure impartial enforcement of environmental regulations. Independent oversight institutions, internal evaluation systems, and public accountability mechanisms can contribute to reducing opportunities for abuse of authority and selective enforcement practices. In addition, clear performance indicators and institutional evaluation systems are necessary to measure the effectiveness of environmental governance and ensure that enforcement institutions remain committed to environmental protection objectives.

Another major challenge that must be addressed is weak coordination among institutions responsible for environmental governance. Environmental protection responsibilities are distributed across various ministries, regional governments, law enforcement agencies, and judicial institutions. While this distribution is intended to support administrative specialization, it often creates overlapping authority, fragmented decision-making, and inconsistent enforcement practices. Therefore, improving inter-agency coordination is essential for ensuring integrated environmental governance. This can be achieved through the establishment of clear divisions of authority, integrated environmental monitoring systems, regular institutional coordination forums, and shared databases for environmental violations and enforcement actions. Stronger coordination allows institutions to respond more quickly and consistently to environmental problems while reducing bureaucratic inefficiencies that frequently hinder effective enforcement.

In addition to structural reform, strengthening legal culture through education and environmental awareness programs is crucial for achieving long-term environmental compliance. Lawrence M. Friedman's legal system theory emphasizes that legal effectiveness depends significantly on societal attitudes and values regarding law. Environmental regulations will not function effectively if they are viewed merely as administrative obligations rather than ethical and social responsibilities. Therefore, environmental education should be integrated into formal education systems, public campaigns, and community development programs to cultivate broader awareness regarding environmental sustainability and legal accountability. Environmental awareness programs should target not only the general public but also business actors and industry stakeholders.

Many companies continue to perceive environmental compliance primarily as a cost burden or licensing requirement rather than as an integral component of sustainable business operations. In reality, environmental sustainability increasingly influences corporate reputation, investment opportunities, consumer trust, and long-term economic resilience. Consequently, businesses must be encouraged to adopt environmental responsibility as part of corporate governance and sustainable development strategies. Incentive-based approaches, such as environmental certification systems, sustainability rankings, and green investment support, may complement traditional sanction-based enforcement mechanisms by encouraging voluntary compliance and innovation in environmental management practices.

Community empowerment also represents a vital element in minimizing the gap between regulation and implementation. Local communities often possess valuable environmental knowledge derived from direct interaction with natural ecosystems. Their involvement in participatory monitoring, conservation initiatives, and environmental decision-making can significantly enhance the effectiveness of environmental governance. Therefore, empowering communities through legal education, technical assistance, and participatory environmental programs is necessary to strengthen their capacity to engage actively in environmental protection efforts. In this context, communities should not merely be treated as passive recipients of environmental policies but as strategic partners in ensuring environmental accountability and sustainability.

Efforts to minimize the gap between regulatory ideals and implementation realities must be understood as interconnected and systemic reforms. Environmental law enforcement effectiveness cannot be achieved solely through stricter regulations or harsher sanctions. Rather, it requires synergy between regulatory improvement, institutional strengthening, inter-agency coordination, public participation, legal culture development, and community empowerment. Only through comprehensive and sustainable collaboration among government institutions, business actors, civil society, and local communities can environmental governance function effectively in protecting ecological sustainability and ensuring environmental justice for present and future generations.

Conclusion

The gap between regulatory ideals and the implementation of environmental law enforcement in Indonesia reflects a multidimensional challenge involving weaknesses in legal substance, institutional capacity, inter-agency coordination, public participation, and legal culture. Although Indonesia possesses relatively comprehensive environmental regulations, their effectiveness remains constrained by inconsistent enforcement, limited institutional resources, fragmented governance structures, and low levels of environmental compliance. Public participation, which should function as a central pillar of environmental governance, often remains procedural rather than substantive due to limited access to information, weak complaint mechanisms, and insufficient legal protection for environmental defenders. Therefore, minimizing this gap requires comprehensive and sustainable efforts that integrate regulatory reform, institutional strengthening, improved coordination among authorities, enhanced transparency, and broader environmental awareness within society and business sectors. Through stronger collaboration between government institutions, private actors, and communities, environmental law can function more effectively as an instrument for ensuring accountability, protecting ecological sustainability, and achieving sustainable development for present and future generations.

References

- Adanma, U. M., & Ogunbiyi, E. O. (2024). A comparative review of global environmental policies for promoting sustainable development and economic growth. *International Journal of Applied Research in Social Sciences*, 6(5), 954-977.
- Agrawal, A., Brandhorst, S., Jain, M., Liao, C., Pradhan, N., & Solomon, D. (2022). From environmental governance to governance for sustainability. *One Earth*, 5(6), 615-621.
- Agyare, P. (2025). Scientific Expertise In Democratic Contexts: Towards Reflexive And Inclusive Governance. *Social Sciences and Education Research Review*, 12(2), 32-45.
- Akerboom, S., & Craig, R. K. (2022). How law structures public participation in environmental decision making: A comparative law approach. *Environmental Policy and Governance*, 32(3), 232-246. <https://doi.org/10.1002/eet.1986>
- Akerboom, S., & Craig, R. K. (2022). How law structures public participation in environmental decision making: A comparative law approach. *Environmental Policy and Governance*, 32(3), 232-246. <https://doi.org/10.1002/eet.1986>
- Akerboom, S., & Craig, R. K. (2022). How law structures public participation in environmental decision making: A comparative law approach. *Environmental Policy and Governance*, 32(3), 232-246. <https://doi.org/10.1002/eet.1986>
- Alicia, F. R. (2024). Implementation of environmental pollution and damage prevention instruments in indonesia: Issues and challenges. *Indonesian Journal of Environmental Law and Sustainable Development*, 3(1), 125-156. <https://doi.org/10.15294/ijel.v3i1.40210>
- Astari, A. J., Aliyan, S. A., Bratanegara, A. S., Muslim, A. B., Nurawaliyah, V. I., & Mohamed, A. A. A. (2024). Understanding the scope of regional geography: a perspective from Indonesia's geographic region. In *E3S Web of Conferences* (Vol. 600, p. 02018). EDP Sciences. <https://doi.org/10.1051/e3sconf/202460002018>
- Awewomom, J., Dzeble, F., Takyi, Y. D., Ashie, W. B., Ettey, E. N. Y. O., Afua, P. E., ... & Akoto, O. (2024). Addressing global environmental pollution using environmental control techniques: a focus on environmental policy and preventive environmental management. *Discover Environment*, 2(1), 8. <https://doi.org/10.1007/s44274-024-00033-5>
- Awewomom, J., Dzeble, F., Takyi, Y. D., Ashie, W. B., Ettey, E. N. Y. O., Afua, P. E., ... & Akoto, O. (2024). Addressing global environmental pollution using environmental control techniques: a focus on environmental policy and preventive environmental management. *Discover Environment*, 2(1), 8. <https://doi.org/10.1007/s44274-024-00033-5>
- Awewomom, J., Dzeble, F., Takyi, Y. D., Ashie, W. B., Ettey, E. N. Y. O., Afua, P. E., ... & Akoto, O. (2024). Addressing global environmental pollution using environmental control techniques: a focus on environmental policy and preventive environmental management. *Discover Environment*, 2(1), 8. <https://doi.org/10.1007/s44274-024-00033-5>
- Boermans, D. D., Jagoda, A., Lemiski, D., Wegener, J., & Krzywonos, M. (2024). Environmental awareness and sustainable behavior of respondents in Germany, the

- Netherlands and Poland: A qualitative focus group study. *Journal of Environmental Management*, 370, 122515. <https://doi.org/10.1016/j.jenvman.2024.122515>
- Boufounou, P., Eriotis, N., Kounadeas, T., Argyropoulos, P., & Pouloupoulos, J. (2024). Enhancing internal control mechanisms in local government organizations: a crucial step towards mitigating corruption and ensuring economic development. *Economies*, 12(4), 78. <https://doi.org/10.3390/economies12040078>
- Carrick, J., Bell, D., Fitzsimmons, C., Gray, T., & Stewart, G. (2023). Principles and practical criteria for effective participatory environmental planning and decision-making. *Journal of Environmental Planning and Management*, 66(14), 2854-2877. <https://doi.org/10.1080/09640568.2022.2086857>
- Digkoglou, P., & Papatnasiou, J. (2025). Application of multiple criteria decision aiding in environmental policy-making processes. *International Journal of Environmental Science and Technology*, 22(8), 6967-6982. <https://doi.org/10.1007/s13762-024-06101-w>
- Ding, Z., Gao, X., Qian, X., & Wang, H. (2022). Governmental inspection and local legislation on environmental protection: evidence from China. *Journal of Economic Surveys*, 36(3), 728-763. <https://doi.org/10.1111/joes.12431>
- Donkoh, S. (2025). *Exploring the Effects of Illegal Mining on Water Bodies in the Western North Region of Ghana* (Doctoral dissertation).
- Evans, J., & Thomas, C. (2023). *Environmental governance*. Routledge. <https://doi.org/10.4324/9781003334699>
- Evans, J., & Thomas, C. (2023). *Environmental governance*. Routledge. <https://doi.org/10.4324/9781003334699>
- Fernández-i-Marín, X., Hinterleitner, M., Knill, C., & Steinebach, Y. (2024). Policy growth, implementation capacities, and the effect on policy performance. *Governance*, 37(3), 927-945. <https://doi.org/10.1111/gove.12816>
- Fontaine, G., Carrasco, C., & Rodrigues, C. (2022). How transparency enhances public accountability: The case of environmental governance in Chile. *The Extractive Industries and Society*, 9, 101040.
- Fritz, L., Baum, C. M., Low, S., & Sovacool, B. K. (2024). Public engagement for inclusive and sustainable governance of climate interventions. *Nature communications*, 15(1), 4168. <https://doi.org/10.1038/s41467-024-48510-y>
- Garrick, J., & Buck, M. (2022). The psychosocial impacts of whistleblower retaliation. *The psychosocial impacts of whistleblower retaliation*. Springer International Publishing.
- Guo, S. (2023). Tackling China's local environmental policy implementation gap: An evolutionary game analysis of China's environmental protection inspection system. *Journal of Cleaner Production*, 416, 137942.
- Hakiman, K., & Sheely, R. (2025). Unlocking the potential of participatory planning: How flexible and adaptive governance interventions can work in practice. *Studies in comparative international development*, 60(1), 43-80. <https://doi.org/10.1007/s12116-023-09415-x>
- Hernández Guzmán, D., & Hernández García de Velazco, J. (2024). Global citizenship: towards a concept for participatory environmental protection. *Global Society*, 38(2), 269-296. <https://doi.org/10.1080/13600826.2023.2284150>

- Jiang, Y., Xiao, Y., Zhang, Z., & Zhao, S. (2024). How does central-local interaction affect local environmental governance? Insights from the transformation of central environmental protection inspection in China. *Environmental Research*, 243, 117668. <https://doi.org/10.1016/j.envres.2023.117668>
- Joseph, R. (2025). Environmental issues in Mining: A Comprehensive Review of Challenges and Strategies for Mitigation and Rehabilitation. *Mining Revue/Revista Minelor*, 31(3).
- Khan, A., & Ullah, M. (2024). The Pakistan-China FTA: legal challenges and solutions for marine environmental protection. *Frontiers in Marine Science*, 11, 1478669. <https://doi.org/10.3389/fmars.2024.1478669>
- Khanam, Z., Sultana, F. M., & Mushtaq, F. (2023). Environmental pollution control measures and strategies: an overview of recent developments. *Geospatial analytics for environmental pollution modeling: Analysis, control and management*, 385-414. https://doi.org/10.1007/978-3-031-45300-7_15
- Kiss, B., Sekulova, F., Hörschelmann, K., Salk, C. F., Takahashi, W., & Wamsler, C. (2022). Citizen participation in the governance of nature-based solutions. *Environmental Policy and Governance*, 32(3), 247-272.
- Lazarus, R. J. (2023). *The making of environmental law*. University of Chicago Press.
- Li, J. (2022). Public participation in China: The case for environmental enforcement. *Journal of Chinese Governance*, 7(2), 159-179. <https://doi.org/10.1080/23812346.2021.1968192>
- Madkhali, H., Duraib, S., Nguyen, L., Prasad, M., Sharma, M., & Joshi, S. (2023). A comprehensive review on e-waste management strategies and prediction methods: A Saudi Arabia perspective. *Knowledge*, 3(2), 163-179. <https://doi.org/10.3390/knowledge3020012>
- Mamokhere, J., & Meyer, D. F. (2023). Towards an exploration of the significance of community participation in the integrated development planning process in South Africa. *Social Sciences*, 12(5), 256. <https://doi.org/10.3390/socsci12050256>
- Maphanga, T., Shale, K., Gqomfa, B., & Zungu, V. M. (2023). The state of public participation in the EIA process and its role in South Africa: a case of Xolobeni. *South African Geographical Journal*, 105(3), 277-305. <https://doi.org/10.1080/03736245.2022.2087726>
- Marx-Stoelting, P., Rivière, G., Luijten, M., Aiello-Holden, K., Bandow, N., Baken, K., ... & Sanders, P. (2023). A walk in the PARC: developing and implementing 21st century chemical risk assessment in Europe. *Archives of toxicology*, 97(3), 893-908. <https://doi.org/10.1007/s00204-022-03435-7>
- Mungiu-Pippidi, A. (2023). Transparency and corruption: Measuring real transparency by a new index. *Regulation & Governance*, 17(4), 1094-1113. <https://doi.org/10.1111/rego.12502>
- Ncube, M. M., & Ngulube, P. (2024). Enhancing environmental decision-making: a systematic review of data analytics applications in monitoring and management. *Discover Sustainability*, 5(1), 290. <https://doi.org/10.1007/s43621-024-00510-0>

- Nugroho, H. Y. S. H., Nurfatriani, F., Indrajaya, Y., Yuwati, T. W., Ekawati, S., Salminah, M., ... & Baral, H. (2022). Mainstreaming ecosystem services from Indonesia's remaining forests. *Sustainability*, 14(19), 12124. <https://doi.org/10.3390/su141912124>
- Ogunkan, D. V. (2022). Achieving sustainable environmental governance in Nigeria: A review for policy consideration. *Urban Governance*, 2(1), 212-220.
- Owen, D. (2023). The negotiable implementation of environmental law. *Stan. L. Rev.*, 75, 137.
- Padhiary, M., & Kumar, R. (2024). Assessing the environmental impacts of agriculture, industrial operations, and mining on agro-ecosystems. In *Smart internet of things for environment and healthcare* (pp. 107-126). Cham: Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-70102-3_8
- Pratiwi, M. E., Din, M., Masdar, R., Amir, A. M., Zahra, F., Kahar, A., & Meldawati, L. (2022). Utilization of information technology to increase human resources capacity and internal control systems on local government financial reporting information. *Universal Journal of Accounting and Finance*, 10(1), 191-199.
- Puri, M., Gandhi, K., & Kumar, M. S. (2023). Emerging environmental contaminants: A global perspective on policies and regulations. *Journal of Environmental Management*, 332, 117344. <https://doi.org/10.1016/j.jenvman.2023.117344>
- Purnamasari, R., Hasanudin, A. I., Zulfikar, R., & Yazid, H. (2025). Technological infrastructure and financial resource availability in enhancing public services and government performance: The role of digital innovation adoption in Indonesia. *Social Sciences & Humanities Open*, 11, 101621. <https://doi.org/10.1016/j.ssaho.2025.101621>
- Rahman, Lokollo, F. F., Manuputty, G. D., Hukubun, R. D., Krisye, Maryono, ... & Wardiatno, Y. (2024). A review on the biodiversity and conservation of mangrove ecosystems in Indonesia. *Biodiversity and Conservation*, 33(3), 875-903. <https://doi.org/10.1007/s10531-023-02767-9>
- Ramani, D. R., Sujitha, B. B., & Tangade, S. (2025). Smart environmental monitoring systems: IoT and sensor-based advancements. *Environmental Monitoring Using Artificial Intelligence*, 45-60. <https://doi.org/10.1002/9781394270392>
- Ricciardelli, A. (2023). Governance, local communities, and citizens participation. In *Global encyclopedia of public administration, public policy, and governance* (pp. 5977-5990). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-66252-3_3221
- Ruppel, O. C., & Houston, L. J. H. (2023). The human right to public participation in environmental decision-making: Some legal reflections. *Environmental Policy and Law*, 53(2-3), 125-138. <https://doi.org/10.3233/EPL-239001>
- Ruppel, O. C., & Houston, L. J. H. (2023). The human right to public participation in environmental decision-making: Some legal reflections. *Environmental Policy and Law*, 53(2-3), 125-138. <https://doi.org/10.3233/EPL-239001>
- Safarli, A. J. (2024). The economics of sustainable development: balancing growth and environmental conservation. *Elmi Əsərlər*, 63.
- Steinebach, Y. (2022). Instrument choice, implementation structures, and the effectiveness of environmental policies: A cross-national analysis. *Regulation & Governance*, 16(1), 225-242. <https://doi.org/10.1111/rego.12297>

- Suhardi, R. M., Rahardi, W., Shih, H. C., Mantiquilla, J. A., Wu, Y. H., Shiao, M. S., & Chiang, Y. C. (2024). A review of the mangrove ecosystem in Indonesia: Biodiversity, conservation, and challenges in sustainable management. *Ecological Genetics and Genomics*, 32, 100282. <https://doi.org/10.1016/j.egg.2024.100282>
- Supriatna, J., & Lenz, R. (2022). *Sustainable environmental management: lessons from Indonesia*. Yayasan Pustaka Obor Indonesia.
- Tiwari, I. (2023). The impact of environmental litigation in India: With reference to illegal mining. *Issue 1 Indian JL & Legal Rsch.*, 5, 1.
- Vandekerckhove, W. (2023). Whistleblowing. In *Encyclopedia of Business and Professional Ethics* (pp. 1895-1896). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-22767-8_1126
- Wang, D., Xu, P. Y., An, B. W., & Guo, Q. P. (2024). Urban green infrastructure: Bridging biodiversity conservation and sustainable urban development through adaptive management approach. *Frontiers in Ecology and Evolution*, 12, 1440477. <https://doi.org/10.3389/fevo.2024.1440477>
- Zahoor, Z., Latif, M. I., Khan, I., & Hou, F. (2022). Abundance of natural resources and environmental sustainability: the roles of manufacturing value-added, urbanization, and permanent cropland. *Environmental Science and Pollution Research*, 29(54), 82365-82378. <https://doi.org/10.1007/s11356-022-21545-8>
- Zakiy, M., & Satyarini, J. N. E. (2025). Becoming a whistleblower and the role of a leader: desires and barriers. *International Journal of Ethics and Systems*. <https://doi.org/10.1108/IJOES-06-2024-0173>
- Zeng, H., Li, X., Zhou, Q., & Wang, L. (2022). Local government environmental regulatory pressures and corporate environmental strategies: Evidence from natural resource accountability audits in China. *Business Strategy and the Environment*, 31(7), 3060-3082. <https://doi.org/10.1002/bse.3064>
- Zeng, P., Liang, L., & Duan, Z. (2023). Ecological and environmental impacts of mineral exploitation in urban agglomerations. *Ecological Indicators*, 148, 110035. <https://doi.org/10.1016/j.ecolind.2023.110035>
- Zhang, D. (2025). Establishing a nation-wide eco-environment monitoring network for sustainable governance. *Environmental Science and Ecotechnology*, 26, 100585. <https://doi.org/10.1016/j.ese.2025.100585>