



Implementation of the polluter pays principle in the settlement of soil pollution disputes

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ABSTRACT

Background: The Polluter Pays Principle (PPP) is a fundamental principle of environmental law that requires polluters to bear the costs of pollution prevention, mitigation, and environmental restoration. Despite its recognition in Indonesian environmental governance, the implementation of this principle remains inconsistent in resolving soil pollution disputes. **Method:** This study aims to examine the implementation of the Polluter Pays Principle in environmental disputes involving PT X. The research employs a normative juridical approach supported by a case analysis of two judicial decisions concerning soil contamination caused by hazardous and toxic (B3) waste. **Findings:** The findings indicate that although PT X has significantly contributed to Indonesia's crude oil production, its operations have also resulted in soil contamination that adversely affected surrounding communities. Analysis of the dispute reveals that compensation was only partially awarded, while environmental restoration costs accounted for merely 12% of the agreed settlement. The study further identifies both normative and procedural barriers to the effective implementation of the Polluter Pays Principle, including the absence of explicit statutory regulation and the reliance on general legal provisions supplemented by technical government regulations. **Conclusion:** The study concludes that these structural limitations hinder comprehensive compensation and environmental restoration, thereby weakening environmental justice and the protection of affected communities' rights. **Novelty/Originality of this article:** This research lies in its integration of normative legal analysis with judicial case evaluation to demonstrate how statutory gaps and procedural deficiencies jointly impede the effective implementation of the Polluter Pays Principle in Indonesia's soil pollution dispute resolution.

KEYWORDS: disputes; polluter pays principle; soil pollution.

1. Introduction

Indonesia is renowned for its remarkable and stunning natural resources. Indonesia is one of the nations with an abundance of natural resources due to its vast tropical rainforests, rich minerals, high biodiversity, and other natural resources. But despite its enormous potential, Indonesia nevertheless faces significant environmental management issues. In addition to the previous decades' fast industrialization, urbanization, and economic growth, Indonesia is also under mounting environmental pressure. Massive deforestation, harm to ecosystems, and deterioration of air and water quality have resulted from the extension of land for oil palm plantations, illicit logging, and natural resource extraction. Furthermore, Indonesia's environmental conditions have gotten worse due to rising greenhouse gas emissions and global climate change (Yustitiningtyas et al., 2025). According to Article 33 paragraphs (2) and (3) of the 1945 Constitution of the Republic of

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Indonesia, petroleum and natural gas are regarded as among the most essential natural resources of the State, contributing significantly to the improvement of the people's welfare. These resources constitute part of the nation's natural wealth contained within the land and waters of Indonesia, which shall be utilized by the State for the greatest prosperity of the people. The State's authority over petroleum and natural gas resources is exercised through exploration and exploitation activities, which form an integral part of the oil and gas industry (Mulyawan, 2023).

Exploration and production of gas and oil have been essential to the world's economic growth including Indonesia. Large-scale manufacturing has historically influenced soil lead concentrations in both urban and rural environment (Apabaga, 2025). These operations frequently have a substantial negative impact on the environment, especially when it comes to soil contamination. A vital component of terrestrial ecosystems, soil performs vital tasks such water filtration, nitrogen cycling, and providing habitat for a wide variety of creatures. But human activities, especially the production of oil and gas, have seriously contaminated the soil, endangering both human health and the ecology. These essential processes can be interfered with by the entry of contaminants like heavy metals and petroleum hydrocarbons into the soil, which can have long-term effects on the environment and human health (Kuer & Onger, 2025).

The processes involved in oil and gas production such as drilling, transportation, and refining will have the potential to discharge various pollutants into the environment. These contaminants frequently reach the soil through accidental spills, leakages, or inadequate waste management. Petroleum hydrocarbons, including both aliphatic and aromatic compounds, are commonly introduced into soils during extraction operations. Such substances tend to persist in the environment, causing soil degradation and posing risks to surrounding flora and fauna. In addition, heavy metals such as lead (Pb), cadmium (Cd), chromium (Cr), and mercury (Hg) are often linked to oil and gas production activities. These elements may infiltrate the soil through multiple routes, including the disposal of industrial waste or leaching from contaminated materials. Over time, the accumulation of heavy metals in soil can reduce its fertility, impair plant growth, and increase the likelihood of bioaccumulation within the food chain (Kuer & Onger, 2025).

Oil spills and residues from oil and gas production have severe impacts on soil quality and ecosystem stability. When pollutants and heavy metals enter the environment, they infiltrate the soil, altering its physical and chemical characteristics. Such contamination often increases soil pH, disrupts nutrient availability, and reduces fertility by lowering the cation exchange capacity (CEC). Moreover, oil pollutants disturb microbial communities essential for nutrient cycling and organic matter decomposition. This disruption decreases microbial biomass and enzyme activity, leading to reduced biodiversity and impaired soil recovery. Prolonged contamination causes long-term soil degradation, diminishing agricultural productivity and ecosystem resilience. Beyond soil impacts, oil spills can contaminate food chains and water sources, posing additional environmental and human health risks (Kuer & Onger, 2025).

Considering soil's crucial function in agricultural production, contamination of soil poses serious risks to food security and public health, as harmful pollutants can be absorbed by crops and transferred through the food chain. Moreover, as a vital component of the ecosystem, soil pollution undermines soil biodiversity and disrupts the ecological services it provides. Therefore, addressing soil pollution has become an urgent priority recognized globally as well as nationally (Lu & Faure, 2020). One of the oil and gas exploration and production activities conducted in Indonesia, specifically in Riau Province, is carried out by PT X. According to PT X's official website, since 1952 the company has been Indonesia's largest oil producer, with a cumulative production of approximately 12 billion barrels, contributing around 40% of the nation's total crude oil output as of August 8, 2021. In the course of its operations, PT X engages in the exploitation, transportation, and processing of crude oil. However, these activities also pose significant environmental risks, including the potential for soil contamination resulting from oil leaks, spills, and the discharge of hazardous and toxic waste (B3) generated during operational processes. Several reports

and studies have indicated long-term environmental impacts, such as the degradation of soil and water quality in areas surrounding PT X's operational sites.

Environmental impacts, such as the contamination of resident's land by hazardous and toxic waste (B3), have prompted affected communities to file lawsuits seeking compensation. One notable case involving PT X concerns a lawsuit filed by the Indonesian Forest Destruction Monitoring Agency/*Lembaga Penyelesaian Perselisihan Hubungan Industrial (LPPHI)* against PT X at the Pekanbaru District Court, alleging environmental pollution within the operational area of the Rokan Block. *LPPHI*, represented by several law firms, initiated a class action following 297 public complaints submitted to the Environmental and Forestry Service Offices of Siak, Rokan Hilir, Pekanbaru, and Bengkalis Regencies. Of these, 149 complaints were verified, including confirmed coordinates and evidence of environmental degradation allegedly caused by oil waste from PT X. The pollution reportedly affected soil, rice fields, plantations, and the surrounding environment in general. These cases subsequently gave rise to legal demands against PT X concerning its environmental restoration obligations, forming a crucial foundation for examining the implementation of the Polluter Pays Principle (PPP) within the Indonesian environmental law framework.

Environmental degradation results from human activities that cause direct or indirect alterations to the physical, chemical, and/or biological conditions of the environment, exceeding established quality standards. Under Article 87 of the Environmental Protection and Management Law, business actors or individuals proven to have engaged in unlawful conduct leading to such degradation may be required to provide compensation and/or undertake remedial measures. This reflects the implementation of the Polluter Pays Principle (PPP) in environmental law, which places the financial responsibility for environmental harm on the polluting party (Implementation of the Polluters Pays Principle in The Case of PT Y).

The essence of the Polluter Pays Principle (PPP) lies in requiring those responsible for environmental pollution to bear the costs of remediation and restoration. Individuals or enterprises that exploit natural resources or release harmful substances into the environment are obliged to compensate for the resulting damage. Companies must assume full responsibility for environmental harm arising from their operations and contribute to rehabilitation efforts, while the state ensures accountability for losses affecting people, biodiversity, and ecosystems. The PPP thus shifts the financial burden of pollution control and waste management from the government to the polluting entities themselves (Thiet, 2021).

The historical principles of climate injustice stipulate that past polluters and/or their successors bear responsibility for the adverse consequences arising from historical emissions that affect both present and future generations. Such responsibility may be discharged through two primary mechanisms. First, past polluters and/or their successors may provide support to those who contributed comparatively less to historical emissions, particularly developing and least-developed countries. Second, they may facilitate the transfer of resources—both economic and technological—to developing and least-developed countries in order to promote green economic growth, strengthen adaptive capacity to climate-related threats, and provide compensation in circumstances where climate disruption is unavoidable (Corvino, 2023).

The adoption of the Polluter Pays Principle (PPP), originally introduced by the OECD, into Indonesia's environmental legislation serves as one of the legal foundations for holding companies or individuals accountable for environmental pollution. However, in practice, environmental contamination particularly soil pollution on oil palm plantations in several areas of Riau Province continues to occur. According to the case register under number 150/PDT.G/LH/2021/PN.Pbr pollution involving a compensation claim took in some places like Siak regency, Bengkalis regency, Rokan Hilir regency, and Pekanbaru regency. The lawsuit was filed by one of the organization in environment called Indonesian Forest Destruction Monitoring Agency (*LPPHI*) against X at the Pekanbaru District Court against PT X. The pollution, resulting from petroleum and natural gas extraction activities, allegedly

involved PT X disposing of hazardous and toxic (B3) waste into surrounding areas, contaminating the plaintiff's oil palm plantation and soil. X stated that it had allocated funds for environmental restoration due to the B3 waste for 121 victims of 297, yet the remaining affected communities have not received adequate compensation. This description illustrates that the implementation of the polluter pays principle remains ineffective in practice. Therefore, further research is necessary to assess the effectiveness of PPP implementation and to identify the factors hindering its effectiveness.

After operating for several decades, PT X has not only contributed oil and gas production to the Indonesian economy but has also been associated with environmental pollution, including soil and water contamination, adversely affecting communities residing in areas surrounding its petroleum operations. The losses suffered by these communities should, in principle, be compensated in accordance with the applicable laws under the Polluter Pays Principle. This study examines two specific cases involving PT X to assess whether the principle has been effectively implemented or whether obstacles persist in its application.

2. Methods

This research employs a normative juridical method with a case approach. Normative legal studies are closely connected to legal practice, particularly concerning two main aspects the formulation and the implementation of law. Normative legal research constitutes a form of legal inquiry that concentrates on the examination of prevailing positive legal norms. The primary objects of analysis encompass statutory provisions, legal principles, doctrinal perspectives, and judicial decisions. Within this framework, law is conceptualized as a coherent and systematic body of norms governed by internal logical consistency. The approach employed in this study is juridical-normative, involving the analysis of legal rules through their structural logic and the underlying principles they embody. The research relies on primary legal materials, including legislation, government regulations, and court judgments, complemented by secondary materials such as scholarly writings and academic journals (Masnun et al., 2025).

In addition, this research also applies a literature study approach by reviewing statutory regulations, scholarly books, journals, and other written materials relevant to the topic. Three types of legal materials are utilized in this study (primary, secondary, and tertiary legal materials) (Muhaimin, 2020). The primary legal materials consist of statutory provisions under the Law on Environmental Protection and Management, Minister of Environment Regulation Number 7 of 2014, Ministerial Regulation P.101/2018. This study analyzes two judicial decisions involving PT X concerning environmental liability arising from soil contamination. The selected cases were chosen because they directly address claims for compensation and environmental restoration, thereby providing a relevant basis for assessing the practical application of the Polluter Pays Principle within Indonesian environmental adjudication. The analysis evaluates the courts' reasoning based on three criteria - (1) the legal basis invoked, (2) the interpretation and application of the Polluter Pays Principle, and (3) the treatment of environmental compensation and restoration claims.

This research employs a normative juridical method combined with a case-oriented analysis of selected judicial decisions concerning environmental disputes. Accordingly, the discussion is confined to the examination of legal reasoning and judicial interpretation as reflected in court rulings and relevant statutory frameworks. This study does not include empirical data, such as field-based observations or interviews with stakeholders, which could offer further insight into the practical implementation of the Polluter Pays Principle. Nonetheless, the normative juridical approach remains suitable for assessing the coherence and effectiveness of legal norms and judicial practices within environmental law enforcement.

3. Results and Discussion

3.1 *The implementation of the polluter pays principle in the settlement of soil pollution disputes arising from the activities of PT X*

The polluter pays principle was first explicitly recognized at the international level in 1972 through the OECD Council Recommendation on Guiding Principles Concerning the International Economic Aspects of Environmental Policies. The modern formulation of this principle was subsequently reflected in Principles 21 and 22 of the 1972 Stockholm Declaration. Following this, the Single European Act (1986) and the European Charter on the Environment and Health (1989) incorporated provisions supporting the application of the principle. Later, the United Nations Conference on Environment and Development (1992) reaffirmed the principle through Principle 15 of the Rio Declaration, which provided a strong normative basis for its global recognition. This development marked a significant milestone in the evolution of international environmental law, establishing the *polluter pays principle* as a widely accepted state practice and granting it recognition within domestic and international judicial systems (Inwang, 2021).

According to the OECD, pollution control entails various types of costs, including the costs of implementing anti-pollution policies, environmental measurement and monitoring, research, technological development for pollution management, and the maintenance of waste treatment facilities. The OECD applies seven main policy instruments to support this principle, namely direct control; taxation; payments; subsidies; incentive-based policies (such as tax incentives, credit facilities, and accelerated debt repayment); pollution rights trading, and levies. Thus, the OECD emphasizes the importance of adopting diverse policy instruments to reduce environmental pollution and to uphold the Polluter Pays Principle by imposing financial burdens and responsibilities on polluting parties (Nugroho et al., 2024).

In Indonesia, the Polluter Pays Principle (PPP) is regulated under Law Number 32 of 2009 concerning Environmental Protection and Management (Law No. 32/2009), which stipulates the principle in Article 87 paragraph (1) stating that “Every person in charge of a business and/or activity who commits an unlawful act in the form of environmental pollution and/or destruction that causes harm to other persons or to the environment shall be obliged to pay compensation and/or undertake certain actions.” Furthermore, Minister of Environment Regulation Number 13 of 2011 concerning Compensation for Environmental Pollution and/or Damage, in Article 3, provides that “Any person in charge of a business and/or activity who commits an unlawful act in the form of environmental pollution and/or environmental damage that causes harm to other persons, the community, and/or the environment or the state shall be obliged to- a) undertake certain actions; b) pay compensation.” These provisions clearly adopt the Polluter Pays Principle, establishing that every business actor or individual is legally responsible for providing compensation when causing environmental pollution.

The Polluter Pays Principle (PPP) emphasizes the strict liability of business actors for environmental pollution resulting from their activities. This principle reflects the notion that enterprises generating waste and causing environmental degradation must bear the financial responsibility for the resulting impacts. The implementation of the Polluter Pays Principle (PPP) in holding business entities legally accountable for environmental pollution caused by hazardous and toxic waste (B3 waste) involves three main legal dimensions (civil, criminal, and administrative). The civil aspect governs compensation and environmental restoration, while the criminal aspect enforces penalties for environmental violations. Meanwhile, the administrative aspect ensures compliance with environmental licensing regulations and imposes sanctions in cases of non-compliance. Overall, the application of PPP serves as a fundamental basis for enforcing legal accountability, underscoring the obligation of business actors to address the environmental impacts arising from B3 waste pollution (Nugroho et al., 2024).

Jurist Michel Despax describes environmental damage as “harm that infringes upon elements of the ecological system, which, due to its indirect and diffuse character, does not

necessarily confer a right to compensation.” In contrast, R. Drago views the environment as the source of harm rather than its victim, defining environmental damage as “injury suffered by individuals or property as a result of their surrounding environment.” Meanwhile, Michel Prieur highlights the importance of distinguishing between pollution-related damage that affects people and property, and harm that directly impacts the natural environment itself (Ouakouak, 2025).

In Indonesia, hazardous and toxic waste (B3 waste) is generated from oil and gas exploration activities, leading to soil contamination. One of the most immediate consequences of oil and gas production on soil is contamination by hydrocarbons and heavy metals. Spills and leaks that occur during drilling, storage, or transportation of petroleum products result in the accumulation of crude oil and refined petroleum substances in the soil. These pollutants frequently contain polycyclic aromatic hydrocarbons (PAHs), which are highly toxic and resistant to degradation. Research in Alberta, Canada, for instance, revealed considerable soil pollution surrounding oil sands operations, with elevated concentrations of arsenic, lead, vanadium, and PAHs. Similarly, in Assam, India, oil exploration and transport have caused recurrent contamination of farmland, reducing soil microbial diversity, decreasing enzyme activity, and lowering crop productivity. Research in Nigeria’s Niger Delta, repeated oil spills from pipelines and illegal refining activities have produced severe PAH accumulation in soils, which persist for long periods, damaging soil quality and posing serious risks to food safety and human health through bioaccumulation. Hydrocarbon pollution alters soil chemistry, reduces fertility, and disrupts microbial processes crucial for nutrient cycling (Kuer & Ongeri, 2025).

Further research highlight that petroleum contamination exerts a profound effect on human health, primarily originating from oil extraction, refining processes, and natural gas operations. It is considered one of the most pervasive forms of pollution, impacting both the natural environment and its biotic and abiotic components. Numerous studies have reported elevated health risks among populations residing near oil fields or engaged in oil spill remediation activities. Exposure to petroleum-derived pollutants has been linked to a range of health disorders, including skin and eye irritation, respiratory tract and mucous membrane damage, as well as kidney, liver, and reproductive complications. In addition a rise in petroleum-related ailments such as skin rashes, sore throats, organ inflammation, infertility, and miscarriages. Moreover, scientific evidence indicates that petroleum-induced DNA damage contributes to genetic instability within cellular metabolic enzymes, potentially leading to malignancies such as leukemia. Several studies, as illustrated in Figure 1, have examined the adverse impacts of petroleum pollutants on human health (Falih et al., 2024).

In addition, further research found that oil pollution also has a significant impact on agricultural productivity, with the severity of contamination largely depending on the level and duration of exposure to petroleum pollutants. Recent findings suggest that selecting and cultivating plant species capable of adapting to crude oil contamination offers a safer and more cost-efficient alternative compared to conventional remediation methods, particularly in addressing food security and environmental degradation issues linked to oil pollution. Research has shown that even minimal concentrations of used motor oil can severely alter soil properties, with phytochemical analyses revealing its inhibitory effects on plant growth. A number of studies have further demonstrated that oil contamination alters the physical characteristics of soil, thereby affecting the stability and habitability of nearby residential areas. This occurs because organic pollutants modify the soil’s geotechnical behavior. Experimental results indicate that key physical parameters such as moisture content, liquid limit, and plastic limit deteriorate as a result of oil exposure, while hydraulic conductivity was found to decrease by approximately 10% due to contamination. Khalefah et al. (2024), pollution in such environments occurs when humans, either directly or indirectly, introduce harmful substances that cause adverse effects on ecosystems and habitats. These impacts illustrate the necessity of strict corporate accountability mechanisms, particularly through the implementation of the polluter pays principle (Triana et al., 2024).

The case of soil pollution caused by hazardous and toxic waste (B3 waste) by PT X occurred in several locations. One of the cases was Decision Number 150/PDT.G/LH/2021/PN.Pbr, filed against PT X concerning B3 waste in the form of oil-contaminated soil/*Tanah Terkontaminasi Minyak (TTM)*. In its report to the Environmental and Forestry Service of Riau Province, there were 297 complaints recorded, among which 198 had been verified in collaboration with PT X, confirming that the reported locations contained oil-contaminated soil. Furthermore, 165 out of the 297 complaints had undergone delineation, which refers to a vertical drilling effort aimed at collecting soil samples and identifying the presence, extent, location, and depth of contamination. The results of the delineation were then used to develop a work plan, including the size of the affected area, the required working zone, and the access routes to the cleanup sites. Despite these delineation efforts, only 121 cases received financial compensation for losses arising from oil-contaminated land, while the remaining cases are still under processing.

Meanwhile in this case, one of the victim asserted that the oil palm plantation land in Manggala Sakti Village had been polluted due to a leakage of B3 waste originating from PT X's operations. Initially, the contamination affected only about half a hectare of land in 2003, but by 2021 it had expanded to approximately 2.5 hectares. The pollution, however, has not been properly remediated by PT X. According to the plaintiff, the handling carried out involved merely scraping off the oil layer up to a depth of 5 cm, placing it into sacks, and covering it with yellow soil. The plaintiff claimed that such remediation efforts only lasted for about two months before the B3 waste resurfaced. This case clearly demonstrates that PT X has not implemented the Polluter Pays Principle, as no compensation was provided to the affected party.

Based on the case mentioned in the first point, the cost of Abandonment and Site Restoration (ASR) in the Rokan Working Area (WK Rokan) was determined by SKK Migas at USD 2,214,000,000 based on the Specific Environmental Audit conducted by PT Z. The audit results were formalized through the Decree of the Director General of Waste and Hazardous Material Management (PSLB3), Ministry of Environment and Forestry, Number S.359/PSLB3/PLB.4/9/2020 dated September 25, 2020, concerning the environmental remaining liabilities of WK Rokan – PT X. PT X contributed 12% of the total ASR cost, amounting to USD 265,680,000 which was not included in cost recovery calculations. The distribution of ASR costs between PT X and the Government followed the Production Sharing Contract (PSC) scheme, where PT X's share as the contractor (KKKS) averaged 12%, with the remaining 88% borne by the Government. However, this cost allocation poses potential legal and financial challenges if the ASR fund later proves insufficient to cover post-mining activities, particularly if new environmental pollution or damage is discovered from PT X's past operations. Since September 9, 2021, the Rokan Working Area has been transferred to PT A, which has been assigned by the Government—through SKK Migas Letter No. SRT-0406/SKKMA0000/2021/S1 dated July 26, 2021—to continue post-operational remediation and handle oil-contaminated soil (*TTM*) resulting from PT X's activities.

PT X reported that it had financed part of the projected post-operation activities, including the remediation of remaining oil-contaminated soil across the Rokan Block, amounting to USD 265,680,000 in relation to post-operational and recovery activities. However, pursuant to the provisions set forth by SKK Migas, the estimated cost for post-operational mining activities in the Rokan Working Area (WK Rokan) was determined to be USD 2,214,000,000 (two billion two hundred fourteen million United States dollars). Despite this, PT X agreed to contribute only 12% of the total post-operational cost, equivalent to USD 265,680,000 (two hundred sixty-five million six hundred eighty thousand United States dollars). Nevertheless, only 121 out of 297 reported cases received financial compensation. The report from one of the victims mentioned above further demonstrates that the issue of oil-contaminated soil has not been adequately resolved, indicating that the implementation of the polluter pays principle procedures remains uneven and incomplete.

The soil pollution caused by hazardous and toxic waste (B3 waste) from PT X not only harmed the plaintiffs mentioned above but also affected other residents living near the

company's mining operations. The Polluter Pays Principle clearly stipulates that both individuals and corporations responsible for environmental pollution must bear the costs of remediation, including compensation. However, in practice, PT X failed to implement this principle in the case discussed above, resulting in prolonged soil contamination over an extended period. Moreover, the lawsuits filed in court concerning the case did not yield favorable outcomes for the affected communities. Not every victim's compensation was granted, nor were there all victims environmental restoration measures undertaken. In particular, in Decision Number 150/PDT.G/LH/2021/PN.Pbr, the court declared both the claim and the exception inadmissible. Consequently, there was no effective implementation of the Polluter Pays Principle in the case, even after judicial proceedings. Therefore, based on the case discussed above, it can be concluded that the implementation of the Polluter Pays Principle by PT X remains ineffective, as compensation were not for all of the victims and restoration remain incomplete. The Court held that, among all the claimants, several cases that had not yet been addressed were still undergoing remediation processes, and therefore no violation of Article 54 of the Environmental Protection and Management Law/*Undang-Undang Perlindungan dan Pengelolaan Lingkungan Hidup (UUPPLH)*, Article 410 of Government Regulation No. 22 of 2021, or Article 2 of Ministerial Regulation of the Ministry of Environment and Forestry No. 101 of 2018 was established. Such assessment was based solely on the evidence presented during the trial proceedings. However, in practice, affected communities have not yet fully received compensation commensurate with the losses they have suffered.

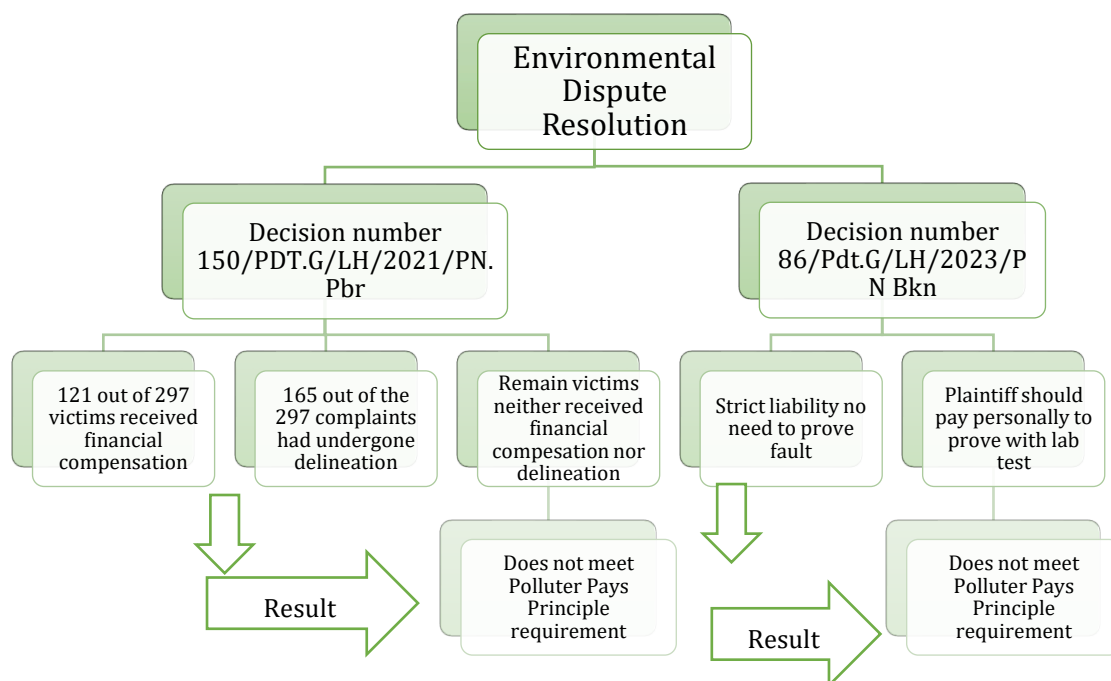


Fig. 1. Charts of case result

The absence of national technical standards for assessing environmental damage adds further complexity. Although the Ministry of Environment and Forestry (*Kementerian Lingkungan Hidup dan Kehutanan/KLHK*) has prepared several valuation guidelines, none have been officially established as binding regulations. As a result, many judgments depend on varying expert assessments, creating inconsistencies in rulings and contributing to legal uncertainty. In addition, legal challenges emerge from the ambiguity of environmental restoration orders. Certain court decisions issue broad directives without clear success indicators, timelines, or monitoring frameworks, making such orders risk becoming purely procedural. Further study is necessary to address these gaps and enhance the effectiveness of environmental litigation in Indonesia. Research indicates that in the absence of external

supervision, many companies either neglect to fully carry out their restoration duties or limit compliance to administrative requirements (Alvina et al., 2025).

In the proposed interpretation of the polluter pays principle (PPP), the government does not need to determine in advance who is responsible for carbon emissions. Nevertheless, the government plays an important role in shaping the proportion of the economic burden of the tax. For example, competition law and policy can influence market structure. Since market structure affects how the tax burden is distributed, it also impacts the allocation of responsibility for emissions. Additionally, governments can increase the elasticity of demand for certain products to reduce the tax burden borne by consumers. For instance, by investing in public transportation systems, the government can decrease citizens' dependence on private vehicles, thereby lowering the carbon price passed on to consumers in the road transport sector. Consequently, as the tax burden on consumers decreases, their share of responsibility diminishes, while that of producers increases (Heine et al., 2020).

3.2 Factors hindering the effectiveness of the implementation of the polluter pays principle in the context of environmental law enforcement in Indonesia

The Polluter Pays Principle (PPP), in economic terms, is often referred to as the "Principle of bearing external costs." This concept asserts that the expenses associated with pollution control should be borne by the polluter, who must treat them as part of the cost of doing business. Consequently, the prices of goods and services in the market should reflect not only the cost of raw materials but also the cost of environmental resources utilized in production. The fundamental purpose of this principle is to enable everyone to live in a satisfactory and healthy environment while ensuring that genuine pollution is effectively eliminated. To achieve this, various mechanisms have been established, such as pollution fee systems, emission restrictions, and financial instruments like compensation and tax incentives (Abdullah & Al-Maliki, 2024).

From a legal perspective, the Polluter Pays Principle is understood in two dimensions. First, any party causing environmental harm to others is required to provide appropriate compensation. Second, it requires that the person or entity responsible for environmentally harmful activities bear all costs necessary to prevent the occurrence of such harm. In this context, one jurist has noted that the notion of "Absolute freedom to pollute" no longer exists, meaning that any country generating hazardous waste must bear the full cost of preventing damage to other states through which such waste passes. According to Srinivas Rao, Special Rapporteur of the International Law Commission, the Polluter Pays Principle represents the most effective mechanism for distributing the costs associated with pollution prevention and control, encompassing both preventive and remedial measures. Likewise, the legal scholar Jean-Pierre Hannequart (1995) emphasized that while the principle initially emerged as an economic guideline, over time it has evolved into a binding and coercive legal norm. Similarly, Prieur defines the principle as requiring polluters to bear the *social cost* of the pollution they cause — thereby holding them accountable not only for damage to property and individuals but also for harm inflicted upon the environment and natural ecosystems. As articulated in the OECD Guidelines on the International Economic Aspects of Environmental Policies, the Polluter Pays Principle mandates that polluters must bear the cost of implementing measures necessary to maintain the environment in an acceptable state. In essence, these costs should be reflected in the prices of the goods and services whose production and consumption generate pollution. This marks the emergence and progressive development of the Polluter Pays Principle as a cornerstone of both environmental economics and environmental law (Abdullah & Al-Maliki, 2024).

Environmental management covering efforts in prevention, mitigation, and restoration of environmental degradation and pollution demands the establishment of diverse policy instruments, programs, and initiatives, along with comprehensive supporting systems. Because the environment is inherently interdependent and holistic, it has become essential to integrate these management efforts and their support systems into the implementation

of development activities across all sectors, both at the national and regional levels (Sudiana et al., 2025). The challenge of securing compensation for environmental restoration arises from the legal system's shortcomings in resolving disputes. There are several dimensions to this issue- Regulatory Framework. There is a lack of practical regulations guiding the execution of such compensation; Institutional Structure. The enforcement of the 'polluter pays' principle mandates that polluters are responsible for funding both the prevention and remediation (Triana et al., 2024).

In Indonesia, the regulation concerning environmental protection is stipulated in Article 1 point 2 of Law No. 32 of 2009 on Environmental Protection and Management (*UUPPLH*), which defines environmental protection and management as follows "Environmental protection and management is a systematic and integrated effort undertaken to preserve environmental functions and to prevent environmental pollution and/or damage, which includes planning, utilization, control, maintenance, supervision, and law enforcement." The legal basis for the definition of pollution is contained in Article 1 point 14, which states: "Environmental pollution is the entry or inclusion of living organisms, substances, energy, and/or other components into the environment by human activities so that it exceeds the established environmental quality standards."

The Polluter pays principle is stipulated in Article 2 letter (j) of the Environmental Protection and Management Law (*UUPPLH*), which states that environmental protection and management shall be carried out based on the principle of the polluter pays. Furthermore, this principle is reaffirmed in Article 87 paragraph (1), which provides that: "Every person in charge of a business and/or activity who commits an unlawful act in the form of environmental pollution and/or environmental destruction that causes harm to other persons or to the environment shall be obligated to pay compensation and/or undertake certain actions." In line with this, the principle of strict liability is regulated in Article 88, which states that: "Every person whose actions, business, and/or activities use hazardous and toxic substances (B3), produce and/or manage B3 waste, and/or pose a serious threat to the environment shall be held strictly liable for any losses that occur without the need to prove fault."

Article 87 of the Environmental Law ensures the legal basis for imposing fines on those responsible for environmental damage and for providing compensation to affected parties. Moreover, the law accommodates the resolution of environmental disputes through both litigation and non-litigation mechanisms, stipulating that any individual or entity engaged in a business or activity that unlawfully causes pollution or environmental destruction resulting in harm to others or the environment must provide compensation and/or undertake specific remedial actions (Fauzi & Iskandar, 2024). Regulations concerning hazardous and toxic waste (B3) pollution are stipulated in the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number P.101/*Menlhk/Setjen/Kum.1/11/2018* on Guidelines for the Remediation of Land Contaminated by Hazardous and Toxic Waste (Ministerial Regulation P.101/2018). Article 2 of Ministerial Regulation P.101/2018 provides that "Any person who generates B3 Waste, collects B3 Waste, transports B3 Waste, utilizes B3 Waste, processes B3 Waste, stores B3 Waste, and/or disposes (dumps) B3 Waste causing environmental pollution and/or environmental damage on land shall be obligated to carry out the remediation of land contaminated by B3 Waste." Furthermore, Article 34 paragraph (1) of Ministerial Regulation P.101/2018 stipulates that, "In the event that there are community activities and/or public facilities located on land contaminated by B3 Waste, the working team shall: a) provide information regarding land contaminated by B3 Waste to affected communities, b) conduct relocation; c). provide compensation; d). carry out demolition; and/or e. undertake other actions in accordance with the provisions of the prevailing laws and regulations."

Minister of Environment Regulation Number 7 of 2014 serves as a guideline for calculating and paying compensation, as well as determining specific actions to be taken in cases of environmental pollution and/or damage between disputing parties. This regulation establishes a standardized framework to ensure accountability and consistency in environmental restoration efforts. According to Article 3 of the regulation compensation for

environmental losses is categorized as follows- (a) Losses due to exceeding environmental quality standards. Such losses may arise from improper waste management or disposal, including soil contamination caused by industrial or hazardous waste leakage. Compensation may include corrective actions such as constructing wastewater treatment facilities (IPAL) or conducting soil remediation to restore contaminated land; (b) Losses for reimbursement of environmental dispute resolution costs. This covers expenses for complaint verification, on-site investigations, laboratory analyses, expert assessments, and supervision related to compensation payments; (c) Losses to cover the costs of managing pollution, environmental damage, and restoration efforts. These include mitigation costs, which are immediate actions to prevent further deterioration when pollution or damage occurs. The government may initially bear these costs but must later be reimbursed by the responsible party; (d) Recovery costs, If the responsible party cannot independently undertake restoration, they are required to pay compensation to the government, which will then execute the necessary remediation, including soil and ecosystem recovery; (e) Ecosystem losses, pollution and environmental degradation such as soil contamination, water pollution, or forest fires generate extensive ecological impacts that must be economically assessed. These may include the loss of a forest's ability to retain water, prevent erosion, and sustain biodiversity. This regulation thus underscores the importance of measurable and enforceable compensation mechanisms, particularly in addressing land and soil pollution that directly affects environmental health and community livelihoods (Putri et al., 2024).

The calculation of restoration costs resulting from environmental damage committed by corporations, as regulated under Minister of Environment Regulation No. 7 of 2014, often creates inequities for the plaintiff. In judicial practice, there remains a lack of clarity in the breakdown of costs presented by experts, despite the existence of calculation guidelines provided in Annex II of the regulation (Aqil et al., 2024). In the annex of Minister of Environment Regulation No. 7 of 2014 that the base rate per pollution unit (UP) is Rp24,750 (IDR). Through this method, the environmental burden and/or hazard level of various industrial waste types can be compared and quantitatively assessed. The total value of pollution units for each parameter in the waste is then aggregated into a single measurement unit, namely the Pollution Unit (UP). However, this method has a conceptual limitation, as it assumes that the pollution unit value for certain parameters, for example, Chemical Oxygen Demand (COD) = 50 kg is uniform across all types of wastewater. Such an assumption may overlook the varying characteristics of industrial waste, potentially affecting the accuracy of environmental restoration cost assessments.

In the Environmental Protection and Management Act, the regulation concerning the polluter pays principle is limited to a general provision under Article 87 paragraph (1), which merely stipulates that any person who pollutes or damages the environment causing loss to others shall be obliged to pay compensation or undertake certain remedial actions. Furthermore, Article 88 only provides for strict liability without further specification as to what types of pollution may give rise to compensation under this principle of strict liability. Such general provisions do not comprehensively regulate specific mechanisms for the implementation of the polluter pays principle, thereby creating obstacles to its effective enforcement (Amalia et al., 2025).

Furthermore, Minister of Environment Regulation No. 7/2014 addresses the state's economic losses arising from environmental damage and restoration expenses, classifying them as non-tax state revenue. However, the government's civil litigation authority is often exercised mainly to pursue financial compensation instead of prioritizing environmental recovery. This tendency creates a misalignment between the environmental harm caused often linked to corrupt practices and the broader framework of state financial governance (Hartanto et al., 2024). Based on Article 34 paragraph (1) letter (a) of Ministerial Regulation P.101/2018, any land contaminated with hazardous and toxic waste (B3 waste) shall be notified to its owner by the competent authorities. The provision mandates that affected individuals be informed if their land is contaminated by B3 waste. However, in practice, many officials fail to comply with this regulation. As discussed earlier, there are

approximately 297 reported cases of oil-contaminated and B3 waste-polluted land, indicating obstacles in the implementation of the polluter pays principle. In accordance with the regulation's intent, victims should receive notification, relocation assistance, compensation, land remediation, or other legal remedies as provided by law. Nevertheless, in reality, it is often the victims themselves who must file reports and independently initiate lawsuits in court, where they frequently fail to obtain their rightful entitlements.

Referring to the explanation in the first point regarding the severe danger posed by hazardous and toxic (B3) waste to affected communities, soil, and human health, it is therefore necessary to provide compensation and environmental restoration in accordance with the Polluter Pays Principle. However, the Ministerial Regulation P.101/2018 does not stipulate the amount of compensation or provide detailed provisions regarding the costs that must be granted to affected victims. The regulatory mechanism of the Polluter Pays Principle within this Ministerial Regulation has yet to specify in detail the estimated costs to be borne by the polluter. The provisions contained therein remain general in nature, merely stating the obligation to provide compensation without establishing clear regulations on the amount of compensation, the procedure for its payment, or the detailed mechanism for environmental remediation.

As one of its core functions, the OECD recommendation outlines that the Polluter Pays Principle serves to allocate the costs of pollution prevention and control in a way that promotes the efficient use of limited environmental resources and prevents distortions in international trade and investment. Under this principle, the polluter is responsible for covering the expenses required to implement measures determined by public authorities to maintain the environment in an acceptable condition. Although this obligation is widely acknowledged, determining whether "the environment is in an acceptable state" has proven to be highly complex and difficult to define with precision (Thiet, 2021).

As previously mentioned, one of the key functions of the Polluter Pays Principle, according to the OECD recommendation, is to allocate the costs of pollution prevention and control in a manner that promotes the efficient use of limited environmental resources. However, neither the Environmental Protection and Management Act nor the Minister of Environment and Forestry Regulation No. P.101/*Menlhk/Setjen/Kum.1/11/2018* regulates the allocation of costs to be borne by the polluter for preventive measures. Within the context of these regulations, the Polluter Pays Principle is only applied after pollution has occurred. This constitutes a significant obstacle, as the principle becomes ineffective in maintaining environmental ecosystems and preventing contamination from hazardous and toxic waste (B3 waste) or oil-contaminated soil, given that its regulatory application is confined to post-pollution situations.

Another obstacle in the implementation of the Polluter Pays Principle lies within the judicial process. In lawsuit Number 86/Pdt.G/LH/2023/PN Bkn, the plaintiff invoked the principle of strict liability concerning soil contamination caused by hazardous and toxic waste (B3 waste) from PT. X. Under the concept of strict liability, there is no requirement to prove fault. However, in its legal reasoning, the panel of judges held that the plaintiff must prove the existence of soil contamination through laboratory testing as evidence of pollution. Article 7 paragraph (1) of Minister of Environment and Forestry Regulation No. P.101/*Menlhk/Setjen/Kum.1/11/2018* (*Permen LHK P.101/2018*) merely regulates the standard for laboratory testing of contaminated land, which states that: "Identification of contaminant substances as referred to in Article 5 paragraph (2) letter e for contaminated land shall be conducted through a toxicity characteristic leaching procedure (TCLP) and total concentration analysis of the contaminant substances." However, the regulation does not specify who bears the cost of such laboratory testing—whether it should be covered by the state with reimbursement by the affected community, or by the polluter. Consequently, in practice, the cost of laboratory testing is borne personally by the plaintiff.

Law enforcement in environmental management remains challenging due to the difficulty of proving violations and the absence of clear, standardized criteria for determining environmental damage (Munawir et al., 2023). Moreover, the burden of proof lies with the party making the allegation, which in this case is the plaintiff, who must provide

laboratory tests to prove soil pollution—costs that can amount to tens of millions of rupiah. These expenses must be borne personally, as there is no legal provision or government assistance to support such financial burdens.

According to the official website of Phoslab Testing Laboratories, the cost range for a standard Toxicity Characteristic Leaching Procedure (TCLP) test typically falls between USD 750 and USD 1,800, depending on several factors such as the type of sample material and the processing time. When converted to Indonesian Rupiah, this amounts to approximately IDR 12 million to IDR 29 million a considerable expense, particularly for victims of soil contamination caused by hazardous and toxic waste (B3 waste) who come from lower to middle-income economic backgrounds. This illustrates a significant obstacle, as there is no clear regulatory provision or active governmental oversight from environmental agencies in addressing soil pollution cases. In principle, it is the polluter who must bear the cost; however, in practice, the reality is quite the opposite. Many affected individuals must fight through lengthy court processes to obtain the compensation and justice they are rightfully entitled to. This condition reflects a fundamental weakness in the enforcement of the Polluter Pays Principle, where the burden of proof and financial responsibility still rests disproportionately on the victims rather than the polluters. Another obstacle in Case Number 150/Pdt.G/LH/2021/PN Pbr lies in the ineffective implementation of the polluter pays principle. Although 297 individuals submitted claims, only 121 received monetary compensation for their losses, while 165 claimants were subjected to soil excavation and remediation measures as a form of environmental restoration. The limited realization of compensation stems from PT X's failure to comply fully with the compensation scheme that had been jointly determined with SKK Migas. The company has reportedly disbursed only 12% of the total budget allocated for compensation and remediation.

In addition, public legal instruments such as administrative regulations and criminal sanctions often struggle to effectively handle complex or transnational environmental harm. Administrative approaches are typically reactive and slow-moving, making them inadequate for urgent environmental challenges like cross-border pollution or global climate change. Moreover, fragmented regulations across different government institutions frequently result in inconsistent enforcement, weakening overall environmental protection. Criminal sanctions, meanwhile, tend to focus on specific violations rather than addressing long-term damages or broader social impacts (Haq, 2025). Meanwhile, The Court of Justice European Union was requested to assess whether oil producers, whose products later became waste, could be made responsible for financing the remediation of environmental damage caused by accidental oil spills. More specifically, the Court had to clarify the extent of Article 15 of the former Waste Framework Directive 75/442/EC (WFD) in relation to the allocation of waste disposal costs. That provision, reflecting the polluter pays principle, stipulated that the financial responsibility for waste management must be borne either by the current “holder” of the waste or by previous holders or the producer of the product from which the waste originated. Under the former WFD, the term “holder” was interpreted broadly to include both the waste producer and any natural or legal person in possession of the waste (Forsberg et al., 2022).

Although both the Waste Framework Directive (WFD) and the Indonesian Environmental Protection and Management Act (*UUPPLH*) formally embrace the polluter pays principle, they operationalise it through distinct normative structures. Under the WFD, the polluter pays principle is embedded within a sector-specific regulatory framework governing waste management. The Directive does not merely proclaim the principle; rather, it translates it into clearly delineated categories of responsibility, namely the current holder, previous holders, and the producer of the product from which the waste originates. Financial liability for disposal is directly and systematically attached to these categories. Moreover, the jurisprudence of the Court of Justice of the European Union further refines and concretises the allocation of responsibility, ensuring a relatively high degree of legal certainty in waste-related liability.

By contrast, the *UUPPLH* formulates the polluter pays principle at a general level as part of Indonesia's broader environmental governance framework. While the Act explicitly

recognises strict liability—arguably a more stringent liability model, it does not disaggregate responsibility into sector-specific classifications comparable to those found in the WFD. The practical contours of liability are largely elaborated through subordinate legislation and regulatory instruments, rather than through a detailed statutory architecture linking specific categories of actors to clearly defined financial obligations. Accordingly, the divergence between the two regimes does not lie in their normative commitment to the polluter pays principle, but in the degree of structural operationalisation and sectoral precision through which that principle is implemented.

Informant 1 identifies several elements that influence the effectiveness of law enforcement, namely the legal substance, law enforcement apparatus, supporting facilities and infrastructure, as well as social and cultural conditions. The enforcement of the Polluter Pays Principle (PPP) faces obstacles within the legal substance, particularly due to the absence of comprehensive technical guidelines for calculating compensation, and within the legal structure, marked by inadequate facilities and infrastructure to operationalize the principle. Moreover, the weakness of the legal structure affects the ability of law enforcement officials to efficiently prevent and address environmental pollution. In addition to these legal factors, non-legal dimensions also contribute — economic pressures and societal tendencies that prioritize financial interests over environmental protection often hinder the consistent application of the law (Triana et al., 2024).

Numerous scholarly studies emphasize the importance of the Polluter Pays Principle (PPP). The Organisation for Economic Co-operation and Development (OECD) prohibit the use of state aid to finance pollution control, reflecting the primary function of the PPP in promoting economic integration and preventing distortions in market competition. In addition, the PPP performs a distributive function by internalizing the social costs of pollution prevention and control to the polluters. The PPP also serves a preventive function by encouraging the reduction of emissions through pricing mechanisms. When the costs of pollution are incorporated into the prices of goods and services, product prices increase in proportion to environmental costs, thereby incentivizing producers to develop more environmentally friendly products in order to remain competitive. Nevertheless, as the risk of environmental damage cannot be entirely eliminated, the PPP also fulfills a curative function by ensuring the remediation of environmental harm, including any residual damage (Zhu & Li, 2025).

4. Conclusions

The exploitation of oil and gas resources in the Rokan Block by PT X has generated significant environmental harm, particularly soil contamination caused by hazardous and toxic waste (B3) and oil pollution. Although the Polluter Pays Principle (PPP), as developed by the OECD, has been incorporated into Indonesia's Environmental Protection and Management Law (*UUPPLH*), notably under Articles 87(1) and 88, its practical implementation remains limited. Although the Polluter Pays Principle has been formally incorporated into the *UUPPLH*, its implementation in practice reveals a structural gap between normative recognition and effective accountability. The outcomes in Case No. 150/Pdt.G/LH/2021/PN Pbr and Case No. 86/Pdt.G/LH/2023/PN illustrate that compensation and remediation remain only partially realised, while victims continue to bear significant evidentiary and financial burdens, including the cost of laboratory testing to prove contamination. The absence of clear and detailed implementing mechanisms results in an uneven allocation of responsibility, whereby those already affected by environmental harm are compelled to incur additional costs in seeking redress. Such a condition undermines the substantive objective of the Polluter Pays Principle, which is to ensure that the financial consequences of environmental damage are borne by the polluter, not by the injured communities. Accordingly, future reform of the *UUPPLH* should aim to operationalise the Polluter Pays Principle more concretely by establishing clearer classifications of responsible parties, mandatory financial assurance or environmental guarantee schemes, and stricter enforcement mechanisms to ensure timely compensation

and remediation. Strengthening these structural elements would enhance legal certainty and ensure that the financial burden of environmental harm is effectively borne by the polluter, rather than by affected communities.

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Conflicts of Interest

The author declares no conflict of interest.

Declaration of Generative AI Use

During the preparation of this work, the author used ChatGPT to assist in improving grammar, clarity, and the academic tone of the manuscript. After using this tool, the author reviewed and edited the content as needed and takes full responsibility for the final version.

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References

- Abdullah, R. A., & Al-Maliki, H. N. (2024). The applied framework of the polluter pays principle under international environmental law. *Pakistan Journal of Life and Social Sciences*, 3925–3937. <https://doi.org/10.57239/PJLSS-202422.1.00289>
- Alvina, H., Wahyudi, I., permata, N. S., Farhan, & Pratama, Y. (2025). Judge's reasoning in determining environmental restoration losses in unlawful acts in forest fire cases

- (Examination of Decision Number 108/Pdt.G/2015/PN.Jkt.Utr.). *PENA JUSTISIA: Media Komunikasi dan Kajian Hukum*, 4862–4876. <https://doi.org/10.31941/pj.v24i2.6451>
- Amalia, I., Isma, N., & Noviarani, D. (2025). Penerapan prinsip polluter pays dalam corporate state responsibility: Perspektif penerapan prinsip polluter pays dalam corporate state responsibility. *Jurnal Ilmiah Wahana Pendidikan*, 66–77. <https://jurnal.peneliti.net/index.php/JIWP/article/view/10674>
- Apabaga, A. L. (2025). Environmental justice and soil lead contamination: Spatial analysis across seven community areas. *DePaul Discoveries*, 1–8. <https://via.library.depaul.edu/depaul-disc/vol14/iss1/12>
- Aqil, N. A., Syahrin, A., & Trisna, W. (2024). Implementation of Minister of Environment Regulation Number 7 of 2014 in the implementation of additional criminal for corporations that commit environmental crime. *Ikatan Penulis Mahasiswa Hukum Indonesia: Law Journal*, 120–146. <https://doi.org/10.15294/ipmhi.v4i1.71244>
- Chevron Indonesia. (2025). *Tentang Chevron: Siapa kami*. Indonesia.chevron.com. <https://indonesia.chevron.com/about>
- Corvino, F. (2023). The forward-looking polluter pays principle for a just climate transition. *Critical Review of International Social and Political Philosophy*, 1–28. <https://doi.org/10.1080/13698230.2023.2243729>
- Falih, K., Mohd Razali, S., Abdul Maulud, K., Abd Rahman, N., Abba, S., & Yaseen, Z. (2024). Assessment of petroleum contamination in soil, water, and atmosphere: A comprehensive review. *International Journal of Environmental Science and Technology*, 1–31. <https://doi.org/10.1007/s13762-024-05622-8>
- Fauzi, A. N., & Iskandar, H. (2024). Environmental pollution in the perspective of civil law. *Legal Brief*, 1052–1059. <https://garuda.kemdiktisaintek.go.id/documents/detail/4765035>
- Forsberg, M., Nilsson, A., & Zetterberg, C. (2022). *Festschrift till Jan Darpö*. Dimograf Poland.
- Haq, M. (2025). Civil law and environmental protection: Expanding liability for sustainable justice. *Journal of Artificial Intelligence and Digital Business (RIGGS)*, 3480–3485. <https://doi.org/10.31004/riggs.v4i3.2478>
- Hartanto, P., Wijaya, S. G., & Chancy, R. (2024). Discourse of ecological damage as a state financial loss: Evidence from Indonesia. *Journal of Law, Environmental and Justice*, 307–331. <https://doi.org/10.62264/jlej.v2i3.110>
- Heine, D., Faure, M. G., & Dominioni, G. (2020). The polluter-pays principle in climate change law: An economic appraisal. *Climate Law*, 94–115. https://brill.com/view/journals/ccla/10/1/article-p94_94.xml
- Inwang, C. M. (2021). Polluter pays principle: A jus cogens or customary international law. *International Journal of Law*, 132–136. <https://www.lawjournals.org/assets/archives/2021/vol7issue1/7-1-42-484.pdf>
- Khalefah, A. R., Omran, I., & Al-Waily, M. (2024). An investigation on the environmental impact of petroleum refinery effluent on soil pollution. *International Journal of Environmental Impacts*, 41–46. <https://doi.org/10.18280/ijei.070105>
- Kuer, B. D., & Onger, Z. J. (2025). The impacts of oil and gas production to soil in Bentiu Unity State, South Sudan. *International Journal of Research and Innovation in Social Science (IJRISS)*, 1385–1395. <https://doi.org/10.47772/IJRISS>
- Lu, M., & Faure, M. G. (2020). Shifts in compensation for environmental damage: Reflections on China's new soil pollution law. *Asia Pacific Journal of Environmental Law*, 136–159. <https://doi.org/10.4337/apjel.2020.02.02>
- Masnun, M. A., Prasetyo, D. E., & Maalikatussofa. (2025). Reconstruction of the normative legal research paradigm in responding to global challenges: An epistemological analysis. *Novum: Jurnal Hukum*, 12(3), 372–384. <https://doi.org/10.2674/novum.v12i03.74364>
- Muhaimin. (2020). *Metode penelitian hukum*. Mataram University Press.
- Mulyawan, A. (2023). Analisis yuridis pemberlakuan heads of agreement pada kontraktor kontrak kerja sama (KKKS) PT. Chevron Pacific Indonesia dalam perspektif

- kepentingan nasional. *VERITAS: Jurnal Program Pascasarjana Ilmu Hukum*, 9(1), 78–96. <https://doi.org/10.34005/veritas.v9i1.2434>
- Munawir, L., Bariun, L., Tolo, S., & Amir, M. K. (2023). Pengelolaan lingkungan hidup di lokasi pertambangan. *Widya Yuridika: Jurnal Hukum*, 6(2), 231–244. <https://doi.org/10.31328/wy.v6i2.4132>
- Nugroho, M. A. T., Salsabilla, T. M., Saufika, T. S., Manihuruk, T. N., & DM, M. Y. (2024). Implications of polluter pays principle in criminal liability of business actors for environmental pollution through wastewater. *Reformasi Hukum*, 28(1), 14–23. <https://doi.org/10.46257/jrh.v28i1.932>
- Ouakouak, C. (2025). The polluter pays principle as a basis for international liability for environmental damage. *Russian Law Journal*, 13(1), 1440–1453. <https://www.russianlawjournal.org/index.php/journal/article/view/5087/3282>
- Phoslab Environmental Laboratories. (2025). *TCLP testing*. https://www.tuv.com/indonesia/en/biodegradability-testing.html?wt_mc=SEA.Ads.Google.ID26_P01_SUS.ID26_P01_SUS_GA.textad.SUS-Ecotoxicity-testing-PhraseMatch&Xd=ID26_P01_SUS_GA&gad_source=1&gad_campaignid=23704455525&gbraid=0AAAAAD7a9hChDB-d2GXoq-enSGwltlbFQ&gclid=CjwKCAjwidXQBhAZEiwA4egw6Kv10i0KYK8e1UI9Oc6ELUibZvJJUswPJbVyxEG26jCG7zBPVljRoCQB8QAvD_BwE
- Putri, R. N., Sukarsa, D. E., & Imamulhadi. (2024). Court decision regarding environmental compensation costs: Application in environmental restoration. *Asian Journal of Social and Humanities*, 2, 2790–2799. <https://doi.org/10.59888/ajosh.v2i11>
- Sudiana, A. K., Suharyanti, N. N., & Faxriddinovich, U. F. (2025). Assessing the government's commitment to achieving ecological justice for society. *Journal of Human Rights, Culture and Legal System*, 5(1), 91–123. <https://doi.org/10.53955/jhcls.v5i1.489>
- Thiet, T. C. (2021). The polluter pays principle in the European Union law and in Vietnam: Selected issues. *Journal of Legal, Ethical and Regulatory Issues*, 24(6), 1–12. <https://www.abacademies.org/articles/the-polluter-pays-principle-in-the-european-union-law-and-in-vietnamselected-issues-11477.html>
- Triana, N., Turistiati, A. T., & Monk, L. J. F. (2024). Alternative dispute resolution in marine pollution: advancing ecological justice through the polluter pays principle. *Volksgeist: Jurnal Ilmu Hukum dan Konstitusi*, 7(1), 89–107. <https://doi.org/10.24090/volksgeist.v7i1.10047>
- Yustitianiingtyas, L., Pratiwi, L., Irawan, A., Stansyah, D., & Arifin, S. (2025). Environmental law policy in Indonesia: Challenges and sustainable justice. *IOP Conference Series: Earth and Environmental Science*, 1473(1), 1–11. <https://doi.org/10.1088/1755-1315/1473/1/012046>
- Zhu, L., & Li, X. (2025). Identifying key polluters: The feasibility of applying the polluter pays principle to marine greenhouse gas emissions. *Transnational Environmental Law*, 14(2), 365–391. <https://doi.org/10.1017/S2047102524000372>

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