

9-14-2025

## REFORMING ENVIRONMENTAL GOVERNANCE IN RESPONSE TO INDONESIA'S NICKEL INDUSTRIAL POLICY: A CRITICAL ASSESSMENT OF SUSTAINABILITY CHALLENGES

Farah Rosada

*Department of International Relations, Faculty of Social and Politics Science, Muhammadiyah Yogyakarta University, farahrsd24@gmail.com*

Follow this and additional works at: <https://scholarhub.ui.ac.id/global>



Part of the [International Relations Commons](#)

---

### Recommended Citation

Rosada, Farah (2025) "REFORMING ENVIRONMENTAL GOVERNANCE IN RESPONSE TO INDONESIA'S NICKEL INDUSTRIAL POLICY: A CRITICAL ASSESSMENT OF SUSTAINABILITY CHALLENGES," *Global: Jurnal Politik Internasional*: Vol. 27: No. 1, Pp. 75-102.

DOI: 10.7454/global.v27i1.1377

Available at: <https://scholarhub.ui.ac.id/global/vol27/iss1/4>

This Article is brought to you for free and open access by the Faculty of Social and Political Sciences at UI Scholars Hub. It has been accepted for inclusion in Global: Jurnal Politik Internasional by an authorized editor of UI Scholars Hub.

## REFORMING ENVIRONMENTAL GOVERNANCE IN RESPONSE TO INDONESIA'S NICKEL INDUSTRIAL POLICY: A CRITICAL ASSESSMENT OF SUSTAINABILITY CHALLENGES

Farah Rosada & Arie Kusuma Paksi

Department of International Relations, Faculty of Social and Political Science,  
Muhammadiyah Yogyakarta University

Email: farahrsd24@gmail.com

Submitted: 9 November 2024; accepted: 20 May 2025

### ABSTRAK

*Penelitian ini mengevaluasi efektivitas reformasi kebijakan lingkungan Indonesia dalam sektor nikel sebagai respons terhadap kritik global mengenai praktik ecocide. Industri nikel Indonesia memiliki peran penting dalam rantai pasokan global, terutama untuk kebutuhan kendaraan listrik. Namun, dampak ekologis dari industri ini menarik perhatian internasional, terutama dari organisasi lingkungan yang menyoroti kerusakan ekosistem yang masif. Menggunakan teori keamanan lingkungan, studi ini berfokus pada evaluasi reformasi kebijakan seperti revisi AMDAL dan pengaturan limbah B3, serta dampaknya terhadap keberlanjutan ekosistem dan stabilitas sosial. Penelitian ini menemukan bahwa reformasi kebijakan cenderung bersifat reaktif dan masih menghadapi hambatan implementasi di lapangan, yang mengurangi efektivitasnya dalam menurunkan laju kerusakan lingkungan. Selain itu, penelitian ini menambahkan kontribusi pada literatur tata kelola lingkungan, dengan mengungkapkan perbedaan antara kebijakan dan praktik, terutama di negara berkembang yang menghadapi tantangan dalam mencapai standar keberlanjutan global. Hasil penelitian ini menyarankan bahwa Indonesia memerlukan pendekatan tata kelola yang lebih kuat dan berkelanjutan untuk menghadapi tuntutan keberlanjutan dari aktor global.*

**Kata kunci:** *ekosida, keamanan lingkungan, nikel, Indonesia, reformasi kebijakan*

### ABSTRACT

*This study evaluates the effectiveness of Indonesia's environmental policy reforms in the nickel sector as a response to global criticism regarding ecocidal practices. Indonesia's nickel industry plays a crucial role in the global supply chain, especially in meeting the demand for electric vehicles. However, the ecological impacts of this industry have drawn international scrutiny, particularly from environmental organisations highlighting extensive ecosystem damage. Using environmental security theory, this study focuses on evaluating policy reforms, such as the revision of Environmental Impact Assessments (AMDAL) and the regulation of hazardous and toxic waste (B3), as well as their impacts on ecosystem sustainability and social stability. The findings indicate that policy reforms tend to be reactive and face substantial implementation challenges in the field, which limits their effectiveness in reducing environmental degradation. Additionally, this research contributes to the environmental governance literature by highlighting the discrepancy between policy and practice, particularly in developing countries that face significant challenges in meeting global sustainability standards. The results of this study suggest that Indonesia requires a stronger and more sustainable governance approach to address global sustainability demands.*

**Keywords:** *ecocide, environmental security, nickel, Indonesia, policy reform*

## **INTRODUCTION**

Nickel is a strategic commodity that contributes significantly to Indonesia's economic growth. According to the United States Geological Survey in 2024, Indonesia is currently the world's largest nickel producer, reaching 1,800,000 metric tons in 2023 (U.S Geological Survey, 2024), with production spread across regions such as Sulawesi and Maluku. Meanwhile, according to Statista (2024), Indonesia holds 55 million metric tons, or 42.3% of global reserves. As global demand rises, particularly for the electric vehicle industry, which uses nickel in battery production, Indonesia's role in the global supply chain becomes increasingly crucial. This also attracts foreign investment, especially in green technology (Gupta, 2023). This is reflected in increased state revenues and growing foreign investment.

In 2022, the nickel sector managed to increase Non-Tax State Revenue (PNBP) to IDR 4.18 trillion from nickel royalties, while contributing 13.19% to the total non-oil and gas natural resources PNBP in 2022 (Wardhani & Djamhari, 2024). According to the Central Statistics Agency (BPS), the export volume of nickel and its products (HS 75) reached 123.17 thousand tons, valued at USD 496.96 million in January 2024 (Tim CNN, 2024). Additionally, the export value of nickel products that have undergone downstream processing reached USD 33.81 billion, equivalent to IDR 504.2 trillion in 2022 (Administrator, 2023). Chinese investment surged after Indonesia rejected the WTO's ruling on raw nickel exports to the EU. Investment figures fluctuated but peaked at USD 5.587.8 in 2023 (Project Multatuli, 2024). This underscores the critical role of nickel in the national economy.

The surge in nickel investment demonstrates strong economic appeal but worsens environmental degradation, especially in Sulawesi and Halmahera. In Pomalaa, North Sulawesi, rapid mining-driven deforestation has disrupted local livelihoods. Hakatubu villagers, once reliant on coastal fishing, now venture further offshore to maintain fish stocks (Irawati, 2020). However, even this adaptation is under threat, as coastal areas used for seaweed cultivation are damaged by ships transporting mining waste. The Bajo community, which has historically depended on marine resources, faces continued marginalisation as the water environment deteriorates due to mining operations. These impacts align with the definition of ecocide (Aida et al., 2023), which defines it in her research as a form of crime against the environment committed by individuals or organisations, causing large-scale environmental destruction. As a result, ecocide threatens not only ecosystems but also human and non-human life. Global watchdogs like

Greenpeace and Mighty Earth have highlighted widespread environmental degradation caused by these activities (Greenpeace International, 2021), including deforestation in protected areas (Brown & Harris, 2024), water source contamination, and disruptions to local biodiversity. Deforestation near nickel facilities threatens biodiversity and contributes to global climate risks.

Similarly, in Morowali, nickel mining waste continues to damage marine ecosystems long after operations have ceased. Syarifuddin (2022) found that waste disposal has disrupted aquatic environments up to 20 kilometres from mining sites, causing seawater discolouration, increased fish mortality, and heavy metal contamination. The emergence of unrecorded arsenic bacteria and the accumulation of coastal toxic waste, which has degraded mangroves vital for crab farming and local livelihoods, illustrate the severity of ecological damage. This study evaluates the effectiveness of Indonesia's environmental policy reforms in the nickel sector as a response to global criticism regarding ecocide practices. Given its key role in EV supply chains, Indonesia's nickel industry faces growing global scrutiny. These environmental policy reforms are important not only for sustaining local ecosystems but also for reinforcing Indonesia's commitment to global environmental agendas, currently lacking robust implementation. Previous research often overlooks how global pressure shapes local policy reforms. This study addresses that gap by evaluating Indonesia's policy responses to sustainability demands from developed countries dependent on nickel for electric vehicle batteries.

Although various studies have highlighted the environmental impacts of the nickel industry in Indonesia, many remain limited to normative policy analyses that overlook implementation effectiveness. The study conducted (Boseke et al., 2021) titled "Legal Review of Law No. 32 of 2009 on the Government's Role in Preventing Environmental Damage Due to Mining Activities," reveals that law enforcement regarding environmental pollution in the mining sector remains weak. This study also outlines the negative impacts of open-pit mining in protected forests on the ecosystem, underscoring the government's inadequate response in addressing the environmental consequences of industrial policies.

Meanwhile, the findings of "Environmental Damage Due to Nickel Mining in Kolaka Regency Through an Environmental Politics Approach" examine environmental degradation from a political perspective (Agussalim et al., 2023). The study states that several companies have been able to conduct mining activities without obtaining the required Mining Business Permit (IUP), and some issued IUPs are deemed flawed due to

procedural irregularities. Compounding the issue, the central government has been criticised for further relaxing land-use conversion permits for investment purposes through the enactment of the Omnibus Law.

On the other hand, Nurbani (2020) highlights the challenges in implementing Submarine Tailings Disposal Systems (STDS) as a method for disposing of nickel mining waste in Indonesia. However, the study finds that STDS increase the risk of heavy metal contamination in surrounding waters. Additionally, weak environmental monitoring has led to sedimentation of mining waste on the seabed, negatively impacting water quality and coral reef ecosystems. This issue is exacerbated by the lack of transparency from mining companies in reporting waste disposal volumes, further hinder regulatory assessment. These three studies serve as key references in understanding the environmental challenges posed by nickel mining in Indonesia into legal, political, and technical aspects. However, none of these studies have thoroughly examined the effectiveness of environmental policies in the nickel industry following criticism from international environmental organisations, nor have they analysed the government's policy reforms in response to these critiques to promote sustainability. Therefore, this study analyses how Indonesia's reforms address ecocide allegations in the nickel industry, focusing on implementation challenges and their impact on environmental sustainability. It contributes to understanding the extent to which domestic policy shifts align with international expectations and whether these efforts sufficiently address the ongoing ecological crisis in the nickel industry.

This research raises two main questions: (1) To what extent have Indonesia's environmental policy reforms in the nickel sector mitigated ecocidal impacts? and (2) Do these reforms reflect substantial change, or are they merely pragmatic responses to external pressure? The study aims to assess the effectiveness of these policies, particularly regarding enforcement and structural barriers to implementation. Additionally, the research focuses on environmental policies in major mining areas such as Sulawesi and Halmahera. With analysis centred on environmental management policies, the roles of domestic and international actors, and institutional responses to global sustainability pressures.

### ***ANALYTICAL FRAMEWORK***

Environmental governance is a comprehensive framework for managing natural resources through coordinated action, including governments, businesses, international organisations, and civil society. This framework involves policymaking, enforcement, and accountability at its core, environmental governance focuses on sustainability, aiming to balance economic development with the preservation of ecological systems. It emphasises that Effective governance depends on robust institutions capable of enforcing policies that protect the environment while also addressing the needs of society and the economy.

International organisations and environmental movements shape governance by setting global environmental standards and monitoring compliance. They pressure governments to uphold sustainability commitments. However, governance efforts often falter when short-term political and economic interests outweigh long-term environmental goals. As the environmental impact on social and economic stability increases, environmental security has emerged as a complementary framework to understanding environmental issues as threats to social security and resilience.

Environmental security theory, which began developing in the early 1990s, focuses on the connection between environmental degradation and the potential for conflict, especially in regions experiencing resource scarcity due to excessive natural exploitation. In this context, weak governance heightens ecosystem vulnerability and social instability. The effectiveness of environmental governance directly influences environmental security outcomes. Poor governance, such as weak regulation or a lack of enforcement, can accelerate ecological degradation and trigger resource-based conflicts. Thus, environmental governance is not only a matter of sustainability, but also a critical mechanism for safeguarding environmental security.

Environmental security theory, developed in the early 1990s, highlights how ecological degradation can threaten global and national stability. Thomas Homer-Dixon, in his book “Environment, Scarcity, and Violence” (1999), argues that resource scarcity resulting from environmental degradation can trigger conflict and violence. Richard Matthew, in “Preserving the Environment: A Global Perspective” (1993), emphasises the need for international cooperation and multidisciplinary approaches to mitigate environmental risks to security. Meanwhile, Elinor Ostrom, in “Governing the Commons” (1990), focuses on local governance of common resources to reduce conflict and enhance community resilience. This case study reflects these theories, as international

criticism, particularly from Greenpeace and Mighty Earth, has highlighted the socio-environmental impacts of nickel mining in Indonesia. According to Homer-Dixon in “The Upside of Down: Catastrophe, Creativity, and the Renewal of Civilization” (2006), one major cause of prolonged social conflict is environmental degradation leading to resource scarcity (Homer-Dixon, 2006).

Homer-Dixon also proposes three hypotheses: First, large-scale population displacement can cause environmental stress, leading to conflicts between groups or ethnicities. Second, environmental scarcity can increase economic losses, disrupt social institutions, and foster instability. Third, while some factors may be controlled, such as the physical supply of environmental resources, the overall scarcity can still trigger conflicts (Bakri et al., 2023). These dynamics align with the conditions in Indonesia’s mining regions, where large-scale exploitation increases social vulnerability.

In addition to Homer-Dixon, another prominent environmental security scholar, Richard Matthew, elaborates on several concepts in his book “Environmental Security: A Guide to the Debate” (1999). Matthew (1999) similarly argues that environmental degradation, such as climate change, resource scarcity, and pollution, can undermine national and global security. He calls for proactive international and national responses, including climate adaptation and mitigation policies, to prevent instability and humanitarian crises (R. A. Matthew, 1999). In the context of nickel mining, this underscores the urgency for sustainable policies and stronger international cooperation.

The relevance of environmental security theory is clear in regions like Sulawesi and Maluku, where mining has led to water contamination, agricultural loss, and community displacement, conditions that reflect Homer-Dixon’s framework of scarcity-induced instability. Weak governance and lack of transparency further erode trust, echoing Matthew’s concerns about insecurity arising from poor environmental management. Thus, this theory provides a lens for analysing how ineffective environmental policies in Indonesia’s nickel industry contribute to broader ecological and social risks. Amid global efforts to address environmental security threats through international cooperation, as highlighted by Richard Matthew, Indonesia continues to take important steps through policy reforms such as revisions to the Environmental Impact Assessment (AMDAL) and hazardous waste (B3) regulations. Implementation challenges underscore the need for stronger cooperation and governance to ensure sustainability.

Applying environmental security theory, this study evaluates whether Indonesia's environmental reforms in the nickel sector effectively safeguard ecosystems and local communities or merely serve as temporary responses to international scrutiny. It critically examines the government's policies and their capacity to balance environmental protection with economic growth.

### **RESEARCH METHOD**

This qualitative study uses secondary data to evaluate nickel mining policy reforms in response to global ecological criticism. Sources include government documents, international organisation reports, NGO publications, and peer-reviewed academic literature to critically assess the effectiveness of these reforms in reducing environmental degradation caused by nickel mining activities.

Secondary data are drawn from diverse sources to provide a comprehensive view of policy impacts. Key sources include government documents, such as reports on the revision of Environmental Impact Assessments (AMDAL), Ministerial Regulation No. 7 on the management of hazardous and toxic waste (B3), and other relevant environmental laws and regulations. Additionally, reports from international organisations and environmental NGOs, such as Greenpeace and Mighty Earth, have provided critical analysis on ecological damage, particularly in relation to deforestation, water pollution, and habitat destruction. Academic studies offer scientific analysis of the socio-environmental impacts of nickel mining and the broader implications for environmental governance.

The study uses content analysis to identify patterns and trends related to policy effectiveness. The analysis focuses on several key areas. First, it examines the implementation of reforms, including AMDAL revisions and B3 waste management, to assess whether these measures address key environmental issues. Comparative analysis evaluates changes in environmental conditions before and after the reforms. Thematic analysis identifies recurring patterns in global criticism and how international pressure has influenced domestic responses. To assess the effectiveness of Indonesia's nickel policy reforms, the study applies specific evaluation criteria. The first examines environmental outcomes—such as deforestation, pollution, and biodiversity loss—as indicators of ecological impact. Second, governance mechanisms and law enforcement are evaluated to determine how well policies are implemented and whether companies are held accountable. The third compares Indonesia's policies with international



environmental standards and agreements. Stakeholder perspectives from local communities, international organisations, and industry actors are considered to understand the broader social and economic impacts of the policy reforms.

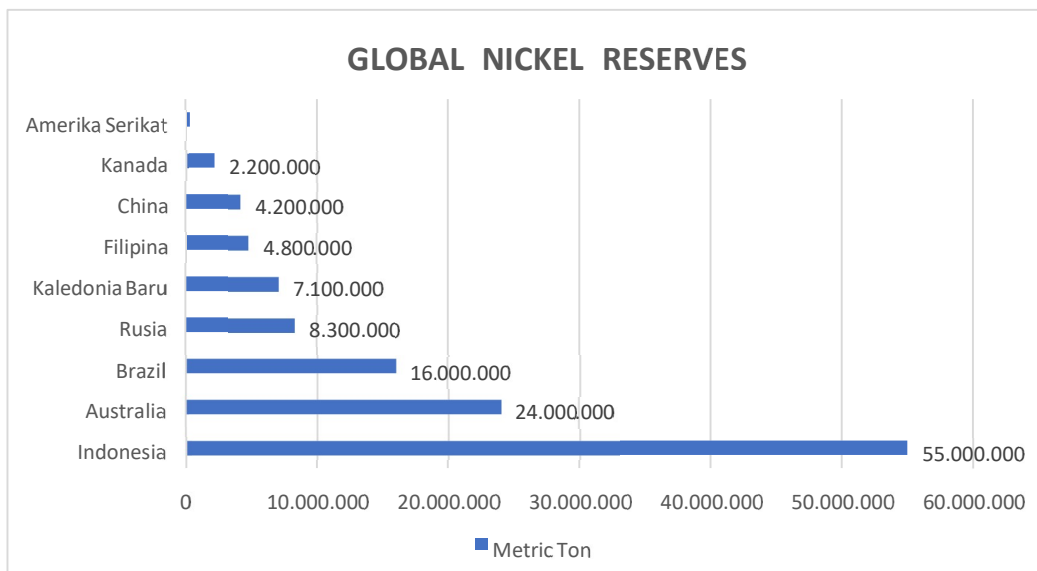
While this study offers a structured evaluation of nickel mining policy reforms using secondary data, certain limitations persist. The reliability and completeness of available sources may constrain the depth of analysis, particularly due to gaps in official reports and inconsistencies in enforcement documentation. Moreover, the absence of primary data may limit the study's ability to capture recent developments or local dynamics observable through fieldwork. Despite these constraints, the study provides a comprehensive assessment of environmental governance in the nickel sector, highlighting both achievements and areas needing improvement.

## ***DISCUSSION***

### **Indonesia's Nickel Mining Industry: A Driver of Economic Growth**

Indonesia has long relied on its abundant natural resources, including coal, gold, nickel, tin, and natural gas, as pillars of national development with commodities such as iron sand, coal, gold, nickel, silver, bauxite, tin, copper, and natural gas playing a significant role in supporting both the industrial and export sectors (Ika, 2017). Among these, nickel has emerged as a key strategic commodity due to rising global demand, especially for electric vehicle batteries, positioning Indonesia as a critical player in the global supply chain.

Figure 1. Global Nickel Reserves



Source: Statista (2024)

In Figure 1, the global nickel reserves of several key countries are illustrated based on Statista's 2024 data. Indonesia ranks at the top with the largest nickel reserves, totalling 55,000,000 metric tons. This amount represents approximately 42.3% of the world's total nickel reserves, which amount to 130,000,000 metric tons, demonstrating Indonesia's dominance in the global nickel industry, making it a focal point of global attention. Australia follows in second place with 24,000,000 metric tons, which is significantly lower than Indonesia's reserves, but it remains a major player in the global nickel industry. Other countries, such as Brazil, Russia, Canada, China, the Philippines, and New Caledonia, also have minor but still important reserves in the global market context.

With its dominance in global nickel reserves, Indonesia plays a central role not only in resource potential but also in global nickel production. In 2023, it produced 1,800,000 metric tons of nickel, the highest in the world (U.S Geological Survey, 2024).

Figure 2. Nickel Production in Indonesia



Source: elaborated from various literature (U.S Geological Survey, 2020; U.S. Geological Survey, 2021; U.S Geological Survey, 2022; U.S Geological Survey, 2024)

From the chart above, it is evident that nickel production decreased from 853,000 metric tons (MT) in 2019 to 760,000 MT in 2020. However, in 2021, production saw a significant increase to 1,000,000 MT and continued to rise to 1,600,000 MT in 2022. Supportive government policies and growing investment in the nickel industry drove this increase. Nickel production remained stable at around 1,600,000 MT through 2023.

Indonesia's vast nickel reserves and production have driven the rapid development of the electric vehicle (EV) industry, as nickel is a key component in high-capacity batteries. According to the Ministry of Investment/BKPM, Indonesia will reach a significant milestone in the automotive industry. The mass production of EV batteries will begin in April 2024, led by PT Hyundai LG Indonesia, located in Karawang, West Java, which will begin commercial production, making Indonesia the first producer of EV battery cells in Southeast Asia. The development of the EV battery ecosystem, valued at USD 9.8 billion, reflects a strong governmental commitment (Kementerian Investasi/BKPM, 2024).

Under President Joko Widodo's leadership, the push for clean energy transitions has intensified, promoting electric vehicles as an environmentally friendly solution due to their ability to minimise air pollution (CNN Indonesia, 2023). This aligns with the government's support for accelerating the implementation of battery-powered electric vehicles (KLBB - *Kendaraan Bermotor Listrik Berbasis Baterai*). These include import duty exemptions and luxury tax reductions for electric four-wheel vehicles, to stimulate investment in the sector. Indonesia is exploring the potential of hydrogen fuel cells as part of efforts to promote sustainable and clean energy solutions. These policies reflect a commitment to diversifying renewable energy technologies.

In 2023, Indonesia produced 43,068 vehicles, consisting of 15,358 electric cars and 27,710 hybrid cars. According to Gaikindo, total four-wheel vehicle sales reached 85,284 units, with cumulative sales of over 1 million. Moreover, domestic sales of electric cars reached 17,147, with 1,504 units exported (Kementerian Keuangan Republik Indonesia, 2024). These significant figures have led to a surge in global demand for nickel. In addition to economic benefits, the high demand has attracted foreign investment in the development of Indonesia's nickel sector, particularly in the processing industry.

However, the rising global demand for Indonesian nickel, especially within the context of clean energy transitions and EV production, has intensified the exploitation of national reserves. According to the Ministry of Energy and Mineral Resources (ESDM), high-grade nickel ore reserves (saprolite) are projected to be depleted within the next 11 years (Muliawati, 2024). In response, the government introduced a downstream policy to reduce dependence on raw exports and promote domestic processing for added value. While theoretically aimed at improving resource efficiency, this policy has, in practice, triggered a surge in foreign investment, particularly in nickel processing plants.

During President Jokowi's administration, the government has set an ambitious goal to build 53 smelters (Santika, 2023), driven by support from China, which dominates investment in the nickel sector. In 2023, domestic investment contributed to the economic growth of 5.05% year-over-year (Simanjuntak, 2024). Furthermore, according to the Ministry of Investment/BKPM, Indonesia's investment realisation reached IDR 1,418.9 trillion, a 17.5% increase compared to 2022 (Annur, 2024). Of this, IDR 216.8 trillion went to mineral smelters, including IDR 136.6 trillion for nickel (Nugroho, 2024). In comparison to other countries, China remains the leading investor. The combined value of investments from China and Hong Kong reached USD 10.8 billion, and after a decade, their contribution to foreign direct investment accounted for 28.6% (Project Multatuli, 2024). Currently, 137 of 248 nickel smelter furnaces in Indonesia are affiliated with Chinese companies, including ten major investors.

Table 2. Chinese-Affiliated Companies in Indonesia's Nickel Sector

<b>Company</b>	<b>Year Established</b>	<b>Location</b>	<b>Products</b>
PT Indonesia Puqing Recycling Technology	2022	PT Indonesia Morowali Industrial Park	Lithium battery recycling plant
PT Tsingshan Steel Indonesia	2016	PT Indonesia Morowali Industrial Park	Stainless steel producer
PT Indonesia Guang Ching Nickel and Stainless Steel	2014	PT Indonesia Morowali Industrial Park	Producer of steel, stainless steel, smelters, and power plants
Huake Nickel Indonesia	2022	PT Indonesia Weda Bay Industrial Park	Processes laterite nickel ore via RKEF into ferronickel sulfidation and nickel matte in partnership with Tsingshan.
PT Yuoshan Nickel Indonesia	2020	PT Indonesia Weda Bay Industrial Park	Joint venture between Tsingshan Group and Huayou Group producing nickel sulfate and operating power
PT Weda Bay Nickel	2009	PT Indonesia Weda Bay Industrial Park	Nickel ore processing and refining
Unity Nickel-Alloy Indonesia	2021	Industri Bantaeng	Focuses on nickel smelting, producing 200,000 MT of ferronickel
Downstone Energy Material	2021	Industri Bantaeng	Focuses on nickel ore smelting, producing 13,000 MT of nickel matte

Source: Riedho (2024)

The table above reflects the dominance of Chinese-affiliated companies in the development of Indonesia's nickel processing and metal sectors. Most of the listed companies operate within industrial zones like the Indonesia Morowali Industrial Park and PT Indonesia Weda Bay Industrial Park, which serve as hubs for the country's nickel downstream activities. Companies like PT Indonesia Puqing Recycling Technology and Huake Nickel Indonesia illustrate the industry's shift. This industrial shift aligns with Indonesia's nickel downstream policy, aimed at increasing the added value of exports.

The significant investment and expansion of Chinese companies in Indonesia not only dominate the nickel industry but also impact other sectors, particularly by driving national economic growth. This expansion accelerates industrial infrastructure development, job creation, and human capital enhancement through technology and skill transfer. Additionally, foreign investment from China contributes to macroeconomic stability, bolstering Indonesia's global competitiveness, particularly in the mineral downstream and high-tech manufacturing sectors.

Foreign investments have facilitated the development of key infrastructure in mining areas within industrial zones in Morowali, Konawe, Bantaeng, and Weda Bay. In 2019, foreign companies created 21,266 jobs. However, while job creation has expanded, local workers are provided with training, especially in mastering advanced technologies, to meet the industry's needs, particularly in nickel processing (Kementerian ESDM, 2020).

The nickel sector has become a strategic pillar of Indonesia's economic growth, driven by key factors related to global market dynamics and domestic economic potential. Rising global demand, especially from countries pursuing decarbonisation, has opened vast investment opportunities for Indonesia to attract large-scale foreign investment. This investment extends beyond financial contributions; its impact also reaches the development of domestic infrastructure and production technologies. Enhancing local industrial capacity in nickel processing triggers a multiplier effect by creating jobs and boosting regional economies. This transformation, if managed sustainably, has the potential to accelerate domestic industrialisation, increase the value-added of natural resources, and solidify Indonesia's position as a key player in the global clean energy economy.

Despite the potential of Indonesia's nickel sector as a cornerstone of national economic strategy, particularly through investment and EV industry development, significant ecological challenges cannot be overlooked. Nickel mining practices that harm ecosystems have sparked international criticism and raised concerns of ecocide, pressuring Indonesia to balance economic interests with environmental responsibility, considering nickel's crucial role in the ethical and sustainable energy transition. Chinese domination in Indonesia's nickel investment landscape underscores a strategic alignment of China's industrial ambitions with Indonesia's resource-based economy. While these investments have significantly accelerated downstream development and boosted export revenues, they risk reinforcing structural dependency, environmental degradation, and unequal value distribution. The dominance of Chinese firms in smelter ownership and supply chains limits Indonesia's bargaining power and hinders technology transfer for long-term economic sovereignty and sustainable development. Thus, while crucial, these investments must be accompanied by stronger governance, diversification, and value-added policies.

### **International Pressure and Ecological Criticism: Global Reaction to Indonesia's Nickel Mining Pressure**

Ecocide, defined as large-scale ecosystem destruction driven by human activity, is increasingly relevant in the context of nickel mining. Gray identifies three key characteristics of ecocide: serious, widespread, and long-term ecological damage (1), it causes serious, widespread, and long-lasting ecological damage, (2) the damage has international repercussions, and (3) the societal costs outweigh its benefits (Merz et al., 2014). Higgins adds that ecocide involves large-scale destruction or loss of ecosystems in a specific area, whether caused by humans or natural events, to the extent that the well-being of the local population is severely diminished (Higgins, 2015). Higgins also differentiates between two types of ecocides: (1) certain ecocide, which refers to environmental destruction directly caused by human activities or institutions, and (2) uncertain ecocide, which refers to environmental damage caused by natural events.

Nickel mining in Indonesia closely aligns with both scholars' definitions, given the industry's extensive and permanent destructive impacts on ecosystems. Nickel extraction causes deforestation, pollution, and erosion, leading to land degradation consistent with Gray's definition of ecocide as severe, long-lasting harm with more societal costs than benefits. Its transboundary effects reinforce its global impact.

According to Higgins, such damage qualifies as certain ecocide due to its direct human origin.

As global demand for nickel continues to rise, its environmental impact is often overlooked. Ecosystem destruction, water pollution, and land degradation pose serious challenges to environmental sustainability. Research by Agussalim et al. (2023) found that mining materials falling into the sea have disrupted marine ecosystems in Kolaka Regency. Another study by Tasa & Sodikin (2023) reveals significant environmental damage in the nickel mining areas of Bahodopi District, Morowali Regency, Central Sulawesi Province. The damage affects both abiotic and biotic components. The abiotic review shows that hilly topography has been flattened and excavated to depths of 8–25 meters due to stripping of topsoil and overburden. Biotic analysis shows that land clearing has removed vegetation, causing biodiversity loss, microclimate changes, and habitat disruption.

Laksono et al. (2020) found that surface water in post-mining reclaimed land in Mohoni Village, North Morowali, was classified as category C, indicating moderate pollution. Violations in Morowali's nickel mining have produced large volumes of sludge containing harmful chemicals and metals. Syarifuddin (2022) reported that sedimentation from mining waste turned seawater brown and disrupted crab farming in mangrove areas. Similar environmental damage has been observed in East Halmahera Regency, where heavy metals such as mercury (Hg) in soil, water, grass, and the liver and meat of cattle grazing near nickel mines exceed safety limits, affecting the quality of meat, water, and vegetation (Gunawan et al., 2015).

Widespread environmental damage from nickel mining has attracted global attention. Environmental organisations such as Greenpeace, Mighty Earth, and the IUCN have criticised the Indonesian government for neglecting ecological impacts in its mining policies. These organisations argue that government policies supporting mining expansion often neglect the detrimental ecological impacts, especially as exploitation rises in response to global demand. Greenpeace has specifically criticised the government for the environmental damage caused by expanding open-pit nickel mining. According to Iqbal Damanik, a forest campaigner for Greenpeace, nickel mining practices in Indonesia generate large volumes of waste, including tailings and land clearance, which are exacerbated by global demand and increased nickel production (Metro TV, 2024).

Meanwhile, the IUCN's article, "Nickel Rush in Indonesia: Deforestation Rates Double Around Nickel-Processing Plants," states that environmental destruction around mines is not only a result of mining itself but also due to the rapid expansion of nickel processing plants. The Indonesian government is criticised for focusing on short-term gains from the nickel boom, which leads to irreversible ecosystem damage in the long term (IUCN, 2024). Mighty Earth's report, aligning with Greenpeace and IUCN, highlights that nickel mining in tropical forests causes habitat loss and worsens climate change. There are 25 nickel concessions in Indonesia, causing damage to tropical forests, 10 of which are in the form of:

Table 3. Nickel Concessions in Indonesia Causing Tropical Forest Damage

<b>Nickel Concession Name</b>	<b>License Type</b>	<b>Last License Issuance Year</b>	<b>Tree Cover Loss Due to Latest License Adjustment until 2022 – UMD Forest Loss (hectares lost)</b>	<b>Tree Cover Loss from 2001 to 2022 – UMD Forest Loss (hectares lost)</b>	<b>Tree Cover Loss from 2020 to 2023 – RADD Alerts (hectares lost)</b>
Vale Indonesia – Sorako Block	CoW	2014	14,558.94	20,833.07	1,400.61
Aneka Tambang – Konawe Utara Block	CoW	2010	2,775.80	4,033.98	430.38
Bintang Delapan Mineral	IUP	2010	2,737.76	2,923.70	461.12
Vale Indonesia – Pomala Block	CoW	2014	2,614.35	4,872.02	160.43
Vale Indonesia-Bahodopi Block	CoW	2014	2,465.37	3,461.01	346.99
Mulia Makmur Perkasa	IUP	2009	1,835.82	2,150.91	131.92
Bukit Makmur Istindo Nikeltama	IUP	2012	1,708.28	2,730.59	348.99
Multi Dinar Karya	IUP	2011	1,414.24	2,936.58	99.82

Source: Brown &amp; Harris (2024)



The data indicate that nickel mining in Indonesia has significantly contributed to deforestation, particularly in tropical forests that are vital to global ecological sustainability. This table also shows that 10 out of 25 nickel concessions, including Vale Indonesia and Aneka Tambang, have recorded the destruction of over 14,000 hectares of forest. At the same time, the area of rehabilitated or reforested land is considerably smaller, leading to a substantial gap between deforestation and ecosystem recovery. Although the Indonesian government regulates mining through permits such as CoW and IUP, the data reveal significant gaps in regulatory enforcement. The extent of deforestation suggests that current regulations are inadequate to prevent further environmental degradation, particularly in ecologically sensitive tropical forest zones. Mighty Earth has also criticised mining companies for violating international environmental standards and neglecting conservation responsibilities, highlighting weaknesses in Indonesian government regulations (Brown & Harris, 2024).

Environmental damage from nickel mining is often attributed to limited government oversight and deficiencies in current regulatory frameworks. Empirical evidence shows that significant environmental consequences reflect the inability of the current regulatory framework to address these issues effectively. Weak law enforcement and inadequate oversight allow violations of existing environmental standards by industry players. Additionally, prevailing policies often lack specific sharpness and are not always updated to respond to emerging environmental challenges. Although environmental damage from nickel mining has attracted the attention of various global organisations, a primary factor exacerbating this situation is the increasing global demand for nickel (Azevedo et al., 2020).

This demand fuels aggressive industry expansion, resulting in ecological harm as documented by environmental watchdogs. Global nickel demand is projected to exceed 4 million tons, driven largely by stainless steel production, which alone may require 1.9 million tons by 2040 (Hasiana, 2024). In 2023, Indonesia produced around 2.03 million tons of nickel, accounting for over half of global output (Taufani, 2024). This indicates that Indonesia plays a dominant role in meeting global nickel demand; however, aggressive production expansion risks exacerbating environmental damage if not accompanied by sustainable mining regulations and practices. Indonesia's rapid nickel industrialisation has caused extensive collateral damage to its ecosystems.

These include mass deforestation, water and soil pollution, and ecosystem degradation, qualifying as *certain ecocide* due to direct human-induced destruction. Mining operations have flattened landscapes, cleared vegetation, and caused biodiversity loss, leading to severe erosion and disruption of local microclimates. Aquatic ecosystems have suffered from seawater contamination and sedimentation, damaging mangroves and disrupting crab habitats. Toxic substances, including mercury, have contaminated soil, water, and livestock, posing serious threats to both environmental and human health. Despite frameworks like CoW and IUP, environmental governance remains fragile, enabling widespread violations and deforestation in major concessions such as Vale and Aneka Tambang. These ecological costs, compounded by fragile oversight and growing global demand, signal long-term and potentially irreversible damage to Indonesia's ecosystems.

### **Indonesia's Policy Reforms Responding to Environmental Criticism**

Amid mounting pressure from diverse stakeholders, the Indonesian government has initiated policy reforms in the nickel mining sector to address ecological challenges stemming from extensive mineral exploitation. In this context, policy reform is essential not only to mitigate adverse environmental impacts but also to establish a more effective and sustainable regulatory system (Afra et al., 2023). Key milestones include the enactment of Law No. 32 of 2009 on Environmental Protection and Management, Ministerial Regulation No. 7 of 2021 on Hazardous and Toxic Waste (B3) Management, and the 2022 revision of the Environmental Impact Assessment (AMDAL) process. While these policies are not explicitly framed as direct responses to international criticism, their timing amid increasing global scrutiny of Indonesia's nickel sector suggests a strategic alignment with international environmental governance norms.

Law No.32 of 2009 serves as a comprehensive legal foundation for regulating environmental protection in Indonesia. It stipulates that any business activities with the potential to cause significant environmental impacts must prepare an Environmental Impact Assessment (AMDAL). This law also establishes the legal basis for the Action and Actor Motivation Theory (Tama) concerning AMDAL, including procedures for its preparation and approval before project implementation. The law outlines general principles of environmental sustainability and delineates the responsibilities of government, communities, and industry actors in managing and monitoring environmental impacts (RI & Indonesia, 2009). Ministerial Regulation No. 7 of 2021

complements this law by detailing technical procedures for managing hazardous and toxic waste (B3), a critical concern in the mining industry. It emphasises strict oversight of the production, storage, transportation, and disposal of B3 waste, which frequently leads to severe pollution (LHK RI, 2021). Together, these regulations aim to address the complex challenge of balancing industrial development with environmental sustainability commitments.

Although both regulations have been enacted to govern environmental protection and management, practical implementation on the ground shows that their effectiveness remains subject to critical evaluation. Law No. 32 of 2009 provides the legal foundation to preserve environmental functions and prevent pollution caused by business activities. Unfortunately, monitoring conducted by Soleman et al. (2020) in North Maluku Province reveals that the process of issuing permits often occurs without fulfilling necessary administrative requirements, such as the existence of an Environmental Management Plan (RKL) or an Environmental Monitoring Plan (UPL) and AMDAL.

In many cases, applicants are only required to submit a letter of commitment to prepare these documents after the permit is granted, and construction often begins even before the permit is officially approved. This non-compliance reflects a serious procedural violation, considering that RKL, UPL, and AMDAL are essential components of the environmental assessment process and must be completed prior to permit approval.

Additionally, violations have been identified under Law No. 32 of 2009 by a nickel ore mining company in Konawe Selatan Regency, Southeast Sulawesi, including: First, the failure to control wastewater pollution. Second, the absence of drainage systems to accommodate used oil from oil traps. Third, the lack of pollution load calculations through emission quality measurements on generators. Fourth, the incomplete labelling of B3 waste on waste packaging. Fifth, not all B3 waste produced is stored in the designated B3 waste storage facilities (Trihatmanto, 2020).

Furthermore, a report by Climate Rights International highlights that many companies continue to violate Law No. 32 of 2009, contributing to extensive deforestation, biodiversity loss, and worsening climate crises caused by nickel mining. Using geospatial analysis, Climate Rights International (CRI) and the AI Climate Initiative at the University of California, Berkeley, revealed that over 5,331 hectares of tropical forest have been cleared within nickel mining concession areas in Halmahera. This deforestation has released approximately 2.04 million metric tons of greenhouse gas emissions (CO<sub>2</sub>e), previously stored in the forest's carbon reserves.

Despite persistent violations by nickel industry actors causing substantial environmental and social harm, the Indonesian government continues efforts to strengthen environmental governance through Law No. 32 of 2009 and Ministerial Regulation No. 7 of 2021. In addition, both policies aim to align national environmental standards with international regulations and practices. This is reflected in Indonesia's participation in international conventions, including the Convention on Biological Diversity (CBD) (LHK RI, 1988) and the Cartagena Protocol (Kementerian LHK, 2004). In the nickel sector, such alignment is essential to ensure mining activities meet domestic priorities while contributing to global environmental goals and climate commitments.

### **Assessing the Effectiveness of Policy Reforms: Are They Addressing Environmental Sustainability?**

The 1945 Constitution of Indonesia recognises the right to a good and healthy environment as a fundamental constitutional and human right. Accordingly, the state and all relevant stakeholders are obligated to conduct environmental protection and management as part of sustainable development. This ensures that the environment remains a vital source of life and ecological support for humans and other living beings (BPK RI, 2009). Law No. 32 of 2009 on Environmental Protection and Management provides a statutory legal foundation for environmental governance in Indonesia (Hakim, 2016). Philosophically, the law affirms the fundamental right of citizens to a good and healthy environment. The law emphasises both protection and management, reflecting a comprehensive and anticipatory approach to environmental governance. This dual emphasis aligns with Teuku Muhammad Radhie's concept of legal politics as a directive for legal development, positioning the EPML as a normative framework guiding environmental protection and management (Hakim, 2016).

According to Article 3 of the EPML, the objectives of environmental protection and management are to: (1) protect the territory of the Unitary State of the Republic of Indonesia from environmental pollution and/or degradation; (2) ensure the safety, health, and well-being of humans; (3) guarantee the continuity of life for living beings and the sustainability of ecosystems; (4) preserve the ecological functions of the environment; (5) achieve harmony, alignment, and balance in environmental systems; (6) ensure justice for both present and future generations; (7) fulfil and protect the right to a good and healthy environment as part of human rights; (8) regulate the wise utilisation of natural resources; (9) realise sustainable development; and (10) anticipate global environmental issues.

These provisions affirm the EPML as both a legal foundation and a political commitment to sustainable development and environmental justice. However, the existence of a strong legal and political commitment does not automatically translate into effective implementation.

Despite the regulatory framework established by Law No. 32 of 2009 and Ministerial Regulation No. 7 of 2021, which aims to tighten oversight of environmentally damaging industrial activities, empirical data indicate that these reforms have not resulted in significant decreases in deforestation or pollution in nickel mining areas. According to a report by Mighty Earth titled "From Forest to Electric Vehicle," from 2020 to 2023, there was a loss of 153,364 hectares of forest attributed to 329 nickel concessions. Annual deforestation data from RADD are summarised in Table 4.

Table 4. Data on Forest Loss

<b>Year</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
<b>Hectares of Forest Loss</b>	2,601,4	3,177,0	3,514,9	6,114,8

Source: Brown & Harris (2024)

Table 4 displays data on the extent of forest loss in nickel industry areas from 2020 to 2023, indicating that despite the enactment of Law No. 32 of 2009 and Ministerial Regulation No. 7 of 2021, deforestation in these areas has continued to increase significantly. In 2020, the recorded area of lost forest was 2,601.4 hectares, which rose to 3,177.0 hectares in 2021. This trend continued with further increases in 2022 to 3,514.9 hectares, and by 2023, forest loss surged to 6,114.8 hectares. Furthermore, a study conducted by Laksono et al. (2020) on the reclaimed land of nickel mining in Mohoni Village, Petasia Timur, North Morowali, revealed that the surface water quality was classified as Class C, indicating moderate pollution, likely resulting from waste produced during nickel ore extraction. Additionally, the water quality in nickel mining areas of North Konawe has declined due to the high acidity of mining waste, damaging aquatic organisms and other fish habitats (Saputro et al., 2024). This indicates persistent water pollution in nickel mining regions.

This highlights the gap between regulations and implementation. Although designed to reduce environmental harm, Law No. 32/2009 and Regulation No. 7/2021 face complex implementation challenges. One of the most significant challenges is the

weak enforcement of laws. Despite having a strong legal framework, Indonesia struggles with limited oversight, especially in the nickel industry, where regulatory non-compliance drives persistent environmental degradation. Table 5 illustrates this gap by mapping ecological harms in nickel mining to relevant articles of Law No. 32 of 2009.

Table 5. Key Forms of Environmental Degradation in the Nickel Mining Industry  
Against Relevant Articles in Law No. 32 of 2009

<b>Form of Environmental Damage</b>	<b>Relevant Legal Provision</b>	<b>Regulatory Content</b>	<b>Empirical Evidence</b>
Deforestation within mining concession areas	Article 69 paragraph (1g)	Prohibits the destruction of areas with high conservation value or critical ecological functions	(Brown & Harris, 2024) reported the loss of 153,364 hectares of forest due to 329 nickel concessions (2020–2023)
Water pollution caused by mining waste	Article 69 paragraphs (1a) and (1f); Articles 98 and 99	Prohibits unauthorised waste disposal and imposes criminal sanctions for pollution resulting in severe environmental damage	Studies by (Laksono et al., 2020) and (Saputro et al., 2024) found a significant decline in water quality, reaching heavily polluted categories
Mining operations conducted without valid AMDAL or UKL-UPL documents	Article 22 paragraph (1); Article 35 paragraph (1a)	Requires environmental assessments and licenses before initiating business activities	(International, 2024) documented manipulation of environmental impact assessment (AMDAL) reports to expedite licensing processes
Absence of post-mining land reclamation or	Article 97	Establishes the obligation of business actors to restore	Numerous abandoned post-mining lands remain unrestored,

environmental restoration		environmental damage caused by their activities	particularly in Morowali and Konawe
Ineffectiveness of law enforcement and monitoring	Article 76; Articles 100–103	Grants the government authority to impose administrative and additional criminal sanctions for violations	Despite existing regulations, weak enforcement results in a lack of deterrent effect for mining industry actors

Source: BPK RI (2009).

These violations reveal systemic enforcement failures and continued regulatory evasion by industry actors. Additionally, transparency in environmental management remains a critical issue. Climate Rights International reports that limited disclosure of AMDAL implementation and oversight exacerbates non-compliance in the extractive sector. Companies often bypass procedures or falsify reports to expedite permits, undermining environmental safeguards (Climate Rights International, 2024).

Balancing economic priorities and environmental sustainability remains a key challenge. As Chandra (2021) notes, the nickel industry is central to the national economy due to global demand, particularly for EV battery production. Economic growth policies often conflict with environmental conservation, leading to unsustainable industrial expansion and ecological degradation. However, its implementation presents a complex landscape. Although normatively progressive, the actual implementation of this law often falls short of its sustainability objectives. Ultimately, environmental policy reform in Indonesia can be viewed as a response to international pressures, as well as an effort to create long-term commitments to sustainable development.

Nevertheless, despite normative progress, the implementation remains inconsistent and fails to meet sustainability goals. Evaluating the effectiveness of Indonesia's environmental policy reforms requires more than assessing the existence of regulatory instruments; it must also involve a critical assessment using indicators derived from the Environmental Security framework, which perceives environmental degradation as a threat to human well-being, social stability, and national security (R. A. Matthew, 1999). Matthew et al. (2010) propose five key indicators for assessing environmental security: (1) Ecosystem Preservation: Has the policy succeeded in preventing ecological

damage and ensuring environmental sustainability? (2) Access to Environmental Resources: Do local communities retain access to clean water, fertile land, and fresh air? (3) Social and Economic Stability: Has the policy reduced inequality or conflicts caused by environmental exploitation? (4) Institutional Capacity: To what extent is the state capable of law enforcement and effective environmental management? (5) Intergenerational Justice: Does the policy guarantee environmental rights for future generations? When applied to Indonesia's environmental laws, such as the PPLH Law and Ministry of Environment Regulation No. 7/2021, especially in the context of the nickel mining sector, several critical failures emerge.

Table 6. Assessment of Environmental Governance Indicators

<b>Indicator</b>	Ecosystem Preservation	Access to Environmental Resources	Social and Economic Stability	Institutional Capacity	Intergenerational Justice
<b>Assessment</b>	Failed	Failed	At Risk	Weak	Weak

This evaluation shows that, despite existing legal frameworks, most dimensions of environmental policy reform in Indonesia's nickel sector fall under the *Failed* category, particularly in ecosystem protection, intergenerational justice, and community access to environmental resources. These failures are evidenced by ongoing deforestation, land degradation, and the marginalisation of local communities due to unchecked mining expansion, despite the existence of regulations such as Ministerial Regulation No. 7/2021. This shows that regulations alone are insufficient without effective oversight and accountability. The *Weak* category emerges in relation to policy transparency and public participation. Although participatory spaces exist, such as AMDAL consultations, they remain largely symbolic and ineffective in shaping decisions. Transparency is further undermined by corporate dominance and limited civil society involvement in long-term policy evaluation. This indicates that despite normative progress, the quality of democratic environmental governance remains superficial and vulnerable to co-optation by economic-political interests.

Meanwhile, the *At Risk* classification is reflected in the lack of sustainability integration within national development planning. Despite adopting green narratives, Indonesia's nickel downstream policies still increase emissions and fossil fuel use. Heavy reliance on Chinese investment and the prioritisation of semi-finished exports risk



reducing the green agenda to mere rhetoric rather than genuine structural transformation. This inconsistency reveals a persistent vulnerability of environmental policy to short-term growth imperatives over long-term sustainability.

Overall, the Failed, Weak, and At Risk classifications reflect that current reforms fail to tackle the root causes of environmental governance issues. The approach remains confined to technocratic environmentalism, lacking structural political-economic transformation. Without substantive change, Indonesia risks reinforcing ecological injustice and weakening its role in the global green transition. Based on the evaluation findings, policy refinement requires: (1) binding ecological thresholds in licensing; (2) transparent and inclusive governance; and (3) coherent alignment between industrial and environmental goals. These measures ensure policies address the structural risks beyond reactive responses. In doing so, reform trajectories would be better aligned with the principles of ecological justice and transformative environmental governance.

## **CONCLUSION**

This study shows that although Indonesia has introduced reforms such as Law No. 32 of 2009 and Ministerial Regulation No. 7 of 2021, their effectiveness remains limited. Policy implementation in the field faces various challenges, including weak oversight and a lack of transparency in environmental management. The environmental security framework reveals that ecosystem degradation from nickel exploitation also heightens social instability in affected areas. The findings of this study support the literature that critiques the gap between policy and practice in environmental governance in developing countries. While international pressure influences reforms, responses remain reactive and lack a long-term sustainability orientation. To achieve broader sustainability goals, Indonesia needs to strengthen institutional capacity and emphasise more transparent and effective environmental governance.

Future research should incorporate primary field data to reflect better the realities of policy implementation in nickel mining areas. Primary data-based studies, such as interviews with relevant stakeholders, including local governments, mining company representatives, and local communities, can provide more in-depth insights into the challenges and dynamics occurring at the policy implementation level. A quantitative approach is also recommended to measure policy impacts on indicators such as deforestation, pollution, and biodiversity. A longitudinal approach is essential to observe environmental change over time.

---

**BIBLIOGRAPHY**

- Administrator. (2023). *Nilai Ekspor Hilirisasi Nikel Melonjak 745%*. Indonesia.Go.Id. <https://indonesia.go.id/kategori/editorial/7255/nilai-ekspor-hilirisasi-nikel-melonjak-745?lang=1>
- Afra, S., R, A. R., Amin, M. Al, Katili, S., & Muttaqien, A. (2023). *Kertas Kebijakan: "Neo-ekstraktivisme di Episentrum Nikel Indonesia: Kerapuhan Tata Kelola Pertambangan, Kerusakan Ekologis, dan Pelanggaran HAM di Bumi Celebes*. <https://satyabumi.org/kertas-kebijakan-neo-ekstraktivisme-di-episentrum-nikel-indonesia-kerapuhan-tata-kelola-pertambangan-kerusakan-ekologis-dan-pelanggaran-ham-di-bumi-celebes/>
- Agussalim, M. S., Ariana, & Saleh, R. (2023). Kerusakan Lingkungan Akibat Pertambangan Nikel Di Kabupaten Kolaka Melalui Pendekatan Politik Lingkungan. *Journal of Social Region Research*, 8(1), 2527–3752. <https://doi.org/10.24256/pal.v8i1.3610>
- Aida, M., Tahar, A. M., & Davey, O. (2023). *Ecocide in the International Law: Integration Between Environmental Rights and International Crime and Its Implementation in Indonesia* (Vol. 1). Atlantis Press SARL. [https://doi.org/10.2991/978-2-38476-046-6\\_57](https://doi.org/10.2991/978-2-38476-046-6_57)
- Annur, C. M. (2024). *Lampaui Target, Realisasi Investasi 2023 Capai Rp1.418 Triliun*. databoks. <https://databoks.katadata.co.id/datapublish/2024/01/24/lampaui-target-realisasi-investasi-2023-capai-rp1418-triliun>
- Azevedo, Marcelo., Goffaux, Nicolas., Hoffman, K. (2020). *How clean can the nickel industry become?* McKinsey & Company Metals & Mining. <https://www.mckinsey.com/industries/metals-and-mining/our-insights/how-clean-can-the-nickel-industry-become>
- Bakri, W., Laupe, S., Muhammad, A., Salam, I., Bakri, W., Ushuluddin, F., Parepare, I., Laupe, S., Ilmu, F., Hasanuddin, U., Name, A., & Laupe, S. (2023). Pertambangan Kawasan Karts dan Kondisi Sosial Masyarakat. *SOSIOLOGIA : Jurnal Agama dan Masyarakat*, 3, 139–150.
- Boseke, Y. C., Kalalo, F. P., & Pontoh, K. C. (2021). Kajian Hukum UU No. 32 Tahun 2009 terhadap Peran Pemerintah dalam Mencegah Kerusakan Lingkungan Akibat Aktivitas Pertambangan. *Lex Administratum*, IX(8), 86–96. <https://ejournal.unsrat.ac.id/v3/index.php/administratum/article/view/36583/34023>
- BPK Republik Indonesia. (2009). Undang-Undang Republik Indonesia Nomor 32 Tahun 2009 tentang Perlindungan dan Pengelolaan Lingkungan Hidup. In *Kementerian Hukum dan Hak Asasi Manusia Republik Indonesia*. <https://peraturan.bpk.go.id/Details/38771/uu-no-32-tahun-2009>
- Brown, D., & Harris, J. (2024). *From Forest to Electric Vehicles*. <https://mightyearth.org/wp-content/uploads/2024/05/FromForeststoEVs.pdf>
- Chandra, W. (2021). *Catatan Akhir Tahun WALHI Region Sulawesi: Industri Nikel Ancam Sulawesi*. Mongabay. <https://www.mongabay.co.id/2021/12/30/catatan-akhir-tahun-walhi-region-sulawesi-industri-nikel-ancam-sulawesi/>
- Climate Rights International. (2024). *Nikel Dikeduk Dampak Industri Nikel di Indonesia terhadap Manusia dan Iklim*. <https://cri.org/reports/nickel-uneearthed/ringkasan/>
- CNN Indonesia. (2023, Juli 12). Industri Baterai Kendaraan Listrik Dipacu, Nikel Diburu. *CNN Indonesia*. <https://www.cnnindonesia.com/ekonomi/20230712132850-85-972548/industri-baterai-kendaraan-listrik-dipacu-nikel-diburu>
- Greenpeace International. (2021). *Destruction: Certified*. In *Greenpeace*. <https://www.greenpeace.org/static/planet4-international-stateless/2021/04/b1e486be-greenpeace-international-report-destruction->
-

- certified\_finaloptimised.pdf?\_gl=1\*1ac3dra\*\_up\*MQ..\*\_ga\*NDIwODU4MzExLjE3MjQ3Nzc5Mzg.\*\_ga\_0CCB1GTVV6\*MTcyNDc3NzkzNy4xLjAuMTcyNDc3
- Gunawan, G., Priyanto, R., & Salundik, S. (2015). Analisis Lingkungan Sekitar Tambang Nikel Terhadap Kualitas Ternak Sapi Pedaging di Kabupaten Halamahera Timur. *Jurnal Ilmu Produksi dan Teknologi Hasil Peternakan*, 3(1), 59–64. <https://doi.org/10.29244/3.1.59-64>
- Gupta, K. (2023). *Indonesia Doubles Down On Nickel Export Bans and Downstreaming*. EastAsiaForum. <https://eastasiaforum.org/2023/12/07/indonesia-doubles-down-on-nickel-export-bans-and-downstreaming/>
- Hakim, D. A. (2016). Politik Hukum Lingkungan Hidup di Indonesia Berdasarkan Undang-Undang Nomor 32 Tahun 2009 Tentang Perlindungan dan Pengelolaan Lingkungan Hidup. *UNIFIKASI: Jurnal Ilmu Hukum*, 3(1), 114–132. <https://doi.org/10.25134/unifikasi.v3i1.404>
- Hasiana, D. (2024). *Kebutuhan Nikel Dunia Lewati 4 Juta Ton 2040, Cadangan Aman?* Bloomberg Technoz. <https://www.bloombergentechnoz.com/detail-news/33394/kebutuhan-nikel-dunia-lewati-4-juta-ton-2040-cadangan-aman>
- Higgins, P. (2015). *Eradicating Ecocide Laws and Governance to Prevent the Destruction of Our Planet* (2nd Edition). Shephard-Walwyn.
- Homer-Dixon, T. (2006). *The Upside of Down: Catastrophe, Creativity, and the Renewal of Civilization* (T. Homer-Dixon (ed.); First Edit). Island Press Hardcover Edition.
- Ika, S. (2017). Kebijakan Hilirisasi Mineral: Policy Reform untuk Meningkatkan Penerimaan Negara. *Kajian Ekonomi dan Keuangan*, 1(1), 42–67. <https://doi.org/10.31685/kek.v1i1.259>
- Irawati. (2020). *The Expansion of Nickel Mining, Environmental Damage and Determinants' of the Bajo Community Marginalization in Pomalaa Regency, Southeast Sulawesi*. 7(2), 139–151. <https://doi.org/https://doi.org/10.22146/jps.v7i2.62529>
- IUCN. (2024). *Nickel Rush in Indonesia: Deforestation Rates Double Around Nickel-Processing Plants*. IUCN National Committee of The Netherlands. <https://www.iucn.nl/en/news/nickel-rush-in-indonesia-deforestation-rates-double-around-nickel-processing-plants/>
- Kementerian Energi dan Sumber Daya Mineral Republik Indonesia [Kementerian ESDM]. (2009). Undang-undang Perlindungan Lingkungan Hidup. In *Kementerian Energi dan Sumber Daya Mineral Republik Indonesia* (Vol. 19, Nomor 19). [https://jdih.esdm.go.id/peraturan/UU 32 Tahun 2009 \(PPLH\).pdf](https://jdih.esdm.go.id/peraturan/UU%2032%20Tahun%202009%20(PPLH).pdf)
- Kementerian Energi dan Sumber Daya Mineral Republik Indonesia [Kementerian ESDM] (2020). *Peluang Investasi Nikel Indonesia*. <https://www.esdm.go.id/assets/booklet/tambang-2020/Booklet-Nikel-FA.pdf>
- Kementerian Investasi/BKPM. (2024). *Bukti Nyata Hilirisasi Nikel, Indonesia Siap Produksi Massal Baterai Kendaraan Listrik pada April 2024*. Kementerian Investasi/BKPM. <https://www.bkpm.go.id/id/info/siaran-pers/bukti-nyata-hilirisasi-nikel-indonesia-siap-produksi-massal-baterai-kendaraan-listrik-pada-april-2024>
- Kementerian Keuangan Republik Indonesia. (2024). *Dukung Pertumbuhan Ekonomi, Pemerintah Dorong Percepatan Implementasi Produksi Electric Vehicle yang Kompetitif*. Kementerian Keuangan Republik Indonesia. <https://www.kemenkeu.go.id/informasi-publik/publikasi/berita-utama/Percepatan-Implementasi-Produksi-Electric-Vehicle>
- Kementerian LHK. (2004). *Protokol Cartagena*. Perpustakaan MENLHK. [http://perpustakaan.menlhk.go.id/pustaka/images/docs/Protokol Cartagena.pdf](http://perpustakaan.menlhk.go.id/pustaka/images/docs/Protokol%20Cartagena.pdf)
- Laksono, F. A. T., Permanajati, I., & Mualim, R. (2020). Analisis Kualitas Air Di Lahan

- Reklamasi Pertambangan Nikel Desa Mohoni, Petasia Timur, Morowali Utara. *Jurnal Sains Teknologi & Lingkungan*, 6(1), 96–104. <https://doi.org/10.29303/jstl.v6i1.142>
- LHK RI. (1988). Undang-Undang Republik Indonesia Nomor 5 Tahun 1994. In *BPK RI* (Vol. 1985, Nomor 1).
- Matthew, R. A. (1999). *Environmental Security: A Guide to the Debate* (R. Matthew (ed.); First Edit). Johns Hopkins University Press.
- Matthew, R. A., Barnett, J., McDonald, B., & O'Brien, K. (Eds.). (2010). *Global Environmental Change and Human Security*. Cambridge, MA: MIT Press
- Merz, P., Cabanes, V., & Gaillard, E. (2014). Ending Ecocide-the Next Necessary Step in International Law. *18th Congress of the International Association of Democratic Lawyers: "Lawyer for people's rights"*, Bruselas, 6(April), 1–18. <https://www.endecocide.org/wp-content/uploads/2014/04/iadlcongress.pdf>
- Metro TV. (2024). *Greenpeace Menilai Hilirisasi Nikel Ugal Ugalan*. Metro TV. <https://www.youtube.com/watch?v=xNhUYHVec4M>
- Muliawati, F. D. (2024). *Hati-Hati Pak Jokowi, Cadangan Nikel RI Bisa Habis dalam 11 Tahun!* CNBC Indonesia. <https://www.cnbcindonesia.com/news/20240307153623-4-520471/hati-hati-pak-jokowi-cadangan-nikel-ri-bisa-habis-dalam-11-tahun>
- Nugroho, R. A. (2024). *Proyek Kebanggaan Jokowi Cetak Investasi Rp 375 T pada 2023*. CNBC Indonesia. <https://www.cnbcindonesia.com/news/20240124095519-4-508530/proyek-kebanggaan-jokowi-cetak-investasi-rp-375-t-pada-2023>
- Nurbani, E. S. (2020). Submarine Tailing Disposal System: Indonesia's Policy and Future Challenges. *Journal of Liberty and International Affairs*, 5(3), 83–95.
- Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge: Cambridge University Press.
- Project Multatuli. (2024). *Cina di Hilir: Gurita Oligarki Nikel Indonesia*. Project Multatuli. <https://projectmultatuli.org/cina-di-hilir-gurita-oligarki-nikel-indonesia/>
- Santika, E. F. (2023). *Pemerintah Berambisi Bangun 53 Smelter pada 2024, Ini Rinciannya*. databoks. <https://databoks.katadata.co.id/datapublish/2023/04/27/pemerintah-berambisi-bangun-53-smelter-pada-2024-ini-rinciannya>
- Saputro, A. N., Sari, E. N., & Putri, F. A. R. (2024). Analisis Penyelesaian Limbah Tambang Nikel di Konawe Utara yang Mencemari Laut Sekitarnya. *Seminar Nasional Teknologi Industri Berkelanjutan IV (SENASTITAN IV)*, *Senastitan Iv*, 1–9.
- Simanjuntak, M. H. (2024). *Konsumsi dan Investasi Jadi Pemacu Pertumbuhan Ekonomi*. antaranews.com. <https://www.antaranews.com/berita/4015470/konsumsidan-investasi-jadi-pemacu-pertumbuhan-ekonomi>
- Soleman, S. H., Alauddin, R., & Rosyidi, I. (2020). Efektivitas Pelaksanaan Amdal pada Kegiatan Pertambangan di Provinsi Maluku Utara. *Khairun Law Journal*, 3(2), 79–92. <https://doi.org/10.33387/klj.v3i2.2893>
- Statista. (2024). *Leading countries based on nickel reserves worldwide as of 2023*. Statista. <https://www.statista.com/statistics/273634/nickel-reserves-worldwide-by-country/#:~:text=As of 2023%2C the total,24 million metric tons%2C respectively.>
- Syarifuddin, N. (2022). Pengaruh Industri Pertambangan Nikel Terhadap Kondisi Lingkungan Maritim di Kabupaten Morowali. *Jurnal Riset & Teknologi Terapan Kemaritiman*, 1 No 2. <https://doi.org/10.25042/jrt2k.122022.03>
- Tasa, A. N. & Sodikin. (2023). *Kajian Kerusakan Lingkungan Akibat Kegiatan Penambangan Bijih Nikel di Kecamatan Bahodopi Kabupaten Morowali Provinsi Sulawesi Tengah*. <https://repository.umj.ac.id/19904/1/Makalah Hukum>

Lingkungan.pdf

- Taufani, M. R. I. (2024). *Proyek Kebanggaan Jokowi Cetak Sejarah, Nikel RI Masuk Bursa Dunia*. CNBC Indonesia. <https://www.cnbcindonesia.com/research/20240530163114-128-542514/proyek-kebanggaan-jokowi-cetak-sejarah-nikel-ri-masuk-bursa-dunia>
- Tim CNN. (2024). *Ekspor Nikel RI Capai 123 Ribu Ton per Januari 2024*. CNN Indonesia. <https://www.cnnindonesia.com/ekonomi/20240215130223-85-1062980/ekspor-nikel-ri-capai-123-ribu-ton-per-januari-2024>
- Trihatmanto, H. (2020). Implementasi Undang – Undang Nomor 32 Tahun 2009 Pada Pengawasan Penataan Perizinan Lingkungan Hidup Di Salah Satu Perusahaan Tambang Bijih Nikel Di Kabupaten Konawe Selatan, Provinsi Sulawesi Tenggara. *Prosiding Temu Profesi Tahunan PERHAPI*, 1(1), 875–888. <https://doi.org/10.36986/ptptp.v1i1.128>
- U.S Geological Survey. (2024). Mineral Commodity Summaries 2024. In *U.S. Geological Survey*. U.S. Geological Survey. <https://doi.org/https://doi.org/10.3133/mcs2024>
- Wardhani, E. A. K., & Djamhari, E. A. (2024). Glorification of Economic Growth and Energy Trilemma in the Nickel Industry. *Repositori Perkumpulan PRAKARSA*, 45(May), 1–4. [https://repository.theprakarsa.org/id/publications/568511/glorifikasi-pertumbuhan-ekonomi-dan-trilemma-energi-dalam-industri-nikel#:~:text=Nikel memberikan manfaat pertumbuhan ekonomi,SDA nonmigas pada Mei 2022.](https://repository.theprakarsa.org/id/publications/568511/glorifikasi-pertumbuhan-ekonomi-dan-trilemma-energi-dalam-industri-nikel#:~:text=Nikel%20memberikan%20manfaat%20pertumbuhan%20ekonomi,SDA%20nonmigas%20pada%20Mei%202022.)