

Who Pays for Environmental Damage? Tax Justice and Environmental Restoration Obligations in Indonesia's Mining Sector

Sultan Alvaro* 

Universitas Andalas, Padang, Indonesia
sultanalvaro@gmail.com

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*Corresponding Author

Abstract

Mining activities generate substantial fiscal revenues while potentially imposing long-term environmental costs on ecosystems and local communities. The effectiveness of Indonesia's fiscal and environmental governance therefore depends partly on whether mining companies bear an appropriate share of the costs associated with environmental degradation and restoration. This article examines environmental fiscal justice in Indonesia's mining sector. Using normative juridical research and policy analysis, the study evaluates taxation, non-tax state revenue, environmental obligations, reclamation requirements, and financial guarantees for mine closure. The article argues that a tax system cannot be considered just when public revenue is collected from resource extraction while substantial environmental liabilities are transferred to governments and future generations. The study proposes an integrated environmental fiscal framework combining taxation, environmental levies, reclamation guarantees, and transparent restoration funds. The framework should ensure that fiscal instruments complement rather than substitute for direct environmental obligations. Particular attention is given to the principles of polluter pays, intergenerational equity, and transparency in environmental financial management. The article concludes that Indonesia's mining fiscal regime should more explicitly incorporate environmental costs into the economic structure of resource extraction. Such reforms would strengthen accountability while ensuring that natural-resource development does not create disproportionate environmental burdens for resource-producing communities.

[Kegiatan pertambangan menghasilkan pendapatan fiskal yang signifikan namun berpotensi menimbulkan biaya lingkungan jangka panjang bagi ekosistem dan masyarakat setempat. Oleh karena itu, efektivitas tata kelola fiskal dan lingkungan di Indonesia bergantung sebagian pada apakah perusahaan pertambangan menanggung proporsi biaya yang wajar terkait degradasi dan pemulihan lingkungan. Artikel ini mengkaji keadilan fiskal lingkungan dalam sektor pertambangan Indonesia. Melalui penelitian yuridis

*normatif dan analisis kebijakan, studi ini mengevaluasi aspek perpajakan, penerimaan negara bukan pajak, kewajiban lingkungan, persyaratan reklamasi, serta jaminan keuangan untuk penutupan tambang. Artikel ini berargumen bahwa sistem perpajakan tidak dapat dianggap adil jika pendapatan publik dihimpun dari ekstraksi sumber daya sementara beban lingkungan yang besar justru dialihkan kepada pemerintah dan generasi mendatang. Studi ini mengusulkan kerangka kerja fiskal lingkungan terpadu yang memadukan perpajakan, pungutan lingkungan, jaminan reklamasi, dan dana pemulihan yang transparan. Kerangka kerja tersebut harus memastikan bahwa instrumen fiskal berperan sebagai pelengkap, bukan pengganti, bagi kewajiban lingkungan secara langsung. Perhatian khusus diberikan pada prinsip pencemar membayar (*polluter pays*), keadilan antargenerasi, dan transparansi dalam pengelolaan keuangan lingkungan. Artikel ini menyimpulkan bahwa rezim fiskal pertambangan Indonesia perlu secara lebih eksplisit memasukkan biaya lingkungan ke dalam struktur ekonomi ekstraksi sumber daya. Reformasi semacam itu akan memperkuat akuntabilitas sekaligus memastikan bahwa pengembangan sumber daya alam tidak menimbulkan beban lingkungan yang tidak proporsional bagi masyarakat di wilayah penghasil sumber daya tersebut.*

Keywords: Environmental taxation, mining, restoration, polluter pays, fiscal justice

Introduction

Indonesia's mineral and coal resources occupy an important position in national development, generating export earnings, employment, investment, tax revenue, and non-tax state revenue. Yet the economic contribution of mining cannot be evaluated independently from the environmental liabilities created throughout the extraction cycle. Land degradation, water contamination, biodiversity loss, altered hydrological systems, abandoned mine pits, and social disruption may persist long after mineral extraction has ceased. The central issue is therefore not whether mining produces economic value, but how the costs and benefits of that value are distributed among mining companies, governments, communities, and future generations. This question lies at the intersection of fiscal justice and environmental justice. Recent Indonesian scholarship similarly emphasizes that natural-resource development may generate economic benefits while concentrating environmental and social burdens on rural and Indigenous communities (Wiriyawadee et al. 2025; Zafiroth and Thammasat 2025). The problem is consequently one of institutional cost allocation: who benefits from extraction, who pays for environmental damage, and who possesses the authority to determine the acceptable level of ecological risk?

The theoretical foundation of this inquiry can be traced to the economics of externalities. Pigou argued that where private production generates social costs not

reflected in market prices, public intervention may be necessary to align private and social costs (Pigou 1920). Mining represents a particularly important case because the market price of minerals may not fully incorporate ecological restoration, public-health impacts, ecosystem degradation, and long-term social costs. The polluter-pays principle subsequently developed as a more specific allocation principle requiring those responsible for pollution to bear the costs of prevention, control, and remediation (OECD 2008). De Sadeleer similarly explains that the principle performs preventive, corrective, and redistributive functions because it seeks to ensure that environmental costs are incorporated into economic decision-making (de Sadeleer 2020). The principle therefore has direct relevance to taxation and mining regulation: if fiscal instruments capture mining rents while environmental restoration remains substantially dependent on public budgets, the fiscal system risks separating economic benefit from environmental responsibility.

Indonesia has formally incorporated environmental responsibility into its legal framework. Law No. 32 of 2009 on Environmental Protection and Management establishes environmental protection as part of sustainable development and recognizes economic instruments and liability mechanisms for environmental management. In the mining sector, Law No. 3 of 2020 amending Law No. 4 of 2009 on Mineral and Coal Mining reinforces obligations concerning reclamation and post-mining activities. Government Regulation No. 78 of 2010 requires mining licence holders to prepare reclamation and post-mining plans and to provide financial guarantees. These rules indicate that Indonesian law does not conceptually permit mining companies to externalize all restoration costs to the state. Nevertheless, the existence of financial guarantees does not automatically establish fiscal justice. The relevant question is whether the amount, timing, enforcement, and accessibility of those guarantees are sufficient to cover realistic restoration costs.

Previous studies reveal an important implementation gap. Research on Indonesia's reclamation bonding mechanism has found that regulatory ambiguity and weak enforcement can undermine the effectiveness of financial guarantees, while a stronger approach would calculate guarantees against the worst reasonably foreseeable environmental damage (Thampapillai and others 2021). More recent research argues that the reclamation obligation should be treated as a substantive legal duty rather than merely an administrative requirement and that the placement of reclamation funds should not relieve mining companies of their primary obligation to perform restoration (2023). Other studies have identified weaknesses in institutional supervision, regulatory fragmentation, and the insufficient integration of ecological justice into post-mining governance (Wicaksono and Rahmawati 2024). These findings are important because they demonstrate that the central problem is not necessarily the absence of environmental obligations but the institutional design through which obligations are calculated, secured, monitored, and enforced.

The fiscal dimension adds another layer to this problem. Mining companies contribute through taxation, royalties, and non-tax state revenue, while producing regions may receive fiscal transfers associated with natural-resource exploitation. Empirical evidence from Indonesia suggests that resource dependence can contribute positively to district-level income, meaning that extraction cannot simply be characterized as economically destructive (Hilmawan and Clark 2019). Research on tin mining similarly demonstrates substantial regional economic multipliers despite the existence of social and environmental costs (2022). The issue, therefore, is not whether mining should produce public revenue but whether fiscal revenue is sufficient and appropriately structured to address the environmental liabilities generated by extraction. Fiscal justice requires consideration of both revenue collection and expenditure responsibility. A region may receive significant resource revenues while still facing underfunded restoration, environmental monitoring, health impacts, and post-mining economic vulnerability. This distinction is central to evaluating the fairness of Indonesia's mining fiscal regime.

Against this background, this article examines whether Indonesia's existing combination of taxation, non-tax state revenue, reclamation guarantees, and environmental obligations adequately internalizes the environmental costs of mining. The article contributes to the literature by treating environmental restoration not as a separate environmental-law issue but as an integral component of fiscal justice. It argues that mining taxation and environmental obligations should be understood as complementary instruments within a single resource-governance framework. Taxation captures part of the economic rent generated from natural resources, while environmental guarantees and restoration obligations ensure that the costs of ecological damage remain attached to the actor generating the risk. The article employs normative juridical and policy analysis, examining statutory rules, legal principles, economic theories, and relevant empirical literature. The analysis focuses on three interconnected dimensions: the legal architecture of environmental cost internalization, the adequacy of reclamation guarantees and fiscal fundamental fiscal justice problem in mining arises from the difference between private production costs and social environmental costs. Mining companies normally calculate extraction costs in terms of labour, capital, equipment, energy, royalties, taxes, and operational expenses.

Environmental degradation, however, may generate costs that are difficult to capture within ordinary corporate accounting, including reduced agricultural productivity, declining water quality, biodiversity loss, public-health expenditure, loss of ecosystem services, and the cost of restoring disturbed landscapes. Pigou's theory of externalities provides a useful analytical basis because it demonstrates corporate income tax, royalties, or non-tax state revenue while continuing to impose restoration costs on the public. Fiscal contribution therefore cannot be treated as a substitute for environmental responsibility. A just regime must distinguish between payments made because a company earns income from public

resources and payments or obligations imposed because its activities generate environmental risks. The former concerns resource law provides a normative basis for this integrated approach. Law No. 32 of 2009 establishes the polluter-pays principle within the broader architecture of environmental protection and recognizes the importance of economic instruments in environmental governance. Government Regulation No. 22 of 2021 subsequently provides an implementing framework for environmental protection and management, including environmental approval and control mechanisms. Meanwhile, the mining regime requires licence holders to undertake reclamation and post-mining activities. The legal structure therefore reflects a double obligation: mining companies must contribute to public revenues associated with resource exploitation and must independently discharge environmental obligations arising from their activities. This distinction is critical for tax justice. If environmental obligations are weakened because companies already pay taxes and royalties, the state effectively transfers the cost of environmental degradation from the producer to the public.

Conversely, when environmental obligations are rigorously enforced alongside fiscal contributions, resource taxation becomes more consistent with the systems often operate annually, whereas ecological impacts can continue for decades. A tax collected in the year of extraction cannot necessarily finance ecological losses occurring twenty or thirty years later. This temporal mismatch creates an intergenerational justice problem. Rawls's conception of justice between generations suggests that institutions should preserve sufficient social and represents an important attempt to prevent environmental liabilities from being transferred to the public. Government Regulation No. 78 of 2010 requires mining licence holders to establish reclamation and post-mining plans and to provide financial guarantees for implementation. The underlying logic is economically sound: financial resources should be secured before environmental damage becomes an unfunded public liability.

However, the existence of a guarantee is not equivalent to the adequacy of a guarantee. The critical issue is whether the amount secured corresponds to the full and realistically estimated cost of restoration. Research on Indonesia's reclamation bonding mechanism has identified regulatory clarity and enforcement as major weaknesses and recommends a worst-case actual restoration. This distinction is essential because environmental damage cannot be resolved simply by transferring money to a government account. A mining company that leaves a contaminated river, unstable waste dump, or dangerous mine pit cannot satisfy the substantive requirements of environmental justice merely because it has deposited a financial guarantee. The law should therefore adopt a performance-oriented conception of environmental responsibility. Financial guarantees should provide the state with the capacity to intervene when a company defaults, while the primary legal expectation remains actual ecological restoration by the responsible, and restoration financing. Environmental taxes and charges can discourage environmentally harmful activities

by increasing the private cost of pollution. Reclamation bonds provide financial security for future restoration.

Conventional taxes and royalties capture resource reclamation guarantees as sufficient justification for weak environmental taxation. Justice requires an integrated architecture in which each instrument addresses a distinct dimension of the mining externality, whose livelihoods depend directly on land and water resources. Recent studies published in the Indonesian justice literature argue that extractive activities can create unequal environmental burdens for Indigenous and vulnerable communities and that environmental governance must incorporate participation may fail to reflect differences in geological conditions, ecosystem sensitivity, proximity to communities, acid mine drainage risks, water contamination, biodiversity significance, and long-term land-use requirements. The guarantee should therefore incorporate environmental risk, restoration complexity, monitoring costs, inflation, and uncertainty.

OECD analysis risks would internalize a greater proportion of expected public costs. Such a system would also reduce the possibility that taxpayers ultimately finance restoration when the private operator cannot be assessed solely by examining the amount of money collected from mining companies. It must also consider where environmental costs occur and where fiscal benefits are ultimately received. Mining production frequently takes place in rural districts, while taxation, regulation, and major fiscal decisions may be concentrated at the national level. Resource-producing regions may receive revenue-sharing transfers, but those transfers do not necessarily correspond to the magnitude of environmental and social impacts. This creates a spatial dimension of justice. A producing region may contribute mineral wealth to national development while simultaneously bearing degraded land, damaged infrastructure, water pollution, and increased public-service requirements. Research on Indonesian resource dependence demonstrates that mining can generate positive income effects at the district level, instruments, and the distribution of environmental and fiscal burdens across companies, governments, communities, and future generations.

Environmental Externalities and the Legal Meaning of the Polluter-Pays Principle

The fundamental fiscal justice problem in mining arises from the difference between private production costs and social environmental costs. Mining companies normally calculate extraction costs in terms of labour, capital, equipment, energy, royalties, taxes, and operational expenses. Environmental degradation, however, may generate costs that are difficult to capture within ordinary corporate accounting, including reduced agricultural productivity, declining water quality, biodiversity loss, public-health expenditure, loss of ecosystem services, and the cost of restoring disturbed landscapes. Pigou's theory of externalities provides a useful analytical basis because it demonstrates that markets can produce inefficient outcomes when social costs are excluded from

private decision-making (Pigou 1920). From this perspective, environmental taxation and regulatory charges are not simply instruments for increasing government revenue. Their deeper purpose is to modify the economic incentives surrounding environmentally harmful activities. The OECD consequently defines the polluter-pays principle as an allocation principle under which the polluter bears the expenses of pollution prevention and control (OECD 2008).

In legal terms, the polluter-pays principle has a broader meaning than the imposition of a conventional environmental tax. It requires a connection between environmental harm and responsibility for prevention, mitigation, restoration, and, where appropriate, compensation. De Sadeleer emphasizes that the principle emerged from the theory of externalities and seeks to ensure that environmental costs are reflected in the economic decisions of polluting actors (de Sadeleer 2020). This distinction is particularly significant in mining because taxation alone cannot guarantee restoration. A company may pay substantial corporate income tax, royalties, or non-tax state revenue while continuing to impose restoration costs on the public. Fiscal contribution therefore cannot be treated as a substitute for environmental responsibility. A just regime must distinguish between payments made because a company earns income from public resources and payments or obligations imposed because its activities generate environmental risks. The former concerns resource-rent sharing; the latter concerns cost internalization. Conflating the two may allow substantial environmental liabilities to remain outside the fiscal calculation.

Indonesian environmental law provides a normative basis for this integrated approach. Law No. 32 of 2009 establishes the polluter-pays principle within the broader architecture of environmental protection and recognizes the importance of economic instruments in environmental governance. Government Regulation No. 22 of 2021 subsequently provides an implementing framework for environmental protection and management, including environmental approval and control mechanisms. Meanwhile, the mining regime requires licence holders to undertake reclamation and post-mining activities. The legal structure therefore reflects a double obligation: mining companies must contribute to public revenues associated with resource exploitation and must independently discharge environmental obligations arising from their activities. This distinction is critical for tax justice. If environmental obligations are weakened because companies already pay taxes and royalties, the state effectively transfers the cost of environmental degradation from the producer to the public. Conversely, when environmental obligations are rigorously enforced alongside fiscal contributions, resource taxation becomes more consistent with the principle that economic benefits and environmental responsibilities should be jointly internalized.

The problem becomes more serious when environmental damage is irreversible or only partially restorable. Conventional fiscal systems often operate annually, whereas ecological impacts can continue for decades. A tax collected in the year of extraction cannot necessarily finance ecological losses occurring twenty

or thirty years later. This temporal mismatch creates an intergenerational justice problem. Rawls's conception of justice between generations suggests that institutions should preserve sufficient social and material conditions for future generations to pursue their own objectives (Rawls 1971). In the mining context, this principle implies that temporary mineral wealth should not be converted into permanent environmental liabilities. Similarly, the broader resource-curse literature warns that natural-resource abundance can create institutional and developmental vulnerabilities when resource wealth is poorly governed (Auty 1993; Sachs and Warner 2001). Environmental restoration obligations are therefore not merely technical requirements for mine closure; they are mechanisms through which the present generation assumes responsibility for ensuring that resource extraction does not unfairly reduce the environmental and economic opportunities available to future generations.

Reclamation Guarantees, Environmental Fiscal Instruments, and the Problem of Cost Adequacy

Indonesia's reclamation guarantee system represents an important attempt to prevent environmental liabilities from being transferred to the public. Government Regulation No. 78 of 2010 requires mining licence holders to establish reclamation and post-mining plans and to provide financial guarantees for implementation. The underlying logic is economically sound: financial resources should be secured before environmental damage becomes an unfunded public liability. However, the existence of a guarantee is not equivalent to the adequacy of a guarantee. The critical issue is whether the amount secured corresponds to the full and realistically estimated cost of restoration. Research on Indonesia's reclamation bonding mechanism has identified regulatory clarity and enforcement as major weaknesses and recommends a worst-case approach in which the bond is calibrated to the most extensive reasonably foreseeable environmental damage (Thampapillai and others 2021). This finding suggests that the effectiveness of a reclamation guarantee depends not only on legal obligation but also on valuation methodology, timing, supervision, and the state's capacity to access the funds when companies fail to perform.

Recent Indonesian scholarship reinforces this concern. Research on mining-law reform argues that the placement of reclamation funds should not be interpreted as extinguishing the company's substantive obligation to perform reclamation and post-mining activities (2023). In other words, a guarantee should function as a security mechanism rather than an alternative to actual restoration. This distinction is essential because environmental damage cannot be resolved simply by transferring money to a government account. A mining company that leaves a contaminated river, unstable waste dump, or dangerous mine pit cannot satisfy the substantive requirements of environmental justice merely because it has deposited a financial guarantee. The law should therefore adopt a performance-oriented conception of environmental responsibility. Financial guarantees should provide

the state with the capacity to intervene when a company defaults, while the primary legal expectation remains actual ecological restoration by the responsible operator.

The design of environmental fiscal instruments should consequently distinguish three functions: revenue generation, behavioural incentives, and restoration financing. Environmental taxes and charges can discourage environmentally harmful activities by increasing the private cost of pollution. Reclamation bonds provide financial security for future restoration. Conventional taxes and royalties capture resource rents for the state. These instruments are complementary rather than interchangeable. OECD analysis similarly emphasizes that environmentally related taxation is most effective when combined with other policy instruments, including regulatory standards and command-and-control mechanisms (OECD 2001). A mining company should not be able to argue that payment of royalties satisfies its environmental responsibilities, nor should a government regard reclamation guarantees as sufficient justification for weak environmental taxation. Justice requires an integrated architecture in which each instrument addresses a distinct dimension of the mining externality.

A further challenge concerns the valuation of environmental damage. Market-based valuation may underestimate ecological losses because many environmental assets do not have observable prices. Forest ecosystems, groundwater systems, biodiversity, and cultural landscapes can possess significant social value even when no conventional market transaction exists. Environmental justice scholarship therefore cautions against reducing environmental harm to a purely monetary calculation (Schlosberg 2007; Martinez-Alier 2002). In Indonesia, this issue is particularly relevant where mining occurs near Indigenous territories and rural communities whose livelihoods depend directly on land and water resources. Recent studies published in the Indonesian justice literature argue that extractive activities can create unequal environmental burdens for Indigenous and vulnerable communities and that environmental governance must incorporate participation and rights protection (Kamal, Fidiyani, and Lindgren 2025; Somsak, Johnson, and Putri 2025).

The implication is that reclamation guarantees should be risk-based rather than production-based. A uniform guarantee calculated merely according to mining area or production volume may fail to reflect differences in geological conditions, ecosystem sensitivity, proximity to communities, acid mine drainage risks, water contamination, biodiversity significance, and long-term land-use requirements. The guarantee should therefore incorporate environmental risk, restoration complexity, monitoring costs, inflation, and uncertainty. OECD analysis similarly recognizes that environmental charges should be connected to the costs associated with environmental protection and risk management (OECD 2008). In Indonesia, a risk-based guarantee would strengthen both fiscal and environmental justice because companies generating higher environmental risks would internalize a greater proportion of expected public costs. Such a system would also reduce the

possibility that taxpayers ultimately finance restoration when the private operator has exhausted its assets or abandoned the mining site.

Environmental Justice, Fiscal Distribution, and the Burden on Mining Communities

Environmental fiscal justice cannot be assessed solely by examining the amount of money collected from mining companies. It must also consider where environmental costs occur and where fiscal benefits are ultimately received. Mining production frequently takes place in rural districts, while taxation, regulation, and major fiscal decisions may be concentrated at the national level. Resource-producing regions may receive revenue-sharing transfers, but those transfers do not necessarily correspond to the magnitude of environmental and social impacts. This creates a spatial dimension of justice. A producing region may contribute mineral wealth to national development while simultaneously bearing degraded land, damaged infrastructure, water pollution, and increased public-service requirements. Research on Indonesian resource dependence demonstrates that mining can generate positive income effects at the district level, but such aggregate benefits do not eliminate the possibility of unequal distribution within affected communities (Hilmawan and Clark 2019). Fiscal justice therefore requires analysis below the level of aggregate regional GDP.

The distributive problem becomes particularly visible when mining communities experience environmental damage without equivalent access to public services. Environmental justice scholarship emphasizes that justice concerns not only the distribution of environmental benefits and burdens but also recognition and participation in-justice perspective, such substitution should be avoided. Environmental obligations should be determined by legal standards and measurable ecological outcomes rather than by discretionary corporate philanthropy. Community development may complement environmental restoration, but it cannot replace it. This distinction protects communities from a governance model in which social benefits are negotiated informally while legally enforceable environmental responsibilities remain weak. earmarked for environmental programs. Excessive earmarking can reduce budget flexibility and undermine efficient public expenditure. However, governments should be able to demonstrate that resource-producing regions have decision-making (Schlosberg 2007). In Indonesia, studies of mining-affected communities identify continuing challenges involving land rights, environmental protection, health impacts, and participation. Recent research on Indigenous communities emphasizes that extractive development can create unequal relationships between corporations, governments, and communities when local rights and participation are inadequately protected (Zafiroth and Thammasat 2025; Somsak, Johnson, and Putri 2025). Such findings demonstrate that environmental restoration should not be understood merely as returning land to a technically acceptable condition. Restoration must also address

the social functions of the affected environment and the interests of communities whose livelihoods depend upon it.

This perspective also challenges the assumption that corporate social responsibility can compensate for environmental externalities. CSR programs may provide scholarships, infrastructure, health facilities, or community donations, but these activities are not equivalent to environmental restoration. Research on CSR and economic justice in Indonesia indicates that corporate programs may be fragmented and insufficient to address structural inequalities in resource-producing communities (Pramudita, Dinesh, and Mahendra 2024). A company may therefore simultaneously operate a CSR program and leave substantial ecological liabilities unresolved. From a tax-justice perspective, such substitution should be avoided. Environmental obligations should be determined by legal standards and measurable ecological outcomes rather than by discretionary corporate philanthropy. Community development may complement environmental restoration, but it cannot replace it. This distinction protects communities from a governance model in which social benefits are negotiated informally while legally enforceable environmental responsibilities remain weak.

The fiscal system should consequently establish a stronger connection between mining revenue and environmental expenditure in producing regions. This does not necessarily mean that all mining taxes must be earmarked for environmental programs. Excessive earmarking can reduce budget flexibility and undermine efficient public expenditure. However, governments should be able to demonstrate that resource-producing regions have sufficient fiscal capacity to conduct environmental monitoring, maintain public infrastructure affected by mining transport, manage water systems, support affected communities, and finance restoration where private responsibility is insufficient or enforcement has failed. A transparent fiscal architecture would allow citizens to determine how much revenue is generated from mining, how much is transferred to producing regions, how much is spent on environmental management, and what measurable outcomes result. This approach documents. A budget may record mining revenue without identifying the corresponding environmental obligations or restoration expenditures. Similarly, reclamation guarantees may exist administratively without public information. The preceding analysis suggests that Indonesia requires an integrated environmental fiscal justice framework rather than isolated reforms to taxation or reclamation regulation. The first element should be appropriate capture of resource rents would transform fiscal transparency from an accounting principle into an environmental justice mechanism.

The issue of transparency is particularly important because environmental liabilities can be difficult for citizens to observe in fiscal documents. A budget may record mining revenue without identifying the corresponding environmental obligations or restoration expenditures. Similarly, reclamation guarantees may exist administratively without public information concerning their value, location, status, and adequacy. Research on extractive-industry governance in Indonesia has

identified weaknesses in subnational monitoring and highlighted the difficulty of ensuring compliance with reclamation requirements (Yanuardi 2022). Transparency should therefore encompass both public revenues and environmental liabilities. The objective is not necessarily to disclose commercially sensitive corporate information but to enable citizens and oversight institutions to assess whether mining-generated public value is proportionate to the environmental burden imposed.

Toward an Integrated Environmental Fiscal Justice Framework

The preceding analysis suggests that Indonesia requires an integrated environmental fiscal justice framework rather than isolated reforms to taxation or reclamation regulation. The first element should be appropriate capture of resource rents through taxes, royalties, and non-tax state revenue. Resource extraction uses assets under state control and therefore generates economic rents that should contribute to public welfare. At the same time, rent capture should not be designed in a manner that eliminates productive investment incentives or encourages premature mine closure. Recent Indonesian policy discussions regarding windfall taxation demonstrate the relevance of capturing extraordinary mining profits during commodity-price booms while maintaining transparency and legal certainty (Alfaruq and Pertiwi 2025). The principle is therefore progressive rather than punitive: when profitability rises because of extraordinary resource rents, the state should capture an appropriate share; when profitability falls, fiscal obligations should remain sufficiently predictable to avoid unnecessary economic disruption.

The second element should be a risk-adjusted reclamation guarantee that is reviewed periodically rather than fixed permanently at the beginning of a mining project. Mining conditions, commodity prices, technological practices, environmental risks, and restoration costs can change substantially during the life of a mine. A guarantee established at the beginning of operations may consequently become inadequate several years later. The regulatory framework should therefore require periodic reassessment based on actual environmental conditions and updated restoration-cost estimates. The guarantee should also remain enforceable throughout the entire mining lifecycle, including temporary suspension and closure. Such a mechanism would operationalize the polluter-pays principle more effectively because the financial security would remain proportionate to the company's continuing environmental liability. The worst-case bonding approach proposed in the international literature provides a useful conceptual basis for this reform (Thampapillai and others 2021).

The third element should be outcome-based environmental accountability. Compliance should not be measured solely by whether a company has submitted documents, paid fees, or deposited a guarantee. The decisive question should be whether the ecosystem has actually been restored to an agreed and scientifically defensible condition. This approach responds to the critique that reclamation guarantees can become administrative formalities rather than instruments of

ecological recovery. Wicaksono and Rahmawati (2024) argue that Indonesia's post-mining framework requires stronger ecological-justice foundations, while other recent studies similarly emphasize the gap between formal legal obligations and environmental outcomes. The shift toward outcome-based accountability would also improve the legitimacy of fiscal instruments. Citizens are more likely to regard environmental charges and mining revenues as legitimate when they can observe measurable improvements in water quality, land stability, vegetation recovery, biodiversity, and community welfare.

The fourth element should be stronger community participation and recognition. Environmental restoration decisions cannot be left exclusively to mining companies and government agencies because communities experience environmental changes directly and possess knowledge about local ecosystems and livelihood patterns. Participation should therefore occur not only during environmental approval but throughout monitoring, reclamation, and post-mining evaluation. Environmental justice requires procedural fairness in addition to distributive fairness (Schlosberg 2007). This is particularly significant for Indigenous communities whose relationships with land may involve cultural, spiritual, and customary dimensions that cannot be reduced to monetary compensation. Recent Indonesian scholarship emphasizes the continuing tension between mining development and Indigenous environmental rights, demonstrating the importance of integrating community recognition into resource governance (Somsak, Johnson, and Putri 2025).

The fifth element should be intergenerational financial planning. Mining revenues are inherently temporary because mineral deposits are exhaustible. If resource revenues are consumed entirely through current expenditure, future generations may inherit degraded environments without corresponding productive assets. An intergenerational resource fund could therefore allocate a defined portion of mining-related revenues toward environmental restoration, economic diversification, education, renewable energy, and post-mining employment. The concept reflects the principle that temporary natural-resource wealth should be transformed into durable forms of human, physical, and ecological capital. It also responds to the broader resource-curse literature, which identifies excessive dependence on extractive income as a potential source of long-term economic vulnerability (Auty 1993; Sachs and Warner 2001). Fiscal justice thus requires not merely distributing current mining revenue fairly but ensuring that resource wealth generates lasting capabilities after extraction ends.

Finally, transparency should connect all elements of the proposed framework. A public environmental-fiscal information system could integrate mining production, taxes, royalties, non-tax revenue, reclamation guarantees, environmental expenditure, restoration progress, and community outcomes. Such integration would allow citizens to evaluate whether the fiscal benefits generated by extraction correspond to the environmental and social costs imposed on producing areas. This proposal is consistent with broader transparency principles

in extractive-industry governance and with recent research emphasizing the importance of public accountability in natural-resource management (Yanuardi 2022). It would also support institutional coordination among the Ministry of Energy and Mineral Resources, Ministry of Finance, Ministry of Environment, regional governments, and public oversight institutions. The central principle should be simple: fiscal transparency must reveal not only how much mining generates, but also what environmental liabilities it creates and whether those liabilities are actually being financed and resolved.

Conclusion

Environmental fiscal justice in Indonesia's mining sector cannot be achieved by increasing taxation alone. The central problem is the relationship between economic extraction and environmental cost allocation. Mining generates taxes, royalties, and non-tax state revenue, but these fiscal contributions do not automatically compensate for environmental degradation. The polluter-pays principle requires a stronger connection between the actor generating environmental risk and the cost of preventing, mitigating, and restoring the resulting damage. Indonesia has already established important legal foundations through Law No. 32 of 2009, Law No. 3 of 2020, and Government Regulation No. 78 of 2010, yet implementation challenges remain concerning the adequacy of reclamation guarantees, institutional supervision, cost valuation, and ecological outcomes. The central reform should therefore be to treat environmental obligations as substantive responsibilities that complement rather than substitute for taxation and resource-rent payments.

A just mining fiscal regime should integrate resource-rent capture, risk-adjusted reclamation guarantees, environmental performance monitoring, community participation, transparent fiscal reporting, and intergenerational resource management. Such a framework would recognize that fiscal justice has both distributive and temporal dimensions: mining benefits should be fairly shared among governments and communities, while environmental liabilities should not be transferred disproportionately to future generations. The proposed approach also suggests that restoration should be measured through ecological and social outcomes rather than administrative compliance alone. Ultimately, Indonesia's challenge is not to choose between mining development and environmental protection but to construct institutions capable of ensuring that the economic benefits of extraction remain proportionate to the environmental responsibilities of those who profit from it. Tax justice, environmental justice, and intergenerational justice should therefore be treated as mutually reinforcing components of sustainable mining governance.

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