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Nickel Mining and Environmental Trade-Off in Raja Ampat Papua, Indonesia: A Conceptual Note on Legal and Policy

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A B S T R A C T

This study examines the environmental and governance trade-offs of nickel mining in Raja Ampat, Papua, Indonesia, within the broader context of the country's ambition to become a key player in the global electric vehicle (EV) supply chain. It aims to assess how national industrial priorities intersect with environmental protection and the rights of local and indigenous communities in ecologically sensitive areas. Using a qualitative descriptive approach, the study analyzes secondary data, including legal frameworks, policy documents, and prior empirical research on nickel extraction and environmental impacts. The findings reveal a fragmented and inconsistently enforced legal and policy regime, allowing mining activities to operate in sensitive coastal and marine ecosystems with weak environmental safeguards and limited community participation. Evidence indicates significant ecological degradation, including damage to coral reefs, mangroves, and fish habitats due to sedimentation, heavy-metal runoff, and acid mine drainage. At the same time, indigenous and customary rights are frequently undermined through land appropriation and weakened local governance structures. Economic benefits are disproportionately captured by corporate and external actors, while local communities bear the social and environmental costs. In conclusion, current governance practices fail to balance economic development with environmental sustainability and social equity. The study calls for stronger legal enforcement, improved environmental standards, and meaningful community engagement to achieve more sustainable and just resource governance.

INTRODUCTION

In the global context, the recent issue of nickel mining has become a significant concern for policymakers who are passionate about addressing it effectively, with a critical perspective and an evidence-based approach. It could serve as a fundamental benchmark for a comprehensive investigation and as a basis for consistently recommending eliminating this issue. To support the justification and urgency of this, we present the global paradigm to show how this issue became a significant concern.

First, the rapid industrialization of nickel mining worldwide sparked concern. This issue emerged as an unsteady condition for environmental ethics and social resilience for humanity and its ecosystem (Ureta & Flores, 2022). Adhering to the fundamental principle of the Protecting Sustainable Act (PSA), it sought to revive awareness of the entities responsible for this and to maintain long-term initiatives to actualize it consistently (United Nations, 2015).

Nevertheless, the current issue we explore focuses on Raja Ampat in Papua, Indonesia. It is renowned for its unparalleled biodiversity and pristine marine ecosystems. Interestingly, it is central to a bunch of the world's coral reefs and aquatic species (Septiana et al., 2023). Admittedly, the region has garnered global attention for its ecological significance and potential for sustainable tourism (Prasetyo et al., 2023). Nonetheless, the increasing demand for nickel threatens the area's condition. It's becoming a vital component in the production of batteries for electric vehicles, and other technologies have intensified mining activities in this ecologically sensitive area (Islam, 2025). This juxtaposition of economic development and environmental conservation reveals fundamental questions about the legal and policy frameworks necessary to balance these competing interests.

In addition, if we examine the outcomes of nickel mining, which is considered a profitable industry in Indonesia, the urgency positions the country as one of the world's leading producers of essential minerals (ChuanYu et al., 2025a; Schröder & Iwasaki, 2024). Then, the benefit of this urgency is the role of the Indonesian government, which actively encourages mining investment to support economic growth and increase national income (Konewka et al., 2021). Hence, there is something separate from this ambition: the environmental consequences of these activities, which have a considerable effect, notably in the Raja Ampat region, where they raise concerns about fragile ecosystems at risk of degradation (Maspul, 2025).

Furthermore, the extraction process associated with nickel mining often causes habitat destruction, pollution, and biodiversity loss (Bose, 2023; Ulat et al., 2024). It significantly threatens the marine environment and communities in some mining areas. Hence, all of that also supported the empirical evidence that Hodge et al. (2022) reported in Indonesia: the consequences of nickel mining reveal persistent issues that distort ecological systems and human life in the immediate area. The critical issue that needs to be addressed by the government and all entities is establishing a policy based on a human approach. Second, Lo et al. (2024) stated that nickel mining

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activities consistently decline well-being indicators, even though the company already provides benefits to the community; the outcomes are not significant. Third, ChuanYu et al. (2025b) note that most nickel mining sites should benefit the communities who have been given the land, but that promise from the government always remains low. Fourth, Heijlen & Duhayon (2024) found that under-regulated nickel mining operations always have a free ride to avoid eligibility requirements and norms, thereby distorting environmental outcomes. And the last, Putra & Samputra (2023), reveal that downstream nickel applications can have a good societal impact.

All in all, the empirical evidence from some scholars strongly supports the view that the nickel mining issues cannot be seen from a single perspective; they require a critical lens through legal and policy lenses, as noted, and this was a core gap that we concentrated on in our study. On this basis, we conducted our study to explore this issue comprehensively.

Moreover, the international attention to nickel mining and environmental protection cannot be overlooked. Global demand for nickel, driven by the transition to renewable energy and electric vehicles, places additional pressure on regions like Raja Ampat. Pertinent to this, the RQ of our paper is how the conceptual note on the legal and policy framework grants sustainable resource management and gives strategies and recommendations for future maps for the Indonesian government through the Raja Ampat cases.

This paper is split into several parts: Section II focuses on the research methods; Section III presents our findings and discusses related academic debates. Section IV provides a conclusion and scientific implications.

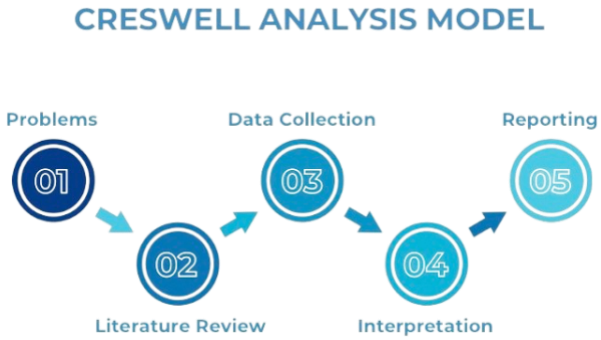
METHOD

This research employs a qualitative descriptive approach with content analysis to systematically scrutinize "Nickel Mining and Environmental Trade-Off in Raja Ampat, Papua: A Conceptual Note on Legal and Policy." In addition, this method was chosen to track the primary issues collectively and clearly, to display strategies and recommendations for environmental protection, and to ensure the rights of affected local communities throughout legal and policy notes. The reason for choosing these methods is to examine in depth the interrelation between law and policy note, as well as to address gaps in the literature that have yet to be fully integrated.

On the other hand, the data sources analyzed were extracted from secondary literature (e.g., academic books, indexed scientific journal articles, national policy documents, and institutional publications from relevant organizations) to guide the inspection of the research theme (Creswell & Báez, 2020).

Likewise, this research also applied the data analysis from Creswell & Poth (2016) with five strategies (i.e., problems, literature review, data collection, interpretation, and reporting) as follows:

Figure 1. Creswell Analysis Model



Source: Author(s) Visualization, 2025

First, the issues of this have received rapid attention regarding the effect of nickel mining on the environment in Raja Amapat, Papua. Globally, some critics have called for protecting the environment and community rights, making this a fundamental core problem to examine. Second, the literature review emphasizes the search and collection of relevant literature as a prerequisite for linking the scrutiny; here, we used it as a basis for concept analysis.

Third, data analysis involves collecting and categorizing data in proportion to the relevant source to support comprehensive and objective content analysis. In this stage, we tested the objectivity carefully and demonstrated the logical framework of the issues. Fourth, the researcher defines the interpretation of the findings based on the data or by systematically synthesizing the summary of the findings. In line with this process, the connection would be the analysis benchmark, informing the government and other entities to take protective action on the environmental issue and community rights.

Last is the reporting stage, which clearly and comprehensively presents the findings. From here, our examination will be based on recommendations and forward direction, grounded in conceptual notes on legal and policy analysis. Overall, through this technique, the researchers will provide the results and findings that link with academic debates based on the research theme.

RESULTS AND DISCUSSION

Nickel Mining in Raja Ampat Papua

Based on the overview, nickel mining in Raja Ampat, Papua, is a core industrial sector that produces minerals to support economic growth. Beyond that, we sought to explore the scientific literature on mining's ecological impacts, which has focused on terrestrial effects (e.g., deforestation, soil erosion, and water pollution). In the case of Raja Ampat, Papua, the new studies we analyse indicate that the risks extend beyond land-based consequences. Here, the proximity of mining sites to coastal and marine areas, along with heavy metal runoff, sedimentation, and acid mine drainage, directly degrade coral reef systems, mangrove forests, and fish nursery ecosystems, which are integral to global biodiversity and indigenous food security.

Next, Rifai et al. (2025) also reported elevated nickel and chromium concentrations in local estuaries, correlating with declines in fish populations and toxicity to aquatic vegetation. The comments also delivered by Haryadi et al. (2024) revealed the circumstances in these activities that caused adverse effects not managed by the government, as the leading sector and has the maximum responsibility to organise. So, this dynamic raises

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public concern about Raja Ampat's role as the epicentre of the Coral Triangle ecosystem; if this is not evaluated, it could lead to disruptions with cascading ecological consequences.

In addition, the dynamic nickel exploration and exploitation in Raja Ampat have gained traction since 2020, primarily driven by Indonesia's ambition to be a global hub for battery manufacturing. From here, the ambitions are pursued by affiliated firms operating under larger conglomerates linked to Chinese and domestic investors. These actors have secured concessions spanning hundreds of hectares, often overlapping with customary land claims and community-conserved areas.

We admittedly, a bunch of the issues are similar to competition to get the profits in the market ecosystems, but it's not serving the public benefits for Indonesia; it's a look-alike trap for negotiating proposals, as conveyed by Syarif (2025) exclusive firms regularly ally with the Indonesian cartel to swamp administrative and authorizing barriers, with a local helper holding a vital role in securing political route. Hence, our focus on that case is on the legal and policy notes, which reveal the multi-level government's inconsistency in protecting the community and environmental issues that are not adequately addressed once industrialisation begins operating. Most of them were focused on advancing political interests and helping several groups achieve the status of the rich through industrialisation, notably in the extractive sector.

Later, our specific scrutiny focused on the fact that nickel is vital to lithium-ion battery production, positioning Indonesia as a key global supplier in the EV (electric vehicle) supply chain and helping fill the domestic industrialisation market. In line with that, the tremendous failure of this dream is that the Indonesian government did not frame the advancement of nickel in Raja Ampat, Papua, as part of the downstream industrialisation policy and a comprehensive energy transition framework. Interestingly, it is only symbolic and pursues biased ambitions, so in actuality, it does not run well because the policy design and the specific roadmap are not implemented by the entities involved in the government's role, primarily through the Ministry of Energy and Mineral Resources.

To assist the investigation with our closer inspection, the projected economic benefits are unevenly distributed in the field by regulation. Some issues, like jobs created, are largely low-skilled and temporary (Patunru, 2023). Then, the royalties from nickel mining often bypass indigenous communities, weaken local governance, and lead to massive corruption. On the other hand, the financial value of intact ecosystems, ecotourism, and sustainable fisheries, cornerstones of Raja Ampat's economy, is then at risk of being overshadowed or destroyed by extractive industry expansion.

Last, the situation in Raja Ampat, which we oversee, presents a pressing case for rethinking environmental science's role in policy advocacy. Dou et al. (2023) state that achieving a stable and long-term mineral supply should meet the needs of local communities and the environment in management, as well as prioritizing an inclusive target focus through the prospects of companies, principally multinational mining companies, to commit and achieve the SDGs through comprehensive government engagement with the community. Even so, we still see that the currently configured trade-off is neither just nor sustainable. In doing so, by taking a conceptual note on legal and policy matters through this scrutiny, we hope the government will take action to accelerate economic growth wisely and not neglect community rights.

To close, the findings supported the theoretical concept of environmental justice, which explains how power asymmetries shape ecological outcomes. The concentration of mining concessions among conglomerates linked to domestic and foreign capital, combined with weak regulatory oversight, reveals how state authority is often mobilised to facilitate extraction rather than regulate it. This condition also occurs in Raja Ampat, Indonesia.

Interestingly, inconsistencies in multi-level governance between national industrial ambitions and local conservation mandates undermine environmental protection. This dynamic aligns with the concept of regulatory capture, which posits that regulatory institutions serve elite interests at the expense of public and ecological welfare. The overlap of concessions with customary lands also exposes the marginalisation of indigenous governance systems, despite constitutional and statutory recognition of customary rights in Indonesia.

Confessionally, the political ecology implications of the Raja Ampat case extend beyond environmental degradation to questions of governance legitimacy and social justice. Even communities experiencing declining fisheries, contaminated waters, and the loss of customary territories, without commensurate benefits or a voice in decision-making, see extraction as a source of structural inequality. Environmental justice thus reframes the conflict not as a technical trade-off between development and conservation, but as a struggle over power, recognition, and environmental rights.

Ultimately, the Raja Ampat case demonstrates that without transforming the political and institutional conditions underpinning extraction, technological solutions and sustainability rhetoric will remain insufficient. An environmental justice-informed policy approach would require redistributing decision-making power, strengthening indigenous governance, and critically reassessing national development narratives that prioritize extractive growth over ecological integrity and social well-being.

So we acknowledge that most of the tremendous issues in Raja Ampat are consistently not considered fundamental to the extractive nickel mining industry. Still, we are driving to see it through an eligible lens, grounded in legal and policy, and a strategic lens, to be applied effectively based on our inspection above as a basis for raising awareness.

Conceptual Notes on Legal and Policy

In the previous investigation, we examined the condition of Raja Ampat, Papua, as the core place affected by mining activities. From that, we know that the nickel mining case in Raja Ampat, Papua, involves a collision between global industrial ambition and regional ecological responsibility, and it's unavoidable given the facts. At its core, the drive to transform Indonesia into a central node in the global electric vehicle (EV) supply chain has, in our view, come at the cost of local ecological stability and governance integrity.

Nonetheless, our criticism is that what is at stake is more than biodiversity: the coherence of legal obligations, the dignity of indigenous stewardship, and the long-term viability of economic systems rooted in natural capital. Notwithstanding, based on our scrutiny, a few key findings surface. First, while nickel is positioned as a strategic mineral for Indonesia's

downstream industrialisation policy, principally in EV battery production, the legal and policy frameworks assisting this expansion remain fragmented and unevenly enforced. The government's narrative emphasises economic nationalism and energy transition, yet operational mechanisms indicate a bypassing of environmental protocols and indigenous rights (community) stability (Putri et al., 2025).

Confessionally, industrialisation in Raja Ampat is not emerging from a unified public policy framework, but from politically brokered concessions that often undermine community interests. Secondly, our focus on the ecological ramifications expands the current scientific narrative, which often concentrates on terrestrial effects (e.g., deforestation, erosion, and pollution). The essential findings indicate that mining in Raja Ampat's coastal waters has exacerbated damage to marine systems, including coral reefs, mangrove forests, and fish nurseries. And so on, these ecosystems are not just biodiversity spotlights; they sustain local food systems and traditional livelihoods, and are foundational to the economic life of Papua's indigenous communities.

Third, nickel extraction in Raja Ampat is driven by conglomerates and foreign interests (notably Chinese investors) who operate under a permissive licensing regime and frail regulatory oversight, as Rifai et al. (2025) show. Linked with the point, Haryadi et al. (2024) further reveal that consequences are poorly managed, exposing failures in public sector oversight and environmental governance. Moreover, our analysis critically engages with and builds on existing literature. In this context, much of the literature has focused on mining activities in Indonesia, which has previously focused solely on the problematic aspects of the extractive industry (e.g., corruption, decentralisation, and land tenure disputes). From this perspective, it remains relevant to the current situation in Raja Ampat, Papua. Therefore, this connotation serves as a foundation for strengthening the current legal concepts and policies and a reminder that current problems result from government inconsistency with communities, particularly those living in mining areas.

Besides, we build on the argument by Dou et al. (2023), who assert that mineral policy must reconcile with environmental priorities and community inclusion to achieve the Sustainable Development Goals (SDGs). On the other hand, Raja Ampat exemplifies the failure of such reconciliation. Here, the nickel policy is not linked to an energy transition framework that honours environmental thresholds or indigenous governance structures.

In addition, the so-called energy transition remains symbolic and performative. It is pursued under the guise of national progress. Still, it fails to materialise in comprehensive roadmap terms, primarily because the Ministry of Energy and Mineral Resources, which should have been at the helm of the policy, has not been. Syarif (2025) also delivered the linear comments that further contextualise this in a political economy frame, highlighting how private firms navigate the legal terrain not to comply but to co-opt it. With guidance from local elites, firms exploit legal grey zones, sidestep community consultation, and neutralise the state's regulatory functions (Anugrah, 2023; Hodge et al., 2022). This pattern mirrors critiques in the broader resource governance literature where laws exist, but enforcement is selective and power-mediated in the field. Overall, the conceptual note on legal and policy, based on our examination, underscores that nickel mining in Raja Ampat raises serious conflicts between national industrial values, local environmental needs, and community interests.

Even though the government promotes mining for electric vehicle production (EVP), the process often ignores ecological rules and the rights of indigenous people. This annotation focuses on weak laws and poor enforcement, allowing large companies to damage land and sea and risk local livelihoods. As a closing message, it highlighted a failure in government planning, and we call for better, fairer policies that protect nature and communities.

Meanwhile, we acknowledge that this condition reveals a contradiction and links to the political ecology idea, which emphasizes that environmental issues, notably in nickel mining and extractive industries, always influence degradation and cannot be separated from power relations, economic interests, and political decision-making (Barbesgaard & Whitmore, 2024; Dunlap et al., 2024). Hence, legally, this case exposes a disjuncture between normative environmental commitments and their operationalisation. Indonesia has a relatively comprehensive legal framework governing environmental protection, indigenous rights, and coastal management. However, political ecology draws attention to how law functions unevenly in practice.

Then, licensing regimes, ecological impact assessments (AMDAL), and spatial planning instruments are selectively enforced, often weakened through discretionary authority and political brokerage (Deberdt & Le Billon, 2025; Mudd & Jowitt, 2022). Yet, rather than acting as safeguards, legal instruments become tools that legitimise extraction after the fact. It reinforces the political ecology argument that law is not neutral but embedded within power relations that privilege corporate and state interests over local communities.

The Raja Ampat case demonstrates that environmental governance cannot be separated from questions of political accountability and institutional coherence. Fragmented authority between central and local governments, combined with weak inter-ministerial coordination, creates regulatory gaps that mining actors exploit. Political ecology critiques such governance failures by showing how decentralisation, rather than empowering communities, can facilitate elite capture when legal oversight is weak (Luong et al., 2022; Warburton, 2024; Yamasue et al., 2022). In Raja Ampat, indigenous communities are formally recognised in policy discourse yet systematically excluded from meaningful participation in land-use decisions, undermining both procedural justice and substantive environmental protection.

The failure to align legal frameworks with ecological realities and indigenous governance structures results in development pathways that are neither socially just nor environmentally sustainable. In sum, for policy reform, this implies the need to re-politicise environmental law, strengthen enforcement, recognise indigenous legal orders, and embed ecological limits into industrial strategy rather than treating environmental harm as an acceptable cost of economic process.

Strategies and Recommendations

In this section, we formulate strategies and recommendations linked with our comprehension of conceptual notes based on legal and policy for nickel mining and environmental trade-off in Raja Ampat, Papua, as follows

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Figure. 2 Strategies and Recommendations

Source: Author(s) Visualization, 2025

Based on the illustration above, we visualize each component we gain from the previous analysis. In the scope of the current issue, we acknowledge that the legal framework is fragmented. Here, we emphasize that Indonesia's environmental laws are inconsistent and even overlap with weakly enforced protections of community rights. As evidence, the lack of harmonized legal standards allows mining projects to proceed despite significant local and ecological opposition.

On this baseline, we oversee legal fragmentation, which creates loopholes for exploitation and undermines long-term environmental governance. By doing so, in the future, legal reform must link indigenous land rights with environmental protection, then creating a unified legal front against exploitative resource extraction. Next, we focus on regulatory capture, which reveals that mining companies frequently bypass environmental policy through political connections and influence. From our lens, it has led to lenient oversight, prioritizing economic incentives over ecological and social safeguards. So, we encourage the government to strengthen transparent governance and accountability mechanisms. As empirical issues, regulatory frameworks will remain ineffective without scaling back corporate lobbying and enforcing stringent environmental assessments.

Regardless, we continue to examine marine ecosystem degradation; these cases demonstrate that nickel mining contributes to coral reef damage, mangrove destruction, and declining fish populations. These effects jeopardize local fisheries, biodiversity, and long-term ecological balance, yet the government is doing nothing about it; they are just leaving it alone and waiting for public concern to arise from criticism. Accordingly, the environmental impact assessments must be extended to include cumulative and long-term effects. For instance, the marine conservation strategies should be legally mandated before the government issues mining licenses.

Moreover, we examine violations of community rights, including customary land seizures and cultural disruptions. It still connects with traditional knowledge and local governance systems, which are frequently ignored during mining operations in the territory. Furthermore, we emphasize that indigenous rights must be urgently incorporated into national mining policies. It also focuses on the legal recognition of customary lands and requires prior informed consent to become a prerequisite for mining approval. Last, our standpoint links to unequal benefit distribution. We look at the facts that profits flow predominantly to corporations, while local communities bear the costs of environmental and social degradation. This imbalance perpetuates poverty and social unrest, as the News has officially informed.

In this regard, we stress that the government should take extraordinary measures to establish equitable revenue-sharing mechanisms and that local benefit guarantees must be institutionalized to address systemic injustices highlighted by public critics and the news media. Meanwhile, we also provide strategic interventions to restructure the legal framework. This process must combine a legal approach with the integration of environmental protection and community rights (e.g., revising environmental licensing, recognizing land tenure, and ensuring rights to consultation). Under these conditions, restructuring could establish legal precedence for co-managed resource use, equating conservation with development. Hence, we focus on reforming the governance framework. Indeed, this stage requires extraordinary effort to implement reforms that scale up transparency, enforcement, and oversight. It contains audits, public reporting, and local monitoring. From this, we believe the institution could be stronger and must curb corruption and hold mining companies accountable. It could revive public trust and secure more inclusive decision-making.

Moving on to protecting marine ecosystems, we stress that ecosystem management must be ongoing, with periodic restoration and evaluation, because the conservation zones should be distributed and legally protected. From here, our perspective is that the governments must connect with regional planning and science-based marine zoning systems to anticipate the destruction of critical habitats. Another thing that we focus on is community empowerment. We advocate maintaining and incorporating traditional knowledge into resource governance to enhance resilience and cultural continuity, and to include participatory planning and education.

On the other hand, the effects will empower communities to resist exploitative practices and lead sustainable development initiatives. Again, we assert that empowerment is not charity but structural justice. Last, we focus on economic justice. This comprehension builds alternative livelihoods and benefit-sharing mechanisms that can more equitably distribute mining wealth. These involve eco-tourism, small-scale fisheries, and community-managed enterprises. This stage would ensure sustainable and inclusive development, but one thing is for sure: the policies must incentivize businesses that prioritize local value creation over extractive profit. Now, we provide the expected outcomes.

The first line covers marine ecosystem recovery; these outcomes ensure the ecosystem partially recovers and maintains fish stocks and biodiversity through effective protection strategies. From here, it would lock ecosystem health, which is

fundamental for conservation, food security, and climate resilience. Then, the government, community, and stakeholders must be committed to regular monitoring and adaptive management, which will be crucial to secure sustainable value.

Secondly, the focus is on protecting social justice. We emphasize that the primary focus is on recognizing and protecting indigenous people's rights, thereby maintaining social stability and mitigating conflict. Here, indigenous rights must be incorporated into governance systems that complement national policies, as the state strives to prioritize community rights to protect their heritage and aspirations, particularly for communities affected by policies that are less comprehensive and proportionate.

Third, we focus on economic sustainability. We intended that mining activities should emphasize a transition from a destructive force to a developmental one by diversifying local economies and granting widespread distribution of benefits. Ultimately, the expectation for this process stressed a sustainable approach that relies on long-term planning and investment in eligible, competitive human resources.

In short, we display the last expected outcomes of the governance transformation, emphasizing that successful reform will lead to more accountable, participatory, and transparent governance structures rooted in justice and sustainability. Based on evidence, this foundation will secure Raja Ampat, Papua, as a case study in transforming extractive governance through legal innovation and community-driven policies.

CONCLUSION

To conclude, our findings reveal a persistent gap between Indonesia's nickel industrialization agenda and the environmental and social realities in Raja Ampat, Indonesia. The governing legal and policy framework is crumbled and inconsistently enforced, enabling mining activities to proceed in ecologically sensitive areas with limited environmental safeguards and inadequate community involvement. This governance weakness has reduced accountability and heightened social and ecological risks.

Moreover, the study's evidence indicates significant degradation of marine ecosystems (e.g., coral reefs, mangroves, and fish nursery habitats) driven by sedimentation, heavy-metal runoff, and acid mine drainage from mining operations near coastal zones. These impacts directly undermine biodiversity and local livelihoods. At the same time, the research identifies ongoing violations of indigenous and customary rights through land appropriation and the weakening of traditional governance structures.

Even though nickel extraction is framed as a driver of economic growth and the energy transition, the benefits are captured mainly by corporate and foreign actors, while local communities bear disproportionate costs. Last, the researcher also acknowledges that this analysis is limited by reliance on qualitative descriptive assessment and secondary environmental data; the findings underscore the need to reorient mineral governance away from extractive priorities toward consistent legal enforcement, environmental protection, and respect for community rights. So, in future research, incorporating field-based environmental monitoring, community-level socio-economic data, and comparative regional analysis would strengthen accountability and inform more equitable and sustainable approaches to mineral development.

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