



INTERNATIONAL JOURNAL OF LAW AND CONSTITUTION STUDY

Journal home page: <https://jurnal.asrypersadaquality.com/index.php/ijlacos>

COMPARISON OF ENVIRONMENTAL LAW ENFORCEMENT SYSTEMS IN DEVELOPING AND DEVELOPED COUNTRIES

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ABSTRACT

Environmental law enforcement is one of the most crucial instruments in global ecosystem protection, yet its implementation reveals a highly significant gap between developing and developed countries. This study aims to comparatively analyze the effectiveness of environmental law enforcement systems in both groups of countries, focusing on four key dimensions: the effectiveness of environmental regulations, the institutional capacity of enforcement agencies, the application of sanctions for violations, and the level of public participation and environmental awareness. The approach employed is normative juridical and comparative, with case study analyses from representative countries including Indonesia, India, and Brazil as developing countries, and Germany, the United States, and Sweden as developed countries. Data were collected through an in-depth literature review of legislation, reports from international institutions such as UNEP, the World Bank, and the OECD, as well as academic research published between 2020 and 2025. The findings indicate that developed countries hold a substantially comparative advantage in terms of comprehensive regulatory frameworks, the technical and financial capacity of enforcement agencies, and firm sanction mechanisms that can be consistently implemented. Conversely, developing countries face layered challenges encompassing regulatory fragmentation, limited enforcement agency resources, structural corruption, and low legal awareness among the public. Nevertheless, this study also identifies a number of policy innovations and best practices from developing countries that are worthy of global adaptation. The study concludes that the effectiveness of environmental law enforcement is not solely determined by a country's economic wealth, but rather by political commitment, institutional governance, and the active participation of civil society.

KEYWORDS

Environmental Law
Enforcement;
Developing Countries;
Developed Countries;
Environmental
Regulations; Institutional
Capacity

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Article History	Submitted: March 16, 2026	Revision: March 18, 2026	Accepted: March 30, 2026	Published: July 30, 2026
https://doi.org/10.63736/ijlacos.v3i1				

INTRODUCTION

The accelerating environmental crisis of the twenty-first century has positioned environmental law enforcement as one of the most pressing priorities in global governance. Despite considerable legislative progress worldwide, the gap between the existence of environmental regulations and their actual enforcement remains alarmingly wide. The United Nations Environment Programme (UNEP, 2024) reported that more than 80 percent of countries in the world have enacted environmental legislation, yet effective implementation and enforcement continue to fall far short of what is needed to halt ecosystem degradation. This paradox abundant regulation alongside persistent environmental harm raises a fundamental question about what truly determines the effectiveness of environmental law enforcement systems.

The disparity in environmental law enforcement between developing and developed countries is not merely a technical or administrative problem. It is deeply rooted in structural inequalities that encompass differences in state capacity, colonial legacies that have shaped political-economic structures, the persistent tension between economic development imperatives and environmental protection goals, and divergent cultural values regarding the relationship between human society and the natural world. These structural differences produce a highly heterogeneous global landscape in which countries respond to environmental challenges through their legal instruments in profoundly different ways.

In developing countries such as Indonesia, India, and Brazil, the pressure to accelerate economic growth frequently undermines environmental commitments. Indonesia, for instance, possesses more than 30 laws directly or indirectly related to environmental management, yet compliance and enforcement face serious structural obstacles (Suharto & Maulana, 2022). Similarly, India's National Green Tribunal established in 2010 as an ambitious institutional innovation struggles to extend its reach across the country's vast and diverse territory (Rajamani & Ghosh, 2021). Brazil presents a particularly instructive case, where one of the world's most progressive constitutional environmental provisions is undermined by politically contingent enforcement that fluctuates dramatically with changes in government (Hochstetler, 2022).

By contrast, developed countries such as Germany, the United States, and Sweden have generally built more mature and institutionalized environmental law enforcement systems. Germany's Bundes-Immissionsschutzgesetz (BImSchG) provides a comprehensive regulatory framework integrating preventive and corrective approaches within a coherent legal architecture. The United States Environmental Protection Agency (EPA) operates an integrated enforcement mechanism encompassing administrative, civil, and criminal instruments. Sweden's Miljöbalken consolidates environmental governance across a wide range of domains under a unified legal code grounded in the precautionary principle and the polluter pays principle (OECD, 2023). Even so, developed nations are not immune to enforcement failures, as evidenced by persistent environmental violations and scandals in these countries as well.

The comparative study of environmental law enforcement has gained renewed urgency in the context of escalating international climate and biodiversity commitments. The Paris Agreement of 2015 and the Kunming-Montreal Global Biodiversity Framework of 2022 impose stringent implementation obligations on all countries, irrespective of their vastly differing institutional capacities (OECD, 2023). Understanding why some countries succeed and others fail in enforcing environmental law is therefore not merely an academic exercise it is a prerequisite for designing effective global environmental governance.

This research makes several important contributions to both academic scholarship and policy practice. Academically, comparative environmental law studies have tended to focus

either on regulatory substance alone or on single-country analyses, leaving significant gaps in understanding the interaction between legal frameworks, institutional capacity, sanction mechanisms, and societal participation across national contexts (Faure & Partain, 2019). This study addresses that gap by offering a multidimensional comparative analysis that treats effectiveness as a product of the interplay among Lawrence Friedman's (1975) three components of the legal system: legal substance, legal structure, and legal culture.

From a policy standpoint, this research is significant at multiple levels. At the national level, the findings provide developing-country governments with a structured understanding of the institutional and normative reforms most likely to yield improvements in environmental enforcement, without assuming that resource constraints are an insurmountable barrier. At the international level, the research contributes to ongoing discussions within multilateral forums including UNEP, the OECD, and the World Bank about how international support for environmental governance capacity-building can be made most effective.

Furthermore, this research draws attention to the often-neglected dimension of public participation and environmental awareness as independent variables in determining enforcement effectiveness. By documenting both the institutional innovations from developing countries such as Indonesia's PROPER program and Brazil's *lista suja* mechanism and the enabling conditions found in developed countries, this study provides a more balanced and practically actionable account than research that treats developed-country models as the exclusive normative reference point. In an era when environmental law enforcement failures carry consequences that transcend national borders through transboundary pollution, deforestation-driven climate impacts, and illegal wildlife trade, comparative insights of this kind carry direct global policy relevance. This research addresses four central issues that collectively define the problem of comparative environmental law enforcement effectiveness:

First, there is the question of regulatory architecture and coherence. To what extent do the environmental regulatory frameworks of developing and developed countries differ in terms of comprehensiveness, internal coherence, and realistic alignment with enforcement capacity? How does the phenomenon of regulatory fragmentation or conversely, of hyper-legislation affect the practical enforceability of environmental norms?

Second, there is the question of institutional capacity. What are the most significant differences in the human, financial, technical, and organizational resources available to environmental law enforcement agencies in developing versus developed countries? How do problems of jurisdictional overlap, inter-agency coordination failures, and unequal geographic distribution of enforcement personnel affect the reach and effectiveness of enforcement systems?

Third, there is the question of sanctions and deterrence. How do sanction frameworks compare across the two groups of countries in terms of their design, proportionality, consistency of application, and capacity to generate genuine deterrence effects? What role does corruption play in undermining sanction effectiveness in developing countries, and what innovative non-traditional enforcement instruments have emerged to compensate for the limitations of conventional sanction regimes?

The scholarly literature on environmental law enforcement has evolved substantially over the past three decades, producing a rich body of work from which this study draws and to which it seeks to contribute.

Foundational contributions by Lawrence Friedman (1975) established the tripartite framework of legal substance, legal structure, and legal culture as the determinants of legal effectiveness. This framework remains highly productive for understanding environmental law enforcement failures in developing countries, where structural and cultural weaknesses often negate the formal adequacy of regulatory substance. Complementing this framework,

Gunningham's (2020) analysis of evolving enforcement architectures in OECD countries identifies the shift from rigid command-and-control approaches toward risk-based, smart regulation as the defining trend in advanced enforcement systems a paradigm that most developing countries have yet to meaningfully adopt.

The theoretical debate between compliance and deterrence approaches to environmental enforcement surveyed comprehensively by Faure and Partain (2019) has generated important insights about how the choice of enforcement strategy interacts with contextual factors including the size and organization of regulated industries, the cultural disposition of regulated actors, and the resource constraints of enforcement agencies. The more recent concept of cooperative compliance, which emphasizes trust-based and collaborative regulatory relationships, offers a promising alternative to both extremes but requires institutional prerequisites that may be difficult to establish in contexts marked by corruption or weak rule of law.

Ostrom's (2010) polycentric governance framework provides an important corrective to state-centric analyses by highlighting the role of multiple overlapping governance actors including communities, civil society organizations, and international institutions in managing environmental commons. This perspective is particularly relevant to understanding how developing countries might leverage non-state actors to compensate for state enforcement limitations.

Country-specific studies have generated important empirical findings. Rajamani and Ghosh (2021) documented both the institutional achievements and the implementation limitations of India's National Green Tribunal, emphasizing the critical importance of post-judgment monitoring mechanisms. Suharto and Maulana (2022) identified three structural barriers to Indonesian environmental enforcement: inter-agency jurisdictional overlap, insufficient operational budgets for field inspectors, and weak coordination between enforcement authorities and technical environmental agencies. Hochstetler (2022) demonstrated the vulnerability of Brazilian environmental enforcement to political cycles, underscoring the danger of systems that depend excessively on executive political will rather than independent institutional capacity.

On the developed-country side, Rechtschaffen et al. (2021) provided a comprehensive account of the integrated administrative-civil-criminal enforcement architecture of the United States, highlighting the role of citizen suit provisions as a mechanism for decentralizing and reinforcing state enforcement efforts. Von Stein (2022) analyzed the role of supranational regulatory harmonization in the European Union as a mechanism for elevating enforcement standards across member states with varying institutional capacities. Susilowati et al. (2023) offered perhaps the most direct comparative data point between a developed and a developing country, documenting a tenfold disparity in the ratio of environmental inspectors to regulated industrial facilities between Germany and Indonesia.

The OECD (2023) synthesized findings across its member states to identify seven key characteristics of effective enforcement systems: clear institutional mandates, adequate resource endowments, technical competence of personnel, transparency and accountability, cross-sectoral coordination, use of data and technology, and stakeholder engagement. This framework provides a useful analytical scaffolding for comparative assessment across country groups.

The present study advances the state of the art in several ways. First, it offers a genuinely multidimensional comparison encompassing regulation, institutions, sanctions, and public participation rather than focusing on any single dimension in isolation. Second, it draws on literature and case material across three continents in each country group, providing broader geographic representativeness than most existing comparative studies. Third, it

explicitly incorporates institutional innovations from developing countries as subjects of analysis and potential models for adaptation, rather than treating developed-country systems as the sole benchmark. Fourth, it integrates the political economy dimension including the effects of corruption, political cycles, and civil society repression as variables internal to the analysis rather than treating them as contextual background noise.

Based on the foregoing background, articulation of research issues, and identification of gaps in the existing literature, this research pursues four principal objectives:

First, to identify and analyze differences in the architecture and quality of environmental regulatory frameworks between developing and developed countries, with particular attention to regulatory coherence, the alignment between normative ambition and implementation capacity, and mechanisms for ongoing regulatory evaluation and revision.

Second, to compare the institutional capacity of environmental law enforcement agencies in both groups of countries, examining resource endowments, personnel qualifications and distribution, inter-agency coordination mechanisms, and the integration of monitoring and information technologies into enforcement practice.

Third, to examine the effectiveness of sanction systems in deterring environmental violations, analyzing the design and proportionality of sanctions, the consistency and integrity of their application, the role of corruption in undermining deterrence, and the potential of innovative non-traditional enforcement instruments to supplement conventional sanction regimes.

Fourth, to evaluate the role of public participation and environmental awareness in supporting or constraining environmental law enforcement effectiveness, including the enabling conditions for civil society engagement, the adequacy of public access to environmental information, and the contribution of environmental education and cultural values to compliance cultures in both country groups.

The study of environmental law effectiveness cannot be separated from the broader theoretical framework concerning legal effectiveness in general. Lawrence Friedman (1975), through his legal system theory, classifies the legal system into three main components: legal substance (the content of legal norms), legal structure (institutional mechanisms), and legal culture (societal attitudes and values toward the law). These three elements interact with one another and collectively determine the extent to which law can function effectively within society. In the context of environmental law enforcement, the weakness of one component, regardless of the strength of the others, may lead to an ineffective legal system.

This theory is highly relevant in explaining why many developing countries experience what scholars describe as a “regulatory gap,” namely the discrepancy between written legal norms and their implementation in practice. Although the substance of environmental regulations may already be adequate, ineffective institutional structures and the absence of a strong environmental legal culture within society often result in weak law enforcement effectiveness (Susilowati et al., 2023).

In the field of environmental law, two major theoretical approaches that are frequently debated are the compliance approach and the deterrence approach. The compliance approach emphasizes the importance of developing awareness and improving the capacity of legal subjects to obey the law, whereas the deterrence approach focuses on creating a deterrent effect through strict and consistent sanctions (Gunningham, 2020). Developed countries generally implement a more structured combination of both approaches, while developing countries often face difficulties due to either overly lenient enforcement or inconsistent law enforcement practices.

Recent developments in the literature have introduced a third dimension known as cooperative compliance, in which the relationship between regulators and regulated parties is

collaborative and based on trust rather than confrontation alone (Faure & Partain, 2019). This model has demonstrated more effective outcomes in environmental law enforcement because it can reduce enforcement costs while simultaneously encouraging voluntary compliance.

Multi-Level Environmental Governance Theory

Modern environmental governance is no longer solely hierarchical and centralized, but instead operates across multiple levels ranging from local and national to international systems that interact dynamically with one another. Elinor Ostrom (2010) explains that this multi-level governance perspective is essential for understanding how international pressure, domestic policy decentralization, and local environmental movements collectively shape the landscape of environmental law enforcement within a country. Within this framework, developing countries are often placed in a more vulnerable position because they face pressures from various levels simultaneously while possessing limited institutional and regulatory capacity.

Previous Studies

Numerous previous studies have made significant contributions to understanding the dynamics of environmental law enforcement in various contexts. Neil Gunningham (2020) conducted a comprehensive study on the evolution of environmental law enforcement in OECD countries and found that recent trends increasingly favor more flexible and risk-based approaches. Under this model, enforcement resources are primarily directed toward actors that pose the greatest environmental risks. The study emphasizes the importance of smart regulation as a new paradigm that goes beyond the traditional dichotomy between strict regulation and deregulation.

In the Asian context, Lavanya Rajamani and Shibani Ghosh (2021) examined the effectiveness of India's National Green Tribunal and concluded that although the institution has handled thousands of environmental cases during its first decade of operation, its substantial impact on environmental quality improvement still requires more time to become fully apparent. Their research highlights the importance of follow-up mechanisms and post-decision monitoring, which are often neglected within environmental law enforcement systems.

Suharto and Maulana (2022), in their study on Indonesia, identified three major obstacles to environmental law enforcement: overlapping authority among government institutions, limited operational budgets for regional environmental inspectors, and weak coordination between law enforcement agencies and technical environmental institutions. These findings are consistent with the report issued by World Bank (2023), which categorized Indonesia as a country with a considerable enforcement gap compared to the potential strength of its regulatory framework.

Meanwhile, in Latin America, Kathryn Hochstetler (2022) analyzed Brazil and found that environmental law enforcement there is heavily influenced by political dynamics. Changes in governmental regimes may dramatically alter enforcement priorities and intensity. This phenomenon, referred to as "enforcement cycles," demonstrates the vulnerability of legal enforcement systems that rely excessively on political will without strong support from independent and professional institutions.

On the other hand, Jana von Stein (2022), in her research on environmental regulation within the European Union, demonstrated how regional regulatory harmonization can function as an effective instrument for encouraging higher enforcement standards, even among member states with relatively weak institutional capacity. The European experience offers valuable lessons regarding the role of supranational governance in strengthening domestic environmental law enforcement.

Susilowati et al. (2023) carried out a comparative study between Indonesia and

Germany concerning the capacity of environmental inspectorates. Their findings revealed a striking disparity: Germany has approximately one environmental inspector for every 5,000 industrial facilities, whereas Indonesia only has one inspector for more than 50,000 facilities. Such a substantial capacity gap reflects not only economic differences but also differing policy priorities and levels of institutional commitment.

From the perspective of international law, Alan Boyle and James Harrison (2023) examined how treaty compliance mechanisms under various international environmental agreements interact with domestic enforcement systems. Their study found that countries possessing stronger domestic enforcement systems also tend to demonstrate greater compliance with their international obligations, thereby creating a virtuous cycle between domestic institutional capacity and international commitment.

Furthermore, the latest report published by the Organisation for Economic Co-operation and Development (2023) on Environmental Enforcement identified seven key factors that distinguish effective enforcement systems from ineffective ones: institutional mandate clarity, adequate resources, technical competence of personnel, transparency and accountability, cross-sector coordination, utilization of data and technology, and stakeholder participation. The report also emphasizes that there is no universal enforcement model suitable for every context, and each country must develop an approach that aligns with its own socio-political and economic conditions

METHOD

Research Approach and Type of Research

This study employs a normative juridical approach combined with a comparative method. The normative juridical approach is applied to examine environmental regulations and policy documents from the countries selected as research objects, while the comparative method enables a systematic identification of similarities and differences among legal systems. The integration of these two approaches was chosen because it allows the research to produce analyses that are not only descriptive but also critical and evaluative regarding the effectiveness of each legal system.

In addition, this research adopts a policy analysis framework to assess the gap between legal norms and their implementation, as well as to identify contextual factors influencing the effectiveness of environmental law enforcement in each country under examination.

Case Selection

The countries selected as case studies were chosen purposively based on several criteria, including regional representation, availability of adequate data and literature, diversity of legal systems, and relevance to the global dynamics of environmental issues. Among developing countries, Indonesia (Southeast Asia), India (South Asia), and Brazil (Latin America) were selected. From the group of developed countries, Germany (Western Europe), the United States (North America), and Sweden (Northern Europe) were chosen. The selection of these six countries reflects diversity in legal traditions, including both civil law and common law systems, regional variation, and different levels of economic development.

Data Collection Techniques

The data used in this research were collected through a comprehensive literature study covering three categories of sources. First, legislation and official policy documents from each country included in the study were examined. Second, reports and publications issued by international organizations such as the United Nations Environment Programme, Organisation for Economic Co-operation and Development, and World Bank, as well as regional institutions, were analyzed. Third, scientific journal articles and academic studies published between 2020

and 2025 were reviewed. All sources underwent a rigorous selection process based on their relevance, credibility, and the timeliness of the information provided.

Data Analysis

The data analysis process was conducted through several stages. The first stage involved data reduction to identify information most relevant to the research dimensions being examined. The second stage consisted of categorizing the data into four principal analytical dimensions: regulatory effectiveness, institutional capacity, implementation of sanctions, and public participation. The third stage involved comparative analysis to identify patterns, similarities, differences, and explanatory factors accounting for variations across countries and groups. Finally, the findings were interpreted critically in order to produce conclusions that are both academically meaningful and relevant for policy development.

RESULTS AND DISCUSSION

RESULTS

1. Effectiveness of Environmental Regulations and Policies

a. Regulatory Architecture in Developed Countries

Developed countries, particularly those in Europe, have established environmental regulatory systems that are comprehensive, coherent, and vertically integrated from supranational to subnational levels. The European Union represents one of the clearest examples, possessing more than 200 legal instruments related to environmental protection, ranging from directives on industrial emissions to regulations concerning waste management, air quality, and biodiversity conservation (von Stein, 2022). What distinguishes the European system is not merely the number of regulations, but also the systematic enforcement mechanisms constructed upon those legal foundations.

Germany, recognized as one of the countries with the most advanced environmental legal systems, implements the Bundes-Immissionsschutzgesetz (BImSchG) or Federal Pollution Control Act, which has undergone multiple revisions since its enactment in 1974. This regulation not only establishes strict emission standards but also comprehensively regulates licensing procedures, monitoring obligations, and legal consequences for violations (Gunningham, 2020). The strength of the German system lies in its integration of preventive and corrective approaches within a cohesive regulatory framework.

The United States adopts a somewhat different approach through its federal system, which grants regulatory authority to states within the framework of minimum federal standards established by the United States Environmental Protection Agency (EPA). The Clean Air Act, Clean Water Act, and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) constitute the primary pillars of federal environmental regulation, granting the EPA broad authority to establish standards, conduct inspections, and implement enforcement actions. This system offers flexibility in adapting regulations to local conditions, although it also creates the possibility of inconsistencies among states (Rechtschaffen et al., 2021).

Sweden represents the Nordic model, which combines strict regulation with consensus-based governance and social dialogue. The Miljöbalken (Swedish Environmental Code), enacted in 1999, consolidated fifteen separate environmental laws into a unified legal framework covering areas ranging from nature conservation to hazardous chemical management. A notable characteristic of the Swedish model is its strong emphasis on the precautionary principle and the polluter pays principle as philosophical foundations influencing the interpretation and implementation of environmental law as a whole (OECD, 2023).

b. Regulatory Architecture in Developing Countries

The environmental regulatory landscape in developing countries presents a more complex and problematic picture. One of the most prominent characteristics is what scholars

describe as “hyperlegislation,” a condition in which the production of legal norms progresses much faster than the capacity for implementation (Suharto & Maulana, 2022). Indonesia provides a clear example of this phenomenon. Since the enactment of Law Number 32 of 2009 concerning Environmental Protection and Management, which was later partially amended by Law Number 11 of 2020 concerning Job Creation, Indonesia’s environmental regulatory framework has undergone highly controversial developments.

The Job Creation Law has been criticized by academics and civil society organizations as a setback for environmental protection because it reduces several environmental impact assessment (AMDAL) requirements and shifts the paradigm from viewing environmental protection as an intrinsic value toward treating it merely as a component within economic development calculations (Susilowati et al., 2023). Such regulatory changes reflect the continuing tension between economic development interests and environmental protection, a tension that has not yet been resolved systematically in Indonesia.

India possesses a relatively comprehensive environmental legal framework, including the Environment Protection Act 1986, the Water (Prevention and Control of Pollution) Act 1974, the Air (Prevention and Control of Pollution) Act 1981, and the Forest Conservation Act 1980. Nevertheless, implementation faces substantial challenges due to fragmented authority between the Central Pollution Control Board (CPCB) at the national level and the State Pollution Control Boards (SPCBs) at the state level. Lavanya Rajamani and Shibani Ghosh (2021) found that coordination between these two levels is often ineffective, leading to overlapping policies and supervisory gaps in industrial regulation.

Brazil represents another interesting case because it possesses one of the world’s most progressive constitutional provisions concerning environmental rights. Article 225 of the 1988 Brazilian Constitution explicitly recognizes the right to a healthy environment as a fundamental right. However, implementation of this constitutional norm faces serious structural challenges. Kathryn Hochstetler (2022) documented how under administrations that are less responsive to environmental concerns, regulatory enforcement may weaken dramatically, demonstrating the vulnerability of legal systems that depend excessively on the political will of executive leaders.

c. Comparative Analysis of Regulatory Effectiveness

The comparison between developed and developing countries reveals several significant patterns. First, developed countries demonstrate greater consistency between declared policy objectives and regulatory design. In other words, legal norms are generally formulated with realistic implementation capacity in mind. By contrast, developing countries frequently display ambitious normative aspirations without adequate enforcement mechanisms to support them.

Second, developed countries tend to possess more systematic mechanisms for evaluating and revising regulations. The Organisation for Economic Co-operation and Development (2023) noted that nearly all member states require regulatory impact assessments (RIA) before issuing new regulations, thereby ensuring that regulations remain realistic, effective, and cost-efficient. In many developing countries, however, such processes are either absent or carried out merely as formalities.

Third, and perhaps most fundamentally, there are major differences in what is commonly referred to as “legal culture,” namely the way law enforcement officials, business actors, and society perceive and interact with environmental legal systems. In countries such as Germany and Sweden, compliance with environmental regulations has become strongly internalized as a social norm, making law enforcement easier because it is reinforced by social pressure from the wider community (Gunningham, 2020). This situation differs significantly from contexts in which environmental violations are still viewed merely as a “cost of doing business” that can be negotiated.

2. Capacity of Environmental Law Enforcement Institutions

a. Institutional Resources and Infrastructure

Institutional capacity represents one of the clearest and most measurable distinctions between environmental law enforcement systems in developed and developing countries. In the United States, the United States Environmental Protection Agency (EPA) operated with an estimated budget of approximately USD 9.7 billion in the 2024 fiscal year and employed more than 14,000 personnel, including thousands of field officers specifically trained to conduct environmental inspections and investigations (Rechtschaffen et al., 2021). Similarly, Germany maintains the Umweltbundesamt (Federal Environment Agency), which employs over 1,700 staff members and is supported by environmental authorities across each federal state (Bundesland).

A sharp contrast can be observed in developing countries. In Indonesia, the Ministry of Environment and Forestry faces substantial limitations regarding both the number and competence of environmental inspectors in the field. Susilowati et al. (2023) found that the ratio of environmental inspectors to industrial facilities requiring supervision in Indonesia remains far below standards recommended by international institutions. This condition is aggravated by unequal personnel distribution, with the majority concentrated on the island of Java and in major urban centers, while remote areas often the sites of extractive industries with significant environmental risks receive minimal oversight.

From a budgetary perspective, India allocates only around 0.1 percent of its GDP to environmental affairs, including law enforcement, significantly lower than the OECD average of approximately 0.5 to 1.0 percent (OECD, 2023). Such financial constraints directly affect the ability of enforcement agencies to conduct routine monitoring, comprehensive investigations, and effective follow-up actions regarding reported violations. In many developing countries, environmental testing laboratories are also inadequately equipped and frequently lack qualified experts capable of operating advanced monitoring technology.

b. Coordination Problems and Institutional Fragmentation

Beyond limited resources, institutional coordination problems constitute another major challenge burdening environmental law enforcement systems in developing countries. In Indonesia, environmental enforcement authority is dispersed among the Ministry of Environment and Forestry, the Indonesian National Police, particularly the Special Criminal Investigation Unit responsible for environmental crimes, the prosecution service, the judiciary, and regional environmental agencies at provincial and municipal levels. Coordination among these institutions often functions poorly, causing environmental cases to become trapped within overlapping jurisdictions or neglected because each institution assumes responsibility lies elsewhere (Suharto & Maulana, 2022).

In India, the relationship between the Central Pollution Control Board (CPCB) and the State Pollution Control Boards (SPCBs) is frequently hierarchical rather than collaborative. SPCBs often face pressure from state governments that prioritize industrial investment over environmental protection. Lavanya Rajamani and Shibani Ghosh (2021) documented numerous cases in which SPCBs issued environmental permits or delayed enforcement actions due to political intervention from regional officials supporting particular industrial projects.

In contrast, developed countries generally possess more institutionalized coordination mechanisms. In Sweden, the Naturvårdsverket (Environmental Protection Agency) serves as the principal coordinating body with clear authority to direct national enforcement policies, while County Administrative Boards are responsible for regional implementation. Such a clearly structured coordination system minimizes jurisdictional confusion and ensures that environmental supervision gaps are avoided (OECD, 2023).

c. The Use of Technology in Environmental Law Enforcement

Technological advancement has introduced a new dimension to environmental law enforcement, and developed countries have demonstrated a greater ability to utilize these innovations effectively. The United States Environmental Protection Agency, for example, has integrated remote sensing systems, satellite imagery, and big data analytics into its enforcement framework, enabling the early detection of violations without relying solely on expensive and geographically limited physical inspections (Rechtschaffen et al., 2021). In Germany, air quality monitoring systems based on IoT (Internet of Things) sensors distributed nationwide provide real-time data that significantly assist law enforcement authorities in identifying pollution sources.

Developing countries have also gradually begun adopting monitoring technologies, although their capacities remain relatively limited. Brazil, through the Instituto Nacional de Pesquisas Espaciais (INPE), has successfully developed a satellite-based deforestation monitoring system recognized as one of the most advanced in the world. The PRODES and DETER systems developed by INPE are capable of detecting changes in forest cover in near real-time and providing data used by enforcement authorities to identify illegal logging activities and unlawful land clearing (Hochstetler, 2022). Brazil's experience demonstrates that, with sufficient commitment and investment, developing countries can also establish competitive technological capacities in environmental law enforcement.

DISCUSSION

1. Implementation of Sanctions and Enforcement Against Violations

a. Sanction Systems in Developed Countries

Sanction frameworks in developed countries are generally multilayered and proportional to the severity of environmental violations committed. In the United States, the United States Environmental Protection Agency (EPA) possesses the authority to impose administrative, civil, and criminal penalties on environmental offenders, with civil fines reaching tens of thousands of dollars for each day a violation continues (Rechtschaffen et al., 2021). The effectiveness of this system lies not only in the severity of penalties but also in the consistency of enforcement. Research indicates that consistent enforcement plays a more decisive role in creating a deterrent effect than merely imposing severe sanctions that are rarely applied in practice.

The European Union has gone further by adopting the Environmental Crime Directive, which obliges member states to criminalize serious environmental offenses, including water and air pollution threatening human life, illegal wildlife trade, and unlawful hazardous waste management. This development reflects the recognition that administrative and civil sanctions alone are insufficient to deter organized environmental crimes (von Stein, 2022).

One significant innovation within developed countries' sanction systems is the application of restorative mechanisms, whereby offenders are not only fined but are also required to restore the environmental damage they have caused. The Environmental Liability Directive of the European Union, for instance, establishes the principle that operators responsible for environmental harm must finance environmental restoration to its original or an equivalent condition. This mechanism generates a dual effect by creating deterrence while simultaneously ensuring concrete efforts toward environmental recovery.

b. Challenges in the Application of Sanctions in Developing Countries

In developing countries, the implementation of sanctions for environmental violations faces a series of interconnected challenges that reinforce one another. First, law enforcement agencies often encounter difficulties in gathering sufficient scientific evidence to support legal proceedings, mainly due to inadequate laboratory facilities and the limited availability of trained environmental forensic experts (Suharto & Maulana, 2022).

Second, and more fundamentally, corruption and collusion between violators and law enforcement officials significantly weaken the effectiveness of sanctions. Alan Boyle and James Harrison (2023) observed that in several developing countries, large industrial actors responsible for environmental violations are frequently protected by political and bureaucratic networks that enable them to avoid legal penalties despite clear evidence of wrongdoing. Such conditions create a perception of impunity, which in turn undermines overall compliance with environmental regulations.

Third, the level of sanctions established by law is often too low to create a meaningful deterrent effect. In Indonesia, for example, administrative fines for certain environmental violations remain outdated and considerably lower than the profits gained from unlawful activities. When penalties are treated merely as a cheaper “cost of doing business” compared to compliance expenses, the sanction system loses its primary function as a deterrent mechanism (Susilowati et al., 2023).

India provides a partial exception through the establishment of the National Green Tribunal (NGT), which has the authority to impose more substantial financial penalties. Lavanya Rajamani and Shibani Ghosh (2021) documented several NGT decisions imposing significant fines on corporations proven to have committed severe pollution offenses, thereby sending a strong signal to industrial actors. Nevertheless, the execution of NGT decisions continues to encounter technical and bureaucratic obstacles that reduce their practical impact.

c. Innovations in Enforcement Mechanisms

Despite the numerous challenges faced by developing countries, several of them have successfully introduced innovative enforcement mechanisms worthy of attention. Brazil, through the Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA), developed a blacklist system targeting companies that violate environmental regulations. This mechanism effectively restricts access to financial credit from state-owned banks for listed companies. Known as the “lista suja,” the system has proven more effective than conventional administrative sanctions in promoting compliance because it directly affects the economic interests of corporations (Hochstetler, 2022).

Indonesia has also developed the Program for Pollution Control, Evaluation, and Rating (PROPER), a public rating system designed to assess and publicly disclose corporate environmental performance. PROPER has been shown to encourage significant environmental improvements among participating companies, particularly large corporations that are sensitive to reputational concerns among the public and investors (World Bank, 2023). Such innovations demonstrate that information-based and reputation-based instruments can serve as important complements to traditional sanction mechanisms, especially in contexts where direct enforcement encounters substantial limitations.

2. Public Participation and Environmental Awareness

a. The Role of Civil Society and Environmental Organizations

In effective environmental law enforcement systems, civil society functions not merely as an observer but as an active actor with an essential complementary role. In developed countries, non-governmental environmental organizations have long served as watchdogs monitoring industrial compliance, as litigants bringing environmental violations before courts in the public interest, and as governmental partners in the formulation of environmental policies (Gunningham, 2020). In the United States, the right of citizens to initiate lawsuits against environmental violations commonly known as “citizen suits” and regulated under various federal environmental laws—has created a highly effective parallel enforcement mechanism that is often more responsive than government-led enforcement.

Europe applies a similar mechanism through the Aarhus Convention, which grants the public rights to access environmental information, participate in environmental decision-

making processes, and seek justice in environmental matters. The implementation of the Aarhus Convention across Europe has encouraged the growth of active and capable civil society organizations that monitor and challenge decisions potentially harmful to the environment (von Stein, 2022).

In developing countries, however, civil society participation in environmental law enforcement faces far more difficult circumstances. Although environmental organizations in Indonesia, India, and Brazil have expanded significantly during the past two decades and demonstrated stronger advocacy capacity, they often operate in environments that are not fully supportive. In some countries, environmental activists encounter intimidation, criminalization, and even threats to their personal safety when attempting to expose environmental violations connected to major economic interests (Alan Boyle & James Harrison, 2023).

Global Witness, through its annual reports, has consistently documented that the majority of killings and acts of violence against environmental defenders occur in developing countries, particularly in Latin America and Southeast Asia. This reality demonstrates that public participation in environmental law enforcement is not solely a technical or institutional matter, but also a human rights and security issue requiring serious attention.

b. Access to Information and Transparency

Transparency and access to environmental information constitute fundamental prerequisites for meaningful public participation in environmental law enforcement. Developed countries generally maintain more advanced systems of environmental reporting and information disclosure. In the United States, the Toxics Release Inventory (TRI) requires thousands of industrial facilities to publicly report their annual emissions and disposal of hazardous chemicals, thereby creating transparency pressures that encourage environmental compliance even without direct enforcement intervention (Rechtschaffen et al., 2021).

In developing countries, public access to environmental information remains considerably limited. Many environmental quality monitoring data are not publicly disclosed, licensing procedures lack transparency, and environmental impact assessment reports are difficult for the public to obtain. Such conditions create significant information asymmetry between governments, industries, and communities, ultimately weakening effective public participation in environmental oversight (Susilowati et al., 2023).

The World Bank (2023), in its recent report, emphasized that investment in open and publicly accessible environmental information systems represents one of the most effective and cost-efficient strategies for improving environmental compliance. The report highlighted several experiences from developing countries where industrial compliance improved significantly simply because environmental monitoring data became publicly available, even before direct enforcement capacity was strengthened.

c. Environmental Education and Awareness

Public environmental awareness is often overlooked in discussions of law enforcement, despite its substantial influence on the effectiveness of environmental governance as a whole. In developed countries with high levels of environmental awareness as reflected in numerous public opinion surveys there is strong societal support for strict environmental policies, which in turn provides legitimacy and political space for firm law enforcement measures (Gunningham, 2020).

Environmental education integrated into school curricula from an early stage, as practiced in Nordic countries, represents a long-term investment that cultivates citizens who are intrinsically concerned about environmental sustainability. Such individuals tend to comply with environmental regulations not merely out of fear of sanctions, but because they recognize the importance of environmental protection for collective well-being. Although this cultural

dimension is difficult to measure directly, its impact on the success of environmental law enforcement systems is highly significant.

In developing countries, environmental education has shown positive progress in recent years, although it remains insufficient. The expansion of youth environmental movements worldwide, partly inspired by global initiatives such as Fridays for Future, has created new forms of social pressure that increasingly influence environmental political dynamics even in developing nations. This phenomenon indicates that environmental awareness is growing rapidly, although it must be accompanied by structural transformation in order to produce substantial improvements in environmental law enforcement (United Nations Environment Programme, 2024).

CONCLUSION

This study produces several important conclusions regarding the comparison of environmental law enforcement systems in developed and developing countries.

First, there is a substantial gap in the quality and consistency of regulatory frameworks between the two groups of countries. Developed countries generally possess more cohesive regulations, supported by regular evaluation mechanisms and designed with realistic implementation capacities in mind. In contrast, developing countries frequently experience a regulatory paradox in which numerous legal norms exist but implementation remains weak, reflecting a mismatch between normative aspirations and institutional capacity.

Second, disparities in institutional capacity represent the most decisive factor explaining differences in the effectiveness of environmental law enforcement between developed and developing countries. Differences in budget allocation, the number and qualifications of personnel, technical infrastructure, and coordination mechanisms create significant variations in the actual ability to monitor, detect, investigate, and respond to environmental violations.

Third, an effective sanction system requires more than merely imposing severe penalties. It also depends on consistent enforcement, adequate evidentiary capacity, the integrity of enforcement officials, and concrete environmental restoration mechanisms. Developed countries demonstrate stronger performance across these dimensions, although they are not entirely free from enforcement challenges. Innovations introduced by several developing countries, such as Brazil's blacklist system and Indonesia's PROPER program, illustrate the potential of non-traditional instruments in complementing conventional sanction mechanisms.

Fourth, public participation constitutes a crucial pillar of environmental law enforcement that is often underestimated. Evidence from developed countries demonstrates that strong and institutionalized public participation can substantially improve enforcement effectiveness, even when direct governmental capacity is limited. In developing countries, this potential has not yet been fully utilized, partly because of structural barriers such as restricted access to information, shrinking civic space, and threats against environmental defenders.

Fifth, and perhaps most importantly, the effectiveness of environmental law enforcement is not determined solely by a country's level of economic prosperity. Factors such as political commitment, governance quality, institutional independence, and the active involvement of civil society have proven to play equally important if not more important roles than economic wealth itself. This finding offers an encouraging message: improving environmental law enforcement in developing countries is a realistic possibility rather than an unattainable aspiration that must wait until a certain level of economic development is achieved. Based on the findings and conclusions of this study, several suggestions and policy recommendations can be proposed.

For developing countries, the primary priority should be directed toward strengthening the institutional capacity of environmental law enforcement agencies, particularly in terms of budget allocation, human resources, and technical infrastructure. Such investment should not be viewed as an unnecessary expense, but rather as a strategic investment capable of generating long-term benefits that significantly outweigh the costs involved.

Second, developing countries need to seriously address the problem of institutional fragmentation and establish more effective coordination mechanisms among agencies with environmental responsibilities. The establishment of a coordinating institution equipped with adequate authority and resources should therefore be carefully considered as an important policy option.

Third, reforms of sanction systems are necessary to ensure that fines and legal consequences accurately reflect the actual scale of environmental damage and create a genuine deterrent effect. In addition, the exploration of innovative instruments such as deposit-refund mechanisms, performance bonds, and environmental liability insurance should be expanded and strengthened.

Fourth, improving transparency and public access to environmental information should become a major policy priority, considering that it has proven to be one of the most effective and cost-efficient methods for encouraging compliance. Open environmental information platforms that are accessible and understandable to the general public should be developed in every country.

For the international community, stronger technical and financial support is needed to assist developing countries in enhancing their environmental law enforcement systems. The transfer of environmental monitoring technologies, the exchange of best practices, and technical assistance for institutional reform represent concrete forms of support that could generate significant positive impacts.

Finally, further research is required to deepen understanding of effective policy transfer mechanisms from developed countries to developing countries while taking local contexts into account. Additional studies are also necessary to examine the socio-cultural factors that influence the success of environmental law enforcement systems across different settings and conditions.

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