



State Financial Loss and Environmental Damage in Natural Resource Corruption: Reconstructing Liability, Valuation, and Recovery

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Abstract:

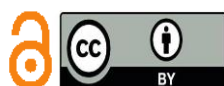
Natural resource corruption in Indonesia exposes a structural weakness in the way criminal law understands loss. Conventional corruption doctrine has treated state financial loss mainly as a fiscal, accounting, or budgetary deficit, while environmental law treats ecological damage as harm to public environmental functions, ecosystem services, and intergenerational welfare. This article examines how state financial loss and environmental damage should be distinguished, connected, and reconstructed in corruption cases involving mining, forestry, plantation, and other extractive sectors. Using normative legal research with statutory, conceptual, case, and reform-oriented approaches, this article analyses Indonesian anti-corruption law, environmental law, the 2023 Criminal Code, Constitutional Court doctrine on actual loss, environmental loss valuation, and selected corruption cases involving ecological damage. The article argues that environmental damage should not be mechanically absorbed into state financial loss, because each concept has a different legal function. Nevertheless, in natural resource corruption, ecological damage can become legally relevant to corruption liability when it is proven as a consequence of unlawful allocation, abusive licensing, illegal enrichment, or the state's future restoration burden. The article proposes a legal reconstruction based on functional integration rather than conceptual merger: environmental damage should not automatically be classified as state financial loss, but may become legally relevant to natural resource corruption through a structured sequence of liability, causality, ecological valuation, and recovery. By separating these stages, the proposed model preserves the principle of legality while enabling scientifically established ecological harm to inform criminal liability, monetary valuation, restoration, and asset recovery in a legally disciplined manner.

Keywords:

corruption; environmental damage; natural resources; state financial loss.

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Introduction

Indonesia's natural resources occupy a dual constitutional and economic position.¹ They are not merely commodities that generate revenue, but public wealth controlled by the state for the people's greatest prosperity. This constitutional mandate makes governing forests, minerals, plantations, fisheries, and land more than an administrative matter. When authorities abuse control over these resources through corrupt licensing, unlawful discretion, permit manipulation, or collusive corporate arrangements, the state's loss rarely stops at

¹ Dian Parluhutan et al., "Understanding Natural Resources Clause in Indonesia Constitution," *IOP Conference Series: Earth and Environmental Science* 940, no. 1 (December 2021): 1-4, <https://doi.org/10.1088/1755-1315/940/1/012040>.

unpaid royalties, tax leakage, or illegal private enrichment.² The harder-to-quantify loss is ecological: damaged soil, altered hydrological systems, polluted rivers, deforested landscapes, biodiversity loss, and restoration costs that the state and surrounding communities may bear for decades.³

The central problem this article addresses is the uneasy legal relationship between state financial loss and environmental damage in natural resource corruption. Indonesian anti-corruption law has long used harm to state finances or the state economy as a core gateway to liability in unlawful enrichment and abuse-of-authority corruption. Environmental law, by contrast, understands harm through pollution, degradation, ecological disruption, restoration cost, and impairment of public environmental functions.⁴ These two languages are not naturally identical. State financial loss asks whether public wealth has been reduced in a way that can be legally and monetarily proven. Environmental damage asks whether environmental functions have been impaired, whether public ecological interests have been violated, and whether restoration, compensation, or specific measures are necessary.⁵ The difficulty arises when the same corrupt act produces both kinds of loss, but the criminal court must decide which losses count for corruption liability and which remain within environmental, administrative, or civil regimes.⁶

This difficulty has become more urgent after the development of the actual-loss doctrine. Constitutional Court Decision No. 25/PUU-XIV/2016 removed the word “may” from the formulation of harming state finance or the state economy in Articles 2 and 3 of the Anti-Corruption Law. In practice, corruption based on state loss must be proven as a material offense, not merely as a potential or speculative loss. The decision was intended to protect legality and legal certainty, but it also created tension in cases where the damage is ecological, progressive, cumulative, and scientifically measurable only through valuation models. Ecological loss does not always appear as an immediate cash deficit in the state budget. It often appears as lost ecosystem functions, the collapse of public environmental services, or the future cost of restoration. Treating such damage as legally invisible merely because it is not a conventional fiscal entry risks under-criminalizing natural resource corruption.⁷

The issue is not whether every form of environmental damage must automatically become state financial loss. That approach would be too broad and may weaken the principle of legality. The more precise question is how the law should determine when environmental damage becomes relevant to corruption liability, asset recovery, compensation, or additional punishment. Natural resource corruption differs from ordinary procurement corruption because the object of abuse is not only money already recorded in a budget, but the state’s

² Putu Arya Wibisana et al., “Qualitative Analysis of Corruption in Mining and Its Impact on Sustainable Development,” *RSF Conference Series: Business, Management and Social Sciences* 4, no. 1 (September 2024): 58–65, <https://doi.org/10.31098/BMSS.V4i1.859>.

³ Indonesia Corruption Watch, *Implementation and Regulation of Ecological Losses Valuation in the Calculation of State Losses in Corruption Cases in the Extractive Industries Sector* (Jambi: Indonesia Corruption Watch, 2024).

⁴ Douglas A. Kysar, “Global Environmental Constitutionalism: Getting There from Here,” *Transnational Environmental Law* 1, no. 1 (April 2012): 83–94, <https://doi.org/10.1017/S2047102511000057>.

⁵ M. P. Ram Mohan and Els Reynaers, “Compensation for Environmental Damage: Progressively Casting a Wider Net, But What’s the Catch?,” *SSRN Electronic Journal*, October 2021, 1–66, <https://doi.org/10.2139/SSRN.3645876>.

⁶ Franky Butar Butar, Iqbal Feliciano, and Thoriq Mulahela, “Mungkinkah Kerugian Lingkungan Hidup Akibat Pertambangan Dapat Dikategorikan Sebagai Tindak Pidana Korupsi?,” in *Prosiding TPT XXVIII PERHAPI 2019*, 2019, 889–902.

⁷ Fatkhurohman Fatkhurohman and Nalom Kurniawan, “Pergeseran Delik Korupsi Dalam Putusan Mahkamah Konstitusi Nomor 25/PUU-XIV/2016,” *Jurnal Konstitusi* 14, no. 1 (July 24, 2017): 1, <https://doi.org/10.31078/jk1411>.

authority to allocate, protect, and regulate public ecological wealth. In an illegal mining permit, a backdated concession, an unlawful plantation operation inside a forest area, or collusive neglect of environmental obligations, the corrupt advantage may be private extraction from public natural capital. The loss therefore has at least three layers: loss of public revenue, loss of lawful governance over natural resources, and loss of ecological functions requiring restoration.⁸

Definitions are important because imprecision has produced inconsistent judicial reasoning. State financial loss in corruption cases is commonly associated with the reduction of state assets or rights that authorized institutions can calculate. State economic loss is broader, referring to injury to the state's economic life, including misallocation of resources and reduced welfare-producing activities.⁹ Environmental damage, however, is not simply an economic loss. It concerns pollution or damage that exceeds environmental quality standards or damage criteria, including harm to ecosystem functions and environmental services.¹⁰ Ecological loss valuation then translates these harms into monetary terms for legal purposes, but valuation does not convert nature into a mere commodity. It is a forensic and remedial tool designed to make environmental damage visible in a legal system that often requires monetary expression.¹¹

In practice, corruption in the natural resource sector appears through several recurring patterns. First, corruption occurs at the licensing stage, where officials issue permits without meeting legal requirements, manipulate spatial planning, ignore environmental impact assessments, or bypass mandatory auctions and procedures. Second, corruption occurs in supervision, where inspectors or local authorities tolerate violations, under-report damage, or allow illegal extraction to continue. Third, corruption occurs in revenue collection, where royalties, taxes, non-tax state revenue, or reclamation funds are manipulated. Fourth, corruption occurs in enforcement, where cases are delayed, sanctions are negotiated, or companies avoid restoration obligations through political protection. These patterns show that environmental damage is not an incidental consequence outside corruption. In many cases, ecological destruction is the physical expression of corrupt allocation of public authority.¹²

Recent Indonesian debates illustrate the stakes. In the Nur Alam case, prosecutors attempted to include environmental and land damage from mining operations as part of state loss, with calculations based on environmental loss valuation.¹³ Courts accepted parts of the corruption allegation but resisted treating ecological loss as the official's personal responsibility in the same way as conventional state financial loss. In the Surya Darmadi case, lower courts recognized massive state economic loss linked to unlawful plantation activities

⁸ Daffa Ladro Kusworo and Titi Anggraini, "Extensive Interpretation of State Financial Losses in Tin Sector Corruption: A Comparative Study of Emerging Economies," *Integritas: Jurnal Antikorupsi* 10, no. 2 (February 12, 2025): 173–86, <https://doi.org/10.32697/integritas.v10i2.1280>.

⁹ Amir Firmansyah et al., "Reframing State Loss Policy in Price-Related Corruption Cases: A Future Agenda," *Contrarius* 2, no. 2 (March 2026): 160–82, <https://doi.org/10.53955/CONTRARIUS.V2i2.274>.

¹⁰ Hemant Bherwani et al., "Valuation of Ecosystem Services and Environmental Damages: An Imperative Tool for Decision Making and Sustainability," *European Journal of Sustainable Development Research* 4, no. 4 (June 2020): 1–12, <https://doi.org/10.29333/EJOSDR/8321>.

¹¹ Retno Dewi Pulung Sari et al., "State Financial Losses as a Result of Environmental Damage," *Journal of Human Rights, Culture and Legal System* 4, no. 1 (February 15, 2024): 121–48, <https://doi.org/10.53955/jhcls.v4i1.136>.

¹² OECD, *Corruption in the Extractive Value Chain: Typology of Risks, Mitigation Measures and Incentives*, Oced, vol. 66, 2016.

¹³ Prio Harry Subekti and Nabiatus Sa'adah, "Measuring Ecological Loss as State Loss in Illegal Mining Crime," *Unram Law Review* 9, no. 1 (April 2025): 91–99, <https://doi.org/10.29303/ULREV.V9i1.390>.

in forest areas, including ecological and restoration components, but later judicial reasoning narrowed the recovery by questioning whether future restoration cost could be treated as actual state loss. These cases reveal a doctrinal gap: the law has methods to calculate ecological damage, and corruption law has mechanisms to punish state loss, but no stable bridge tells courts how to connect them without either overextending criminal liability or ignoring ecological reality.¹⁴

The social facts behind this doctrinal problem are severe. Natural resource corruption does not only transfer money from the state to corrupt actors. It changes landscapes and social relations. Communities lose access to clean water, fisheries, forests, agricultural land, and cultural spaces.¹⁵ Local governments may inherit restoration burdens while corporations retain profits from unlawful extraction. The state's fiscal loss may be smaller than the ecological damage, yet the ecological damage may impose a longer and more distributed burden on public welfare. If criminal law recognizes only the easily audited part of the loss, the sanction will not reflect the offense's true gravity. Conversely, if courts accept every environmental valuation without clear causal, methodological, and legal standards, convictions may become vulnerable to challenges based on uncertainty, duplication of recovery, or violation of legality.¹⁶

Existing scholarship has taken important steps, but it remains fragmented. Pattiwael argues that ecological loss arising from corruption should be understood as part of state financial loss through extensive, historical, and systematic interpretation. Butar Butar, Feliciano, and Mulahela ask whether mining-related environmental loss can be categorized as corruption and highlight the limits of conventional fiscal approaches. Sari and colleagues argue that environmental damage has state financial implications because it creates public burdens and must be restored. Sugiri and Zakaria examine whether environmental damage may constitute state financial loss in the Nur Alam context. These works are valuable because they challenge the narrow budgetary paradigm. However, many discussions still move too quickly from ecological damage to state financial loss without fully separating the evidentiary stages needed in criminal adjudication.¹⁷

This article's novelty lies in reconstructing the legal relationship between state financial loss and environmental damage through functional integration rather than conceptual equivalence. Environmental damage is not automatically transformed into state financial loss; instead, its relevance to natural resource corruption must be established through a structured sequence of liability, causality, ecological valuation, and recovery. Instead, it develops a four-stage model: first, proving the corrupt act and the unlawful benefit or abuse of authority; second, proving environmental damage through scientific evidence and environmental legal

¹⁴ Indonesia Corruption Watch, *Implementation and Regulation of Ecological Losses Valuation in the Calculation of State Losses in Corruption Cases in the Extractive Industries Sector*.

¹⁵ Philippe Le Billon, "Natural Resources and Corruption in Post-War Transitions: Matters of Trust," *Third World Quarterly* 35, no. 5 (May 2014): 770–86, <https://doi.org/10.1080/01436597.2014.921429>.

¹⁶ Joey Josua Pamungkah Pattiwael, "Kerugian Ekologis Akibat Tindak Pidana Korupsi," *Jurnal Rechtsens* 10, no. 1 (June 29, 2021): 27–42, <https://doi.org/10.36835/rechtsens.v10i1.1003>.

¹⁷ Pattiwael; Sari et al., "State Financial Losses as a Result of Environmental Damage"; Franky Butar Butar, Iqbal Feliciano, and Thoriq Mulahela, "Mungkinkah Kerugian Lingkungan Hidup Akibat Pertambangan Dapat Dikategorikan Sebagai Tindak Pidana Korupsi?," *Prosiding Temu Profesi Tahunan PERHAPI* 1, no. 1 (March 29, 2020): 889–902, <https://doi.org/10.36986/ptptp.viii.129>; Bambang Sugiri and Alfons Zakaria, "Corruption: Does Environmental Damage Constitute Staters Financial Loss?," in *Proceedings of the 2018 International Conference on Energy and Mining Law (ICEML 2018)* (Paris, France: Atlantis Press, 2018), <https://doi.org/10.2991/iceml-18.2018.12>.

standards; third, monetizing damage through transparent ecological valuation; and fourth, determining the legal function of the valuation, whether as state financial loss, state economic loss, restitution, restoration order, compensation, or sentencing consideration. This separation matters because the same monetary calculation can have different legal meanings. A restoration cost may be actual state loss if the state has incurred or is legally certain to incur it. It may be state economic loss if it reflects misallocation and diminished public welfare. It may also serve as a basis for restorative sanctions even when it is not counted as the core element of corruption liability.¹⁸

This article therefore pursues three objectives. First, it clarifies the conceptual distinction between state financial loss and environmental damage in natural resource corruption. Second, it analyses how Indonesian law and selected cases reveal tensions among actual loss, ecological valuation, and scientific evidence. Third, it proposes a reformulation that preserves criminal legality while allowing environmental damage to influence liability and recovery in a principled manner. The article argues that natural resource corruption should be treated as an integrated public harm: a violation of state financial governance, a distortion of natural capital allocation, and a cause of ecological injury. Courts should not collapse these elements into one undifferentiated concept, but they should not allow their separation to become a loophole that protects corrupt extraction.

The article also responds to a practical drafting problem faced by prosecutors and academics. A manuscript or indictment that says simply that ecological damage is state loss may be attractive, but it leaves too many questions unanswered. Which state interest was harmed? Which institution must calculate the loss? Is the value a past expenditure, a future restoration cost, a lost ecosystem service, or an unlawful benefit? Who must pay it and for what purpose? These questions must be answered before ecological loss can become a stable part of corruption adjudication. The broader theoretical foundation is the idea of natural capital as public wealth. Natural capital accounting literature shows that forests, water, soil, biodiversity, and ecosystem services sustain economic activity and public welfare.¹⁹ If law recognizes buildings, cash, land titles, and state-owned enterprises as state assets, it is difficult to deny that state-controlled natural resources also have public economic value. Yet natural capital is not identical to cash. Its value is often relational, ecological, and intergenerational. Criminal law therefore must approach natural capital carefully: it should not commodify ecological life in a reductionist way, but it should not refuse monetary valuation when valuation is necessary to prevent impunity and fund restoration. This balance is crucial in countries where resource extraction and corruption intersect with local political power.²⁰

International governance literature also supports a broader view of corruption harm. The OECD has described corruption in the extractive value chain as complex and sophisticated, affecting licensing, operations, revenue collection, commodity trading, and

¹⁸ Indonesia Corruption Watch, *Implementation and Regulation of Ecological Losses Valuation in the Calculation of State Losses in Corruption Cases in the Extractive Industries Sector*, 62–82.

¹⁹ James W. Boyd et al., "The Natural Capital Accounting Opportunity: Let's Really Do the Numbers," *BioScience* 68, no. 12 (December 2018): 940–43, <https://doi.org/10.1093/BIOSCI/BIY135>.

²⁰ World Bank, *Natural Capital Accounts and Policy in Indonesia* (Washington, DC: World Bank, 2019).

closure.²¹ UNODC has shown that crimes affecting the environment, including wildlife, forest, waste, and minerals crimes, are often facilitated by corruption and organized networks.²² EITI guidance similarly treats transparency, beneficial ownership disclosure, licensing integrity, and revenue governance as anti-corruption tools in extractive sectors. These sources confirm that natural resource corruption is not a narrow financial offense. It is a governance failure that can generate ecological, economic, social, and institutional losses.²³ For Indonesia, the challenge is amplified by legal pluralism across anti-corruption law, environmental law, sectoral natural resource statutes, administrative licensing rules, and the 2023 Criminal Code. The Criminal Code now contains corruption provisions that restate the core of unlawful enrichment and abuse of authority in Articles 603 and 604.²⁴ This recodification does not eliminate the need for anti-corruption enforcement, but it requires renewed attention to the meaning of state financial loss and state economic loss in a post-2026 legal landscape. If the new formulation continues to rely on conventional proof of loss without a clear ecological bridge, the same problems will persist. If it is interpreted too expansively, however, it may undermine predictability. The reform agenda must therefore be doctrinally precise rather than merely punitive.²⁵

Method

This article uses normative legal research to examine how state financial loss and environmental damage should be understood in natural resource corruption. The research objective is not to measure a particular polluted site or audit a particular state account, but to reconstruct the legal criteria by which ecological harm can become relevant to corruption liability and recovery. The approach is statutory, conceptual, case-based, and reform-oriented. The statutory approach examines the Anti-Corruption Law, the 2023 Criminal Code, the Environmental Protection and Management Law, the State Finance Law, the Treasury Law, environmental loss valuation rules, and procedural rules on evidence. These legal materials are treated as primary legal data, not as bibliographic references. They are analyzed to determine the scope, function, and limits of state loss and environmental loss in Indonesian law. This conceptual approach clarifies the meanings of state financial loss, state economic loss, environmental damage, ecological loss, natural capital, restoration, and asset recovery. These concepts are often used interchangeably in public debate, but they perform different legal functions. State financial loss is primarily linked to proving corruption and recovering public assets. State economic loss relates to broader harm to the state's economic life and resource allocation. Environmental damage concerns the impairment of environmental functions and public ecological interests. Ecological valuation translates damage into

²¹ Eleanor R. E. O'Higgins, "Corruption, Underdevelopment, and Extractive Resource Industries: Addressing the Vicious Cycle," *Business Ethics Quarterly* 16, no. 2 (April 2006): 235–54, <https://doi.org/10.1017/S1052150X00012823>.

²² Helen Canton, "United Nations Office on Drugs and Crime—UNODC," *The Europa Directory of International Organizations* 2021, July 2021, 240–44, <https://doi.org/10.4324/9781003179900-33>.

²³ OECD, *Corruption in the Extractive Value Chain: Typology of Risks, Mitigation Measures and Incentives*; Extractive Industries Transparency Initiative, "Addressing Corruption Risks through EITI Implementation" (Oslo, 2024); United Nations Office on Drugs and Crime (UNODC), "World Wildlife Crime Report 2024: Trafficking in Protected Species" (Vienna, 2024).

²⁴ Dijan Widijowati, "The Crime of Corruption Codified in Law Number 1 of 2023," *Journal of Law and Sustainable Development* 11, no. 11 (November 2023): 1–19, <https://doi.org/10.55908/sdgs.viii.11859>.

²⁵ Hariman Satria, "Perluasan Makna Kerugian Keuangan Negara Dalam Korupsi Izin Usaha Pertambangan," *Jurnal Yudisial* 13, no. 2 (January 11, 2021): 165–86, <https://doi.org/10.29123/jy.v13i2.417>.

monetary terms for adjudication and restoration. Separating these concepts allows the article to avoid both under-inclusion, where ecological damage is ignored, and over-inclusion, where every environmental loss is automatically treated as state financial loss without sufficient proof.²⁶

The case approach focuses on selected Indonesian corruption cases involving natural resource governance and environmental harm, especially the Nur Alam and Surya Darmadi cases, while also considering broader debates on palm oil, mining, and forest-area licensing. The purpose is not to provide a full doctrinal commentary on each judgment, but to identify recurring problems in judicial reasoning. These problems include causality between corrupt acts and ecological damage, the legal status of restoration costs, experts' authority to calculate ecological loss, the distinction between company liability and official liability, and the interpretation of actual loss after Constitutional Court Decision No. 25/PUU-XIV/2016. The cases are treated as legal data for understanding how courts negotiate the boundary between anti-corruption law and environmental law.²⁷ Secondary materials include recent journal articles, policy papers, reports, and international guidance on corruption, ecological harm, natural capital, and extractive governance. Recent Indonesian scholarship is prioritized, while older sources are retained only for foundational concepts. The analysis is qualitative and prescriptive. It identifies the governing law and case findings, diagnoses uncertainty at the intersection of financial and ecological loss, assesses its effects on prosecution and recovery, and develops an integration model that preserves criminal legality while enabling restoration. The study does not conduct fieldwork or independently verify case-specific environmental calculations. Its contribution is doctrinal and institutional. Future empirical research should test how investigators select experts, courts assess scientific evidence, and restoration orders are implemented.

Discussion

1. The Public-Loss Structure of Natural Resource Corruption

The first finding is that natural resource corruption creates a layered public loss that no single fiscal category can capture. In conventional corruption cases, state financial loss often appears as overpayment, fictitious procurement, budget leakage, or unlawful disbursement. In natural resource corruption, by contrast, the public loss may begin with the unlawful allocation of authority over land, forests, minerals, water, or plantation areas. The corrupt act allows private actors to access public natural capital without meeting legal, environmental, or fiscal obligations. The state may lose royalties or taxes, but it may also lose the lawful opportunity to manage resources sustainably, protect ecological functions, and ensure fair distribution of benefits. This layered structure explains why natural resource corruption must be analyzed as a governance offense, not merely as a financial irregularity.²⁸

²⁶ Muhamad Muhdar, "Rekonstruksi Basis Perhitungan Kerugian Negara Dalam Peristiwa Tindak Pidana Korupsi Pada Sektor Sumber Daya Alam," *Jurnal de Jure* 12, no. April (2020): 38–53.

²⁷ Laily Maghfiroh and Abdul Kholiq, "Valuing Environmental Damage as State Financial Loss in Corruption Cases: A Substantive Justice Analysis of The Harvey Moeis Verdicts," *Journal of Mathematics Instruction, Social Research and Opinion* 4, no. 4 (December 21, 2025), <https://doi.org/10.58421/misro.v4i4.884>.

²⁸ Yunus Husein, *Korupsi Dan Corporate Criminal Liability Di Sektor Sumber Daya Alam* (Jakarta: Auriga Nusantara, 2020), 21–36.

The second finding is that Indonesian law already contains the building blocks for recognizing this layered loss, even though it has not fully integrated them. The constitutional mandate over natural resources establishes that public control over natural wealth is directed toward public prosperity. Anti-corruption law criminalizes unlawful enrichment and abuse of authority that harm state finance or the state economy. Environmental law recognizes pollution, damage, restoration, compensation, and government authority to sue for environmental loss. Environmental loss valuation rules provide methods for calculating ecological damage, economic loss, and restoration cost. Sectoral laws on mining, forestry, plantations, and spatial planning regulate access to resources. These components indicate that the legal system has sufficient materials. The problem is the absence of a coherent adjudicative sequence for combining them in criminal corruption cases.²⁹

The loss is also public in character. A polluted river, damaged forest, or unreclaimed mine affects health, livelihoods, biodiversity, water regulation, disaster risk, and local economies. Although communities bear direct consequences, the broader legal interest is the conversion of public ecological wealth into private gain through corruption-tainted governance. Environmental harm therefore cannot be treated as a mere externality of the corruption offense.³⁰ The distinction between state financial and environmental loss nevertheless remains necessary. Treating ecological valuation as an automatic substitute for proving corruption loss would weaken causality and legality. Conversely, excluding ecological harm would ignore the gravest consequences of corrupt extraction. Functional integration offers the middle course: courts should identify whether a valuation proves state financial loss, state economic loss, aggravating harm, compensation, or restoration, rather than merging all categories.³¹

Table 1. Legal Location of Loss Components in Natural Resource Corruption

Loss component	Main legal meaning	Typical proof	Possible function in corruption case
Lost state revenue	Unpaid tax, royalty, non-tax state revenue, concession fee, or other public income	Financial audit, fiscal records, licensing and production data	Core state financial loss if actual, calculable, and caused by unlawful act
Unlawful enrichment	Private benefit obtained through illegal permit, abuse of authority, or collusion	Company accounts, production records, asset tracing, beneficial ownership	Proof of enrichment and basis for confiscation or replacement money
Environmental damage	Pollution, degradation, or impairment of ecosystem functions	Scientific evidence, field verification, laboratory tests, expert assessment	Basis for ecological valuation, aggravating factor, restoration order, or economic loss
Restoration cost	Cost needed to restore environmental functions or remediate damage	Environmental valuation, restoration plan, expert calculation	State loss if incurred or legally certain; otherwise basis for restorative remedy
State economic loss	Reduction of public economic welfare due to misallocation of resources	Economic modeling, natural capital valuation, regional impact data	Broader element where corruption harms the state economy beyond the budget

Source: Author's synthesis

²⁹ Indonesia Corruption Watch, *Implementation and Regulation of Ecological Losses Valuation in the Calculation of State Losses in Corruption Cases in the Extractive Industries Sector*, 15–24.

³⁰ Sari et al., “State Financial Losses as a Result of Environmental Damage.”

³¹ Kusworo and Anggraini, “Extensive Interpretation of State Financial Losses in Tin Sector Corruption: A Comparative Study of Emerging Economies,” 173–86.

The table shows that each loss component should be proven through different evidence. Lost revenue requires fiscal and production data. Unlawful enrichment requires proof of benefit. Environmental damage requires scientific evidence. Restoration cost requires expert-based remedial calculation. State economic loss requires economic reasoning about misallocation and public welfare. This separation is essential because the reliability of one component does not automatically prove another. A company may unlawfully enrich itself even if the exact restoration cost remains disputed. Environmental damage may be scientifically proven even if the state has not yet paid restoration expenses. State economic loss may be broader than a budgetary deficit, but it still requires a legally intelligible connection to the corrupt act.³² This distinction explains the difficulties in Nur Alam and Surya Darmadi. Nur Alam required a causal link between an official's corrupt licensing decision, corporate extraction, ecological damage, and the official's legal responsibility. Surya Darmadi raised whether ecological and economic calculations represented actual loss, future restoration cost, or broader state economic loss. Both demonstrate that valuation alone is insufficient without allocating legal responsibility.³³

A stronger theory of natural resource corruption should begin from abuse of public allocation. Licensing is not a neutral administrative formality. It is the state's gatekeeping function over public natural capital. When a licence is issued unlawfully, backdated, manipulated, or granted without required environmental procedures, the state's control over the resource is corrupted. This corrupted allocation then allows extraction that may produce ecological damage and private gain. The prosecution should therefore prove the licensing corruption as the first legal wrong. Environmental damage should then be connected to that wrong through evidence that the unlawful allocation enabled, accelerated, expanded, or concealed the damaging activity. This avoids the weak argument that every environmental damage connected to a corrupt actor automatically becomes corruption loss.³⁴

The concept of state economic loss may provide a better bridge than state financial loss in certain cases. State financial loss suggests a reduction of assets or rights that can be audited with financial methods. State economic loss, however, can capture the decline in welfare, production, allocation efficiency, and public benefit caused by corruption. In natural resource corruption, the state may suffer economic loss when corrupt licensing transfers resources to actors who extract without fulfilling environmental obligations, causing a reduction in ecosystem services and future productive capacity. This does not mean that state economic loss is unlimited. It must still be proven through a clear method, connected to a specific unlawful act, and distinguished from ordinary business risk or environmental damage caused by non-corrupt factors.³⁵

³² Totok Dwi Diantoro et al., *Penghitungan Kerugian Keuangan Negara Dalam Korupsi Sumber Daya Alam* (Jakarta: PUKAT FH UGM-KPK RI, 2022), 40–58.

³³ Indonesia Corruption Watch, *Implementation and Regulation of Ecological Losses Valuation in the Calculation of State Losses in Corruption Cases in the Extractive Industries Sector*, 35–45.

³⁴ Satria, "Perluasan Makna Kerugian Keuangan Negara Dalam Korupsi Izin Usaha Pertambangan," 172–80.

³⁵ Taufik Rachman et al., "Defining State Economic Loss Due to Corruption within the Indonesian Law: Hurdle and Solution," *World Journal of Entrepreneurship, Management and Sustainable Development* 19, no. 1–2 (May 19, 2023): 53–67, <https://doi.org/10.47556/J.WJEMSD.19.1-2.2023.5>.

The public-loss structure also requires attention to communities. Local communities are often the first victims of ecological damage, but corruption trials tend to frame the state as the only injured party. This creates a representation problem. The state is harmed because public wealth and authority are abused, while communities are harmed because environmental functions that support their lives are degraded. The two harms overlap but are not identical. An integrated approach should allow community harm to inform the valuation of ecological and economic loss, especially where livelihood, health, and access to environmental services are affected. However, community harm should not be absorbed entirely into state loss, because affected communities may also need separate remedies, participation, and restoration guarantees.³⁶

A narrow fiscal model understates serious offences, weakens deterrence, and shifts restoration costs to the public. An undisciplined ecological-loss model risks inflated calculations, double recovery, and liability without causation. The legal objective is therefore a framework that is ecologically realistic while retaining the precision required by criminal law.³⁷ Extractive corruption may occur at licensing, operations, revenue collection, trading, monitoring, and closure, with different evidence and losses at each stage. A sound indictment should therefore identify the stage of corruption, the defendant's authority, the unlawful benefit, the environmental consequence, and the remedy sought rather than presenting them as one undifferentiated loss.³⁸ Indonesia's natural capital context makes this especially important. Natural capital accounting shows that forests, minerals, land, and ecosystem services contribute to national wealth and development planning. Indonesia has experience with environmental-economic accounts and ecosystem accounting initiatives. These tools can inform legal valuation, but they should not replace legal proof. National accounts measure broad trends, while criminal trials require proof of conduct, causality, loss, and responsibility. The value of natural capital accounting is that it demonstrates why ecological functions have public economic significance. Its limitation is that it must be translated into case-specific evidence before it can justify criminal recovery.³⁹

The public-loss structure proposed here therefore rests on four premises. First, natural resources under state control are public wealth with ecological and economic functions. Second, corrupt allocation of natural resource authority can generate both fiscal and ecological harm. Third, environmental damage is not automatically a state financial loss, but it can become legally relevant when connected to corrupt conduct through causality and valuation. Fourth, courts must assign the legal function of ecological valuation with precision. These premises support a model of natural resource corruption that is neither purely anthropocentric nor vague. It recognizes the value of ecosystems while preserving criminal law's evidentiary discipline.

³⁶ Phelps J. et al., "Valuasi Lingkungan Di Indonesia: Implikasi Pada Kebijakan Di Kehutanan, Pertanggung-Jawaban Hukum Dan Estimasi Kerugian Negara," 2014, <https://doi.org/10.17528/cifor/005289>.

³⁷ Rimawan Pradipto, *Modul Integritas Bisnis: Dampak Sosial Korupsi* (Jakarta: Komisi Pemberantasan Korupsi, 2016), 15–23.

³⁸ OECD, *Corruption in the Extractive Value Chain: Typology of Risks, Mitigation Measures and Incentives*, 66:31–55.

³⁹ World Bank, *Natural Capital Accounts and Policy in Indonesia*.

2. Actual Loss, Scientific Evidence, and Ecological Valuation

The second major problem is evidentiary. Actual-loss doctrine requires that state financial or economic loss be real, calculable, and causally connected to the unlawful act. This requirement is defensible in corruption law because criminal punishment must not rest on speculation. However, environmental damage often becomes visible through scientific inference rather than direct accounting. A forest's loss of water regulation, a soil's reduced fertility, or a river's contamination may not appear as a budget debit. The damage is established through field verification, sampling, laboratory results, remote sensing, ecological modeling, and expert valuation. The challenge is to make scientific proof legible to criminal courts without diluting the standard of proof.⁴⁰ Scientific evidence should be understood as a bridge between environmental fact and legal consequence. It does not decide guilt on its own. It identifies whether pollution or damage occurred, what functions were impaired, how far the damage extends, what restoration is required, and what monetary value can be assigned to the damage. Judges must then decide whether that damage is legally attributable to the defendant's corrupt conduct. This division of roles is important. Experts should not replace judges in determining criminal responsibility, but judges should not disregard expert findings merely because ecological harm is complex. The court's task is to test relevance, reliability, methodology, and causal connection.⁴¹

Indonesian environmental valuation may include pollution-control costs, verification, restoration, ecosystem loss, and losses suffered by affected communities. These components serve the polluter-pays principle in environmental law, but courts must still assign their legal function. A valuation may prove state loss, support state economic loss, inform replacement money, or justify an additional restorative measure; those functions are not interchangeable.⁴² Restoration cost is particularly difficult under actual-loss doctrine because it can be calculated before the state pays it. Yet where environmental damage already exists, a legal duty to restore is established, and the amount is reliably calculated; the loss is not merely hypothetical. The remaining uncertainty concerns quantum, which expert evidence and judicial assessment can test.⁴³ The law should distinguish speculative loss from scientifically estimated actual loss. The former depends on events that may never occur; the latter monetizes existing damage through accepted methods. Courts should therefore examine the transparency of assumptions, methodological acceptance, site-specific data, and avoidance of duplication, rather than rejecting ecological valuation simply because it involves estimation.⁴⁴

Environmental adjudication demonstrates why scientific evidence is indispensable for pollution and ecological damage. Corruption courts should not require ecological harm to be

⁴⁰ Fatkhurohman and Kurniawan, "Pergeseran Delik Korupsi Dalam Putusan Mahkamah Konstitusi Nomor 25/PUU-XIV/2016," 10–16.

⁴¹ Mochamad Agung Sasongko et al., "EIA in Strengthening Law Enforcement and Penalties: A Case of Corruption in Natural Resource Sector," *Hasanuddin Law Review* 10, no. 3 (December 12, 2024): 292, <https://doi.org/10.20956/halrev.v10i3.5167>.

⁴² Butar, Feliciano, and Mulahela, "Mungkinkah Kerugian Lingkungan Hidup Akibat Pertambangan Dapat Dikategorikan Sebagai Tindak Pidana Korupsi?," 2019, 891–94.

⁴³ Indonesia Corruption Watch, *Implementation and Regulation of Ecological Losses Valuation in the Calculation of State Losses in Corruption Cases in the Extractive Industries Sector*, 72–82.

⁴⁴ Sari et al., "State Financial Losses as a Result of Environmental Damage," 136–42.

proven like missing cash. The prosecution should instead present a clear chain from the unlawful act and violated environmental obligation to ecological change, valuation method, causality, and the legal consequence sought.⁴⁵

Table 2. Proposed Evidentiary Sequence for Ecological Loss in Corruption Cases

Stage	Question to be answered	Main evidence	Legal control
Corrupt act	Was there unlawful enrichment, abuse of authority, bribery, collusion, or illegal allocation of rights?	Permits, official correspondence, witness testimony, money flow, beneficial ownership	Legality of offense and role of defendant
Environmental obligation	What legal environmental duties applied to the activity?	Environmental approval, AMDAL, reclamation plan, spatial plan, license conditions	Sectoral legality and unlawfulness
Environmental damage	Did pollution or ecological damage occur?	Field verification, laboratory test, remote sensing, expert report	Scientific reliability and relevance
Causality	Did the corrupt act enable or contribute to the damage?	Chronology, permit-decision chain, operational records, expert causal analysis	Attribution and non-duplication
Valuation	What monetary value reflects the damage or restoration need?	Ecological valuation, restoration cost estimate, fiscal data	Transparency, method, proportionality
Legal function	How should the valuation be used?	Indictment, judgment reasoning, recovery order	Distinction between state loss, economic loss, restitution, restoration, sentencing

Source: Author’s normative reconstruction.

The sequence begins with the corrupt act because corruption liability cannot be built solely on environmental damage. It then identifies environmental obligations because the same activity may be lawful or unlawful depending on permits, spatial status, environmental approval, and compliance conditions. It next proves environmental damage through scientific evidence. Only then does the analysis move to causality and valuation. This order prevents prosecutors from beginning with a large ecological-loss number and then searching for a corruption theory. It also prevents courts from dismissing ecological loss merely because it is not a conventional audit result. Each stage has its own legal control. Causality is the most difficult stage. Natural resource damage often has multiple causes, including corporate operations, weak supervision, community activities, previous concessions, natural events, and long-term land-use change. A corruption court does not need to prove that the corrupt act is the only cause of damage. It should require proof that the corrupt act was a legally significant cause: it enabled illegal access, expanded the area of exploitation, removed safeguards, concealed violations, or allowed operations to continue despite known environmental risks. This standard is more realistic than sole causation and more precise than mere association. It recognizes that corruption often enables environmental harm.⁴⁶

The authority of experts must also be clarified. Financial auditors are essential for calculating conventional state financial loss, but ecological loss requires environmental

⁴⁵ Sasongko et al., “EIA in Strengthening Law Enforcement and Penalties: A Case of Corruption in Natural Resource Sector.”

⁴⁶ Gian Marco Moisé, “Corruption in the Oil Sector: A Systematic Review and Critique of the Literature,” *The Extractive Industries and Society* 7, no. 1 (January 2020): 217–36, <https://doi.org/10.1016/j.exis.2020.01.002>.

scientists, economists, geologists, foresters, hydrologists, remote-sensing experts, and restoration specialists. The 2023 Criminal Code's definition of state financial loss has sparked debate over which institution should determine it. That debate should not exclude environmental expertise. The correct solution is institutional coordination, not monopoly by one type of expert. Financial auditors can verify fiscal loss and state expenditure. Environmental experts can verify ecological damage and restoration costs. Economists can assess state economic loss. The court can then decide the legal status of each calculation.⁴⁷ This coordinated approach avoids a false choice between BPK/BPKP-style financial audit and environmental valuation. The former is not designed to measure biodiversity loss or hydrological impairment. The latter is not designed to audit state cash flows. A natural resource corruption case may require both. If the prosecution alleges lost royalties, a financial audit is central. If it alleges ecosystem damage, it needs environmental valuation. If it alleges state economic loss from misallocating resources, it needs economic modeling. Judicial reasoning should explain how these forms of evidence relate rather than forcing all of them into the language of accounting.

Double counting must also be controlled. Experts should separate fiscal loss, ecological damage, restoration cost, unlawful benefit, and community loss, identify overlaps, and explain why each component is necessary. Restoration cost should not be monetized twice under different labels, and unlawful operator profits should not automatically be treated as state loss. Transparent categorization protects both proportionality and recovery.⁴⁸ The relation between company liability and official liability must also be specified. Natural resource corruption often involves an official who grants or facilitates an unlawful benefit and a corporation that extracts resources and causes physical damage. The official may not have operated the mine or plantation, but the official's abuse of authority may have enabled the operation. The corporation may be liable for environmental damage and corruption if it participated in the corrupt scheme or benefited from it. A sound judgment should allocate responsibility according to role. The official may be responsible for abuse of authority, unlawful enrichment, and foreseeable consequences of corrupt allocation. The corporation may be responsible for operational damage, unlawful benefit, and restoration. Joint responsibility may be appropriate where the corrupt scheme and ecological damage are inseparable.⁴⁹

Sentencing should reflect ecological harm even when the court is cautious about classifying all environmental damage as state financial loss. Environmental damage can aggravate culpability because it shows that the corruption harmed not only the treasury but also public welfare and intergenerational interests. Replacement money should recover unlawful enrichment and actual state loss. Restoration orders or compensation should address ecological damage. Asset confiscation should target proceeds of corrupt extraction.

⁴⁷ Wendy Assanti and Hendry Noor, "Debating Expert Authority in Corruption Cases: The Challenge of Interpreting State Financial Losses Under the 2023 Indonesian Criminal Code," *Padjadjaran Jurnal Ilmu Hukum (Journal of Law)* 12, no. 3 (2025): 331–51, <https://doi.org/10.22304/2442-9325.1351>.

⁴⁸ Indonesia Corruption Watch, *Implementation and Regulation of Ecological Losses Valuation in the Calculation of State Losses in Corruption Cases in the Extractive Industries Sector*, 77–80.

⁴⁹ Imam Rofi'i, "Kajian Yuridis Pertanggungjawaban Korporasi Terhadap Kerusakan Lingkungan Yang Mengakibatkan Kerugian Negara Dalam Putusan Nomor 2633/K/Pid.Sus/2018," *Novum: Jurnal Hukum* 07, no. 04 (2020): 140–52, <https://doi.org/https://doi.org/10.2674/novum.v7i4.33677>.

Fines should not be the only response because they may be far lower than the ecological and economic benefit obtained. A restoration-oriented sentencing model aligns punishment with the real harm of natural resource corruption.

State economic loss must not become a residual category for every ecological harm. Use it only where corruption demonstrably reduces public economic welfare, distorts resource allocation, or imposes public restoration burdens. Economic experts should provide a reasonable, data-based counterfactual showing what lawful governance would have produced and how corruption reduced that value.⁵⁰ The actual-loss doctrine should therefore be read in an ecological context, not against it. Actual loss does not mean only cash already spent. It means a real loss, not a hypothetical possibility. Environmental damage that has already occurred is real. A legally required restoration cost for existing damage is real, even if the exact expenditure has not yet been disbursed. Lost ecosystem services may be real if proven through scientific and economic methods. The court's role is to determine whether the valuation is reliable and legally attributable. This interpretation preserves the Constitutional Court's concern for certainty while preventing ecological loss from being dismissed as merely potential.

3. Reformulating Liability, Recovery, and Restoration

The reform problem is coordination, not absence of law. Anti-corruption, environmental, sectoral, procedural, audit, and scientific regimes operate in parallel, creating risks of prosecutorial overreach, judicial rejection of ecological evidence, and ineffective restoration. Reform should integrate these regimes while preserving their distinct legal functions.⁵¹ First, judgments should distinguish fiscal state financial loss, ecological-economic state loss, and community or ecosystem restoration loss. The categories may overlap factually, but they should be reasoned separately so that environmental harm is recognized without forcing every component into a narrow financial definition.⁵² The second reform is procedural: indictments in natural resource corruption should include an environmental-loss annex in which ecological damage is alleged. The annex should identify the environmental obligations, the scientific findings, the valuation method, the causal theory, the categories of loss, and the recovery requested. This would make the prosecution's theory transparent from the beginning and allow defendants to challenge the evidence. It would also help judges separate the proof of corruption from the proof of environmental damage. The annex should not replace the indictment, but it should discipline the presentation of complex ecological evidence.

The third reform is institutional: investigation should use a multi-regime team. A corruption investigator may understand bribery, abuse of authority, and asset tracing, but environmental damage requires technical expertise. A good team should include financial auditors, environmental investigators, sectoral regulators, geospatial analysts, environmental economists, and asset recovery specialists. Each should have a defined role. Financial auditors

⁵⁰ Rachman et al., "Defining State Economic Loss Due to Corruption within the Indonesian Law: Hurdle and Solution."

⁵¹ United Nations Office on Drugs and Crime (UNODC), "Global Programme on Crimes That Affect the Environment Annual Report 2024" (Vienna, 2024), 3–12.

⁵² Ainun Jiwanti and Mona Ervita, "Urgency of Expanding the Meaning of State Financial Losses Based on Ecological Losses Resulting from Corruption in the Natural Resources Sector," *JUSTISI* 11, no. 3 (June 23, 2025): 702–18, <https://doi.org/10.33506/js.v11i3.4334>.

calculate fiscal loss. Environmental experts verify damage and restoration. Economists assess broader state economic loss. Asset recovery specialists trace proceeds and identify recoverable property. Coordination is essential because fragmented investigations produce fragmented proof.⁵³ The fourth reform is judicial: judges handling natural resource corruption with environmental-loss claims should receive specialized guidance on scientific evidence and ecological valuation. Indonesia has already developed specialized approaches for environmental adjudication. Corruption courts should not become environmental courts, but they need the competence to evaluate scientific evidence when ecological loss is at issue. Guidelines could cover admissibility, expert qualification, methodology, causality, double counting, restoration orders, and the relation between criminal and civil recovery. Such guidance would reduce inconsistency and improve confidence in judgments.

The fifth reform concerns remedies. Criminal courts should not treat imprisonment and ordinary replacement money as sufficient in natural resource corruption. A restoration-based remedy should be available where the offense causes ecological damage. This remedy should aim to restore environmental functions, not merely deposit money into general state revenue. Where direct restoration is feasible, the convicted corporation or responsible party should fund and implement restoration under supervision. Where direct restoration is not feasible, compensation should support ecological rehabilitation in the affected region. The state should not profit from ecological damages while the environment remains unrepaired.⁵⁴ The sixth reform concerns asset recovery. Natural resource corruption often hides proceeds through corporate structures, nominees, commodity transactions, land banks, and offshore arrangements. Recovery should target the economic benefit obtained from corrupt extraction, not merely the proven bribe or fiscal loss. If a corporation gained revenue from an unlawfully obtained concession, confiscation and replacement money should reflect that benefit. However, recovery must avoid confiscating lawful revenue unrelated to the corrupt act. The calculation should distinguish gross revenue, production cost, lawful taxes paid, unlawful benefit, restoration liability, and third-party rights. This is complex, but without it, asset recovery will remain weaker than the profits of corruption.⁵⁵

⁵³ Totok Dwi Diantoro et al., *Penghitungan Kerugian Keuangan Negara Dalam Korupsi Sumber Daya Alam*, 70–85.

⁵⁴ Sigit Sambodo, I Gusti Ayu Ketut Rachmi Handayani, and Pujiyono Suwadi, “Environmental Damage as State Financial Loss in Corruption Offenses,” 2025, 404–16, https://doi.org/10.2991/978-2-38476-519-5_32.

⁵⁵ La Ode Ghondohi et al., “Asset Recovery from Mining Corruption: Rationality, Urgency, and Challenges for Environmental Restoration,” *Journal of Law, Environmental and Justice* 3, no. 2 (August 9, 2025): 446–75, <https://doi.org/10.62264/jlej.v3i2.172>.

Table 3. Reformulated Model for Liability and Recovery in Natural Resource Corruption

Judicial issue	Recommended reasoning	Remedy or legal consequence
Corrupt conduct proven, but no ecological damage proven	Convict based on ordinary corruption elements if fiscal loss or unlawful benefit is proven	Imprisonment, fine, replacement money, confiscation of proceeds
Corrupt conduct and fiscal loss proven	Treat fiscal loss as state financial loss	Replacement money equal to proven loss; asset confiscation
Corrupt conduct and ecological damage proven, restoration cost reliable	Determine whether cost is actual state loss, state economic loss, or restoration remedy	Restoration order, compensation, replacement money where legally justified
Corrupt permit enables corporate environmental damage	Allocate responsibility between official and corporation according to role and causality	Joint or separate liability, corporate recovery, official sentencing aggravation
Valuation includes uncertain future impacts	Separate proven existing damage from speculative projections	Accept reliable actual components, use projections cautiously for restoration planning
Community livelihood loss proven	Recognise affected communities in remedy design	Restitution, compensation channel, local restoration programme

Source: Author's normative reconstruction.

This model demonstrates that ecological loss can have several legal consequences without always serving the same function. Where fiscal loss is proven, replacement money is straightforward. Where ecological damage is proven, and restoration cost is reliable, the court must determine whether the state has incurred or is legally certain to incur the burden. If yes, the cost can be treated as actual loss. If not, it can still justify a restoration order or sentencing aggravation. Where the valuation includes speculative projections, the court should separate reliable components from uncertain ones. This makes judgments more resistant to appeal because the court does not depend on an all-or-nothing approach. Legislative reform should clarify the status of environmental loss in corruption law. One option is to amend anti-corruption provisions or accompanying explanations to state that state financial or economic loss in natural resource corruption may include measurable environmental restoration costs, ecological-economic loss, and loss of state-controlled natural capital, provided that the loss is actual, causally connected, and calculated by competent experts through recognized methods. This formulation would not automatically criminalize environmental damage as corruption. It would only clarify that ecological damage is not excluded when it satisfies legal standards. Such clarification would reduce the inconsistency seen in case law.

A second legislative option is to create a procedural regulation or Supreme Court guideline for ecological loss in corruption cases. This may be more flexible than statutory amendment. The guideline could instruct courts to examine the evidentiary sequence described earlier. It could also require expert panels in complex cases, mandate separation of loss categories, and provide rules against double counting. Because ecological valuation is technical and evolving, a guideline may adapt more easily than statutory text. However, the guideline must not create new criminal offenses. It should regulate proof, reasoning, and remedy within existing legal boundaries. A third option is to strengthen environmental restoration funds linked to criminal judgments. If a court orders payment for environmental restoration, the money should be traceable and used for actual ecological recovery. Without

such a mechanism, environmental compensation may be absorbed into general revenue and fail to restore affected ecosystems. A dedicated mechanism would also increase public trust because communities could see that corruption recovery repairs damage. The fund should be transparent, audited, and participatory. It should involve environmental authorities, local governments, affected communities, and independent experts.

Corporate liability must be central to reform. Officials rarely commit natural resource corruption alone. Corporations often request, benefit from, finance, or knowingly exploit unlawful permits. If the corporation is not prosecuted or required to make restitution, the official's conviction may not restore the loss. Pursue corporate liability where there is proof of corporate participation, benefit, failure to prevent corruption, or use of corporate structures to conceal illegal extraction. Sanctions should include fines proportionate to benefit, confiscation, restoration, compliance monitors, debarment from future concessions, and publication of judgment. These sanctions are more relevant to extractive corruption than imprisonment alone. The prevention dimension also needs attention. Recognition of environmental loss in corruption cases will be reactive if licensing systems remain opaque. Prevention requires transparent concession maps, beneficial ownership disclosure, environmental approval databases, production and royalty data, reclamation guarantees, and public participation in monitoring. EITI guidance and extractive governance literature show that making licensing and revenue information accessible and verifiable can mitigate corruption risks. In Indonesia, integration of spatial data, environmental approvals, and anti-corruption red flags would help detect risky concessions before ecological damage occurs.⁵⁶

Public participation is especially important because communities often detect damage earlier than state institutions. Whistleblowers, local residents, indigenous communities, environmental organizations, and journalists can provide early warning of illegal extraction and permit manipulation. But participation must be protected. Natural resource corruption cases can involve powerful actors and local political networks. Legal protection for complainants, access to information, and community involvement in restoration planning are therefore part of anti-corruption policy. The law should not treat communities merely as witnesses after damage occurs. They hold public ecological interests and should be involved in prevention and remedy. The proposed model also has implications for legal education and expert practice. Prosecutors need training in environmental law and ecological valuation. Environmental experts need training in criminal evidentiary standards. Financial auditors need awareness of natural capital and environmental restoration obligations. Judges need tools for evaluating scientific complexity without surrendering legal judgment to experts. Universities and professional bodies can develop interdisciplinary modules on natural resource corruption. This is important because the problem cannot be solved by legal doctrine alone. It requires a shared language among law, ecology, economics, accounting, and public administration.

The concern that ecological loss may overburden criminal courts is legitimate, but it calls for limits, not exclusion. Environmental damage should enter corruption adjudication

⁵⁶ Extractive Industries Transparency Initiative, "Addressing Corruption Risks through EITI Implementation," 5–18.

only where the corrupt conduct enabled, expanded, protected, or benefited from the harmful activity. Unrelated environmental violations should remain within ordinary environmental regimes. Another objection is that ecological valuation is uncertain. All valuation involves uncertainty, including financial audits that rely on assumptions about price, quantity, and counterfactual contracts. The question is not whether uncertainty exists, but whether it is transparent, methodologically acceptable, and legally controlled. Courts routinely evaluate expert evidence in medical, forensic, construction, and financial cases. Environmental valuation should be treated similarly. Courts must test, challenge, and reason through it. Rejecting it wholesale would privilege forms of loss that are easy to count over forms of loss that are socially and ecologically more serious. The reform model also preserves the principle of *ultimum remedium* in environmental criminal law. Not every environmental violation should become a corruption case. Corruption law should apply where there is abuse of public authority, unlawful enrichment, bribery, collusion, or serious harm to state finances or the state economy. Environmental administrative and civil tools remain important for ordinary compliance failures. The integrated model is reserved for cases where corruption and environmental damage are causally connected. This preserves proportionality and prevents the over-criminalization of technical environmental violations.

From a constitutional perspective, the model better reflects the state's duty over natural resources. The constitutional mandate is not satisfied by collecting royalties while allowing corruption-enabled ecological destruction. Public prosperity includes sustainable use, intergenerational equity, and environmental quality. State financial governance should therefore be interpreted to recognize the economic value of ecological functions without reducing the environment to money. Corruption law should protect public finance and public natural capital together, but through carefully differentiated categories of proof and remedy. The model also strengthens deterrence. If perpetrators know that courts will consider only direct fiscal loss, corrupt extraction remains profitable. If courts can recover unlawful benefits, restoration costs, and proven ecological-economic loss, incentives change. Deterrence in natural resource corruption requires making corruption unprofitable and making restoration unavoidable. This does not require arbitrary punishment. It requires accurate accounting of all public harms that are legally connected to the offense. A principled ecological-loss model therefore supports both fairness and deterrence. The reconstruction also has an expressive function. Natural-resource corruption demonstrates that treasury loss and ecological harm are not wholly separate: corrupted licensing can convert public ecological wealth into private accumulation. Judicial recognition of this relationship reinforces the idea that environmental protection is part of integrity in state governance, not merely an administrative supplement.

The preferred approach is therefore neither narrow fiscalism nor unlimited ecological criminalization. It separates concepts, sequences proof, coordinates expertise, assigns legal functions to valuation, and directs recovery toward restoration. This produces a more realistic and legally defensible response to corruption where financial and ecological harms intersect. Public prosperity under constitutional natural-resource control should include ecological security, clean water, resilient livelihoods, disaster prevention, and intergenerational access to resources. When corruption converts forests, coasts, mines, or plantations into private

rent-seeking, the state loses both regulatory integrity and capacity to govern natural capital. Seriousness should therefore reflect abuse of authority, private benefit, ecological degradation, and restoration burden, not only money already missing from the treasury.⁵⁷

Judicial reasoning should identify which components of ecological valuation it accepts or rejects, and why. A rejected restoration cost may still be relevant to a restoration order or sentencing; accepted state economic loss must be explained through misallocation and non-duplication; and where operations directly caused damage, courts should still examine whether a corrupt permit was a legally significant enabling cause. Criminal recovery and civil environmental litigation must be coordinated to prevent both under-recovery and double recovery. Orders should distinguish money returned to the treasury, funds devoted to restoration, compensation for affected communities, and assets securing compliance. Coordination matters most when corporate defendants can move assets before fulfilling environmental obligations. Beneficial-ownership transparency is integral to recovery because one company may hold licenses while profits flow through nominees or affiliates. Investigators should combine environmental evidence with corporate records, financial intelligence, tax and land data, and commodity transactions to identify the real beneficiaries of corrupted allocation and the parties responsible for restoration. Finally, ecological accountability must preserve defense rights. Defendants should be able to challenge expert qualifications, sampling, valuation assumptions, causality, and the separation of loss categories, including through cross-examination and competing experts where necessary. Evidentiary fairness makes ecological-loss judgments more legitimate and durable rather than weakening accountability.

Conclusion

Natural resource corruption requires a reconstructed relationship between state financial loss and environmental damage. The concepts differ in legal function and proof, yet corrupt licensing, abuse of authority, and unlawful enrichment may connect them by enabling damage to public natural capital. Environmental damage should therefore not automatically become state financial loss. It becomes legally relevant only when the prosecution proves the corrupt act, applicable environmental duty, actual ecological damage, causal connection, reliable valuation, and the legal function of that valuation. This sequence allows courts to recognize ecological harm while preserving the actual-loss doctrine and the principle of legality.

Indonesia should develop formal guidance or statutory clarification for ecological loss in natural-resource corruption. The framework should separate fiscal loss, ecological-economic loss, restoration cost, unlawful enrichment, and community loss; regulate scientific evidence; prevent double counting; and direct recovery toward verifiable restoration. Multi-regime investigations, judicial competence in ecological valuation, and transparent management of restoration payments are also necessary. Because this study is normative,

⁵⁷ Robert Costanza et al., "The Value of the World's Ecosystem Services and Natural Capital," *Nature* 387, no. 6630 (1997): 253–260, <https://doi.org/10.1038/387253a0>.

future research should examine how courts evaluate ecological evidence, implement restoration orders, and support community participation in recovery.

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