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# *Political Ecology of Nickel Industrialization: Transforming Living Landscapes and Social Consequences in Lelilef Waibulan, Central Halmahera*

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### A B S T R A C T

Nickel has become a central pillar of Indonesia's extractive economy amid the global energy transition. Following the 2020 downstream industrialization policy, the expansion of nickel mining and smelter industries has accelerated socio-ecological transformation in eastern Indonesia. This study examines how the conversion of agrarian-coastal landscapes into industrial zones reshapes livelihoods, ecological relations, and social structures in Lelilef Waibulan Village, Central Halmahera, the site of the Indonesia Weda Bay Industrial Park (IWIP). Using a critical ethnographic approach, fieldwork was conducted from April to December 2025 through participant observation, semi-structured interviews with 45 informants, and document analysis. Findings reveal significant ecological degradation and growing social inequality. At least 7,000 hectares of productive land, including secondary forests, coconut groves, and mixed gardens, have been converted into industrial infrastructure. Residents reported severe water turbidity, declining fish catches, coastal sedimentation, and the disappearance of several freshwater sources. Among 31 observed households, 45 had shifted from farming and fishing to precarious wage labor in the mining sector, characterized by temporary contracts and economic insecurity. The study also found widening social disparities between households connected to mining-related economic networks and those excluded from industrial access. Simultaneously, customary rituals and ecological practices tied to ancestral forests and coastal spaces have gradually disappeared due to restricted access and territorial enclosure by corporate concessions. These findings demonstrate that nickel industrialization produces not only environmental degradation but also social dislocation, dependency, and the erosion of local ecological knowledge. The study argues that Indonesia's extractive development model reproduces uneven development in which economic growth is accompanied by ecological vulnerability and new forms of exclusion.

## A. INTRODUCTION

Nickel has become the central emblem of Indonesia's extractive economy amid the global energy transition. Since the implementation of the export ban and downstream industrialization policy in 2020, the government has reaffirmed its ambition to position Indonesia as a global hub in the electric vehicle battery supply chain (IEA, 2021). Within the national development discourse, nickel is framed as a strategic metal underpinning modernization, industrial sovereignty, and the green economy. Yet, behind this narrative of progress lies a deepening socio-ecological paradox, particularly evident in nickel-producing regions across eastern Indonesia.

The expansion of extractive industries in Southeast Sulawesi, Central Sulawesi, and North Maluku reveals a structural tension between economic growth and socio-ecological sustainability. Industrial development under the downstreaming scheme has accelerated land conversion, triggered agrarian conflicts, and displaced coastal livelihoods from farming and fishing to precarious wage labor (AEER, 2023; Climate Rights International, 2024; JATAM, 2025; WALHI, 2023). In Central Halmahera, the Indonesia Weda Bay Industrial Park (IWIP) now occupies roughly 5,000 hectares along the Weda coastline, encompassing secondary forests, smallholder gardens, and coastal zones converted into industrial areas and supporting infrastructure (AEER, 2023; Mongabay Indonesia, 2022). The corporate concessions surrounding this complex extend over tens of thousands of hectares, indicating an ecological pressure that transcends administrative boundaries and marks the emergence of a hegemonic industrial spatial regime.

These spatial transformations have generated complex socio-ecological consequences. Research indicates that the expansion of nickel mining has accelerated shifts in household economies, eroded traditional ecological knowledge, and increased pollution in coastal and freshwater systems, directly affecting domestic water sources and fish stocks (Ajam, Ahmad, Karman, et al., 2023; Ajam, Ahmad, Sumar-karman, et al., 2023). Similar patterns appear elsewhere in North Maluku, where indigenous communities face sedimentation, deforestation, and horizontal conflicts linked to their exclusion from productive resources (AEER, 2023). At the national level, ecological studies show that nickel mining has driven deforestation exceeding sixty percent and produced starkly uneven welfare outcomes—while some groups benefit economically, others experience dispossession and livelihood loss (Heijlen & Duhayon, 2024; Lo et al., 2024).

This transformation underscores the intertwined nature of ecological degradation and structural social change. Income inequality, the weakening of customary institutions, and elite dominance in licensing processes have deepened the exclusion of local communities from decision-making spaces (Bebbington et al., 2018; WALHI, 2023). In Central Halmahera, communities surrounding the IWIP industrial complex experience ecological dislocation and the loss of control over land and water, accompanied by a gradual erosion of social and spiritual values that once

sustained human-nature harmony (Ajam, Ahmad, Karman, et al., 2023).

Before mining arrived, residents of Lelilef Waibulan lived within an agrarian-coastal system governed by customary institutions and inherited ecological wisdom, maintaining equilibrium between subsistence, moral order, and local cosmology. Since 2015, however, the industrial expansion of IWIP has restructured this system around the logic of capital and production. Land and sea once regarded as ancestral heritage have been reduced to industrial commodities, while ritual practices and ecological traditions have gradually disappeared.

This study adopts the concept of living landscapes to understand the socio-ecological transformation occurring in Central Halmahera. Living landscapes refer to landscapes that are not merely physical environments or productive spaces, but socio-ecological assemblages where livelihoods, ecological knowledge, cultural practices, spiritual values, and collective identities are continuously produced and reproduced through everyday interactions between people and their environment. In agrarian-coastal communities such as Lelilef Waibulan, forests, gardens, rivers, and coastal areas function simultaneously as sources of livelihood, sites of social relations, repositories of historical memory, and spaces of spiritual significance. From this perspective, industrial expansion represents not only a change in land use but also a transformation of living landscapes through which ecological, social, and cultural relations are reconfigured.

This phenomenon illustrates how development projects designed to deliver progress often produce unforeseen socio-ecological effects. Nickel industrialization in Central Halmahera exemplifies the paradox of development: national progress driven by transition minerals is achieved at the cost of local ecological integrity and cultural meaning.

Political ecology provides the primary analytical framework for understanding the socio-environmental transformations associated with nickel industrialization in Central Halmahera. Political ecology argues that environmental change is not merely the result of ecological processes or technical interventions, but is fundamentally shaped by unequal power relations among the state, corporations, and local communities (Bryant & Bailey, 1997; Escobar, 1995). In the Indonesian context, state-led modernization and resource-based development frequently reshape peripheral regions through policies that prioritize economic growth while marginalizing local ecological practices and customary systems of resource management (Li, 2010; WALHI, 2023). Environmental degradation, therefore, can be understood as a political outcome produced through specific configurations of power, development, and capital accumulation.

To examine how benefits and opportunities from industrial development are distributed, this study employs the theory of access developed by Ribot and Peluso (2003). The theory emphasizes that access to resources is determined not only by formal ownership or legal rights but also by the political, economic, and social mechanisms that enable certain actors to derive benefits from them. In mining regions, access is

often shaped through licensing arrangements, investment networks, infrastructure development, and state policies that privilege particular actors. As a result, local communities may experience declining control over land, forests, and coastal resources despite maintaining historical and cultural connections to these territories (AEER, 2023).

This study also draws on the anthropology of mining to understand how extractive industries transform the meanings of landscapes and everyday social life (Godoy, 1985; Jacka, 2018). From this perspective, mining is not simply an economic activity but a social process that reconfigures relationships between people, nature, labor, and cultural values. The expansion of nickel extraction alters how communities perceive and interact with land and sea, shifting them from spaces embedded in social, cultural, and spiritual relations into territories increasingly governed by industrial and market logics. Such transformations affect not only livelihoods but also local identities, social relations, and moral understandings of the environment.

Several supporting concepts help illuminate particular dimensions of these transformations. Li's (2010) notion of the will to improve provides insight into how development interventions are legitimized through narratives of progress and modernization. Tsing's (2005) concept of friction helps explain the encounters between global extractive capitalism and local socio-cultural realities. Likewise, Merton's (1936) notion of unintended consequences and Bodley's (2011) discussion of the paradoxes of development are useful for interpreting how projects designed to promote economic progress may simultaneously generate new forms of social vulnerability and ecological disruption. These concepts are used as complementary analytical tools rather than as independent theoretical frameworks.

Previous studies in Central Halmahera have largely focused on the environmental impacts of nickel mining, livelihood changes, and the erosion of local ecological knowledge (Ajam, Ahmad, Karman, et al., 2023; Ajam, Ahmad, Sumar-Karman, et al., 2023). While these studies provide important evidence regarding pollution, economic transformation, and socio-environmental impacts, they generally examine these issues separately. Limited attention has been given to how industrial expansion simultaneously restructures power relations, access to resources, and the cultural meanings attached to land and coastal environments. Furthermore, existing research has not sufficiently explored how local communities experience and interpret the transformation of agrarian and coastal living spaces into extractive industrial landscapes.

This study addresses these gaps by integrating political ecology, theory of access, and anthropology of mining to examine nickel industrialization as a multidimensional socio-ecological transformation. Rather than focusing solely on environmental impacts or economic outcomes, the research investigates how industrial expansion reshapes power relations, access to resources, and the meanings of living landscapes in everyday community life. Through a critical ethnographic approach, this study

contributes to a deeper understanding of how extractive development reconfigures socio-ecological relations and produces uneven consequences for local communities in Central Halmahera.

Thus, this study seeks to understand the transformation of agrarian-coastal landscapes into extractive industrial regimes in Central Halmahera as a complex socio-ecological process where power relations, access to resources, and ecological values intertwine. It argues that the paradox of nickel development in Indonesia lies not merely in the political economy of extraction but in the loss of local spatial meaning and the erosion of moral-ecological orders under the project of modernity.

## B. METHOD

This study employed a critical ethnographic approach to examine how nickel industrialization reshapes the living space and socio-ecological systems of communities in Lelilef Waibulan Village, Weda Tengah Subdistrict, Central Halmahera. This approach seeks to interpret local experiences from within their own social world while simultaneously uncovering the structures of power and political economy in which they are embedded (Madison, 2011).

Fieldwork was conducted over two months, from January to September 2025, using a live-in strategy. During this period, the researcher lived among community members to observe changes in livelihoods, spatial use, and socio-ecological relations resulting from the expansion of the Indonesia Weda Bay Industrial Park (IWIP). The site was chosen because it represents a rapid transition from an agrarian-coastal region to a heavy industrial zone, profoundly transforming the community's social and ecological order.

Lelilef Waibulan has long been a local administrative hub, but the arrival of industrial operations has intensified the flow of people and materials. The once open and orderly village is now crowded with newcomers—mostly mining workers from outside North Maluku. Narrow alleys have become congested and poorly organized, while the main road, traversed by company trucks, is dusty in dry weather and muddy during rain. Hauling vehicles and company jeeps (mostly white *Hilux* trucks) pass incessantly. Workers without access to company housing rent rooms from villagers at rates of one to one and a half million rupiah per month. The village now operates without pause from morning until night. For residents not employed in the mines, daily life has become one of spectatorship—watching an industrial rhythm that dominates their living space. A few still farm or fish, though yields continue to decline due to shrinking land and deteriorating environmental conditions.

Informants were selected purposively and expanded through snowball sampling (Neuman, 2014). In total, 45 key informants were interviewed, including customary leaders, farmers, fishers, women, youth, mine workers, and village officials. They represent diverse social positions within the new economic structure formed under industrial expansion. Attempts to interview representatives of PT

IWIP, particularly from its CSR and external relations divisions, were formally made through an official letter but were declined, with the company citing its policy against such requests.

Data were collected through three primary techniques. First, participant observation documented everyday economic, social, and environmental changes. Second, semi-structured in-depth interviews were conducted to explore community members' experiences, perceptions, and adaptive strategies in responding to socio-ecological transformations. Third, documentary and socio-ecological mapping were undertaken through the analysis of data from the Central Bureau of Statistics (BPS), as well as environmental reports from AEER (2023) and WALHI (2023), complemented by satellite imagery comparisons to assess land-cover changes before and after industrial expansion.

Data analysis followed an iterative process using a *thematic coding* model (Miles et al., 2014). Three analytical stages were applied: (1) data reduction according to key themes—spatial transformation, power relations, and socio-ecological consequences; (2) ethnographic narration linking empirical findings to analytical categories; and (3) theoretical interpretation integrating *political ecology*, *theory of access*, and *anthropology of mining*, along with the concepts of *progress of the victim* (Bodley, 2011) and *unintended consequences* (Merton, 1936).

Research validity was ensured through source and method triangulation, as well as member checking with key informants. Ethical procedures were strictly followed, including obtaining informed consent, ensuring participant anonymity, and minimizing potential social risks.

At the initial stage of fieldwork, many residents expressed suspicion or hesitation, assuming the researcher was affiliated with the mining company and intended to persuade them to sell their land. Once the research purpose was clearly explained and the official introduction letter from the village government presented, trust gradually developed. Interviews were conducted informally through everyday conversations, with clear assurances of confidentiality and the academic purpose of the research.

This critical ethnographic approach enabled a contextual and reflexive understanding of how Lelilef Waibulan residents interpret the transformation of their living space amid the pervasive industrialization of nickel—a perspective that reads development not from above but from within the lived realities of those who endure its socio-ecological

## C. RESULTS AND DISCUSSION

### 1. Transformation of Living Landscapes: Ecological Change and Spatial Reconfiguration

The most visible transformation in Lelilef Waibulan Village is the conversion of its agrarian-coastal landscape into an enclosed industrial zone. Since 2015, the expansion of PT Indonesia Weda Bay Industrial Park (IWIP) has massively converted secondary forests, coconut groves, and mixed gardens into smelter complexes, workers' housing, and industrial infrastructure.

AEER (2023) estimates that at least 7,000 hectares of land in Central Halmahera have been transformed—an extent that, in the local context, represents the near-total loss of productive community space.

Field observations conducted between January to September 2025 confirm these data. Areas once cultivated with coconut and clove trees are now covered by mining roads, construction materials, and tailing deposits. The river water has turned brown due to lateritic erosion and heavy sedimentation near the estuary. Residents remarked that “the river has not been clear since the heavy machines started operating upstream,” reflecting a profound shift in their ecological perception of the landscape.

Direct observation of household wells revealed severe turbidity. One well owner explained that it was once the family's main source of water for drinking, cooking, and washing, but it has been unusable for years. The water has turned murky and reddish-brown. Pointing to the dust-covered plants in her yard, the resident blamed the mining company for “destroying the village,” noting that the leaves, trees, and even house walls were blanketed in industrial dust.

Satellite imagery overlay further indicates a marked reduction in vegetative cover and green space within a two-kilometer radius of the industrial area (Figure 1).

Figure 1. Satellite image of PT IWIP's concession area 1984-2020



This decline aligns with Lo et al. (2024), who reported Indonesia's highest rate of forest loss in Southeast Asia due to nickel mining expansion. The pattern suggests that nickel industrialization not only converts land use but also generates ecological fragmentation, disrupting the spatial continuity between forest, farmland, and coastal ecosystems.

Ecological degradation extends beyond land to water systems and coastal zones. Several traditional freshwater sources have dried up or are now deemed contaminated by mining waste. Local fishers report declining catches since coastal areas were reclaimed for industrial port facilities. Simple community-based water tests indicate higher turbidity levels in seawater near river mouths. A young activist from Lelilef Waibulan explained:

*“The coming of the mine in Halmahera Tengah, especially here in Lelilef, has two sides. Some people are happy because they can work, some rent out their houses and earn money. But people don't realize the mine is taking away our future.”*

*The environment is ruined. One day, when the company leaves, what will be left? Just look at the beach – it's filthy, the water is not like before, fishing's far, and we barely catch anything. People give up easily now; it's too hard, too expensive." (A, youth activist, interview, 20 February 2025)*

Beyond material destruction, this landscape transformation is also deeply symbolic. Areas once used for ancestral rituals are now fenced off, and access to sacred forests is restricted by corporate security. For indigenous residents, this is not merely a loss of land but a rupture in spiritual and moral relations with their ancestral environment. Industrialization has not only altered the physical ecology but has severed the cosmological connection between people and the land that sustains them. A customary leader expressed:

*"When we go to the gardens or forest, it's never random. Our ancestors taught us that the forest has its guardians. Before entering, we must ask permission. The earth and sea have their owners, just like humans, though invisible to most. That's why we must be respectful – don't take too much or destroy carelessly. But now they dig deep into the earth. They call it mining. So what's left for us? We say this is our land, but it's already gone." (LW, interview, 20 September 2025)*

Analytically, these findings indicate that ecological change cannot be understood merely as a technical byproduct of development but as the expression of an extractive logic that prioritizes economic efficiency over social sustainability. Within the framework of *political ecology* (Bryant & Bailey, 1997; Escobar, 1995), spatial conversion in Lelilef reflects the production of power-laden space—where state and corporate actors jointly reorganize the landscape for capital accumulation while dispossessing local communities of both material and symbolic access to their living environment.

Thus, the physical transformation of Lelilef represents the entry point into a broader socio-ecological restructuring. The loss of land and water resources marks not only environmental degradation but also the beginning of deeper changes in livelihoods, power relations, and ecological morality—issues explored in the following sections.

## 2. Transformation of Living Landscapes: Livelihoods, Access, and Dependency

The spatial transformation in Lelilef Waibulan was swiftly followed by a fundamental reconfiguration of its economic system. Prior to industrialization, livelihoods were sustained through smallholder farming of coconut, clove, nutmeg, cacao, banana, and cassava, complemented by seasonal artisanal fishing. These economic practices were largely autonomous, household-based, and governed by local norms of reciprocity and mutual labor exchange. Following the establishment of IWIP, most productive lands were absorbed into the industrial complex, while new forms of livelihood emerged in the form of contractual

and subcontracted wage labor within the industrial supply chain.

Field data indicate a profound shift: among 45 observed households, 31 now have at least one member employed in the mining or industrial service sector. These jobs, however, are temporary, poorly remunerated, and mediated by outside contractors. As one local worker stated, "I used to work my own land; now I work at the mine. The pay is higher, but I'm never a permanent employee. The contracts keep changing. Sometimes I go months without work."

This situation reflects what Jacka (2018) conceptualizes as *extractive dependency*—a condition in which communities lose their subsistence base and become reliant on volatile industrial wage structures. When mining operations temporarily halt, many families find themselves without income or alternative livelihoods. Such dependency mirrors the broader *boom-bust economy* dynamics observed across extractive frontiers in the Global South, characterized by rapid growth followed by social stagnation (Bebbington et al., 2018).

Beyond economic autonomy, local communities have also lost control over their value chains. Traditional products such as coconut and fish, once traded in local markets, are now difficult to sell due to logistical domination by industrial transport networks. Meanwhile, local elites have begun capturing rent opportunities through monopolistic control of catering and transport contracts with the company, reinforcing internal social inequality. A trader in Lelilef Waibulan described the barriers to entering the company's supply network:

*"It would be good if we could supply goods to the company – the profit is clear. But it's not easy. Their demand is big and must be steady. Maybe we could manage it, but without connections, it's difficult. There are people inside who take their cut; they say it's because they 'opened the way.' So only those with networks can get in. It's not officially forbidden – they say everyone can join – but in practice, it's never simple." (RZ, interview, 5 September 2025)*

These transformations reveal that industrialization does more than generate employment—it embeds structural dependency between local communities and extractive capital. Within the framework of the *theory of access* (Ribot & Peluso, 2003), this dependency signifies the loss of the *means, relations, and processes* that once enabled autonomous access to resources. Consequently, the local economy has shifted from subsistence-based livelihood to wage-based survival, where well-being is determined by the rhythms of global production rather than the ecological capacity of the local environment.

## 3. Social Dislocation and the Loss of Spatial Meaning

The conversion of ecological space into industrial territory has not only erased land but also disrupted the social fabric and local cosmology. Within the customary system of Lelilef, land, forest, and sea are not merely economic assets but constitute a living social body that binds humans to

their ancestors. Annual rituals such as *tuf ma soa* (cleansing of sacred forests) and *ferre soa* (ritual prohibitions on cutting trees) are now rarely performed, as these ritual grounds have been fenced within the industrial concession.

Interviews with customary elders underscore this transformation of meaning. One remarked, “The land used to be our spirit; now it belongs to the company.” This statement captures a form of *ontological displacement*, in which human–nature relations shift from spiritual and ecological domains toward bureaucratic and corporate regimes of control.

*“Not only the gardens – even our feelings now belong to the company. We have no land left; they’ve taken everything. Even if we didn’t want to sell, they would eventually take it anyway. If your land borders theirs, what can you do? In time, you’ll be surrounded. People protest, but operations continue. No more rituals in the gardens – how could we, when the company has fenced everything off? I feel both angry and sad when I think about it. The younger ones don’t care about adat anymore. They’ve already forgotten.” (RZ, interview, 2 September 2025)*

Socially, the community has become fragmented between those employed in the mining sector and those who remain in small-scale agriculture or coastal fishing. Communal solidarity once nurtured through collective farming has been replaced by the discipline of wages and industrial time. Young people prefer working for the mine rather than continuing their family farms, while women face a double burden – losing access to economic resources and bearing the household impacts of environmental degradation, such as polluted water and dusty air.

*“Our income keeps shrinking while our daily expenses rise. Everything’s getting expensive now. In the past, it was fine – we could go fishing, and my husband always came back with something. We’d eat some, sell some. Now life is harder. The company has made everything costly. Maybe it’s good for those who work there, but for the rest of us, it’s getting tough. Even fish, cassava, and bananas have gone up. What else can we say?” (VT, coastal woman, interview, 15 September 2025)*

Culturally, these changes signify an erosion of spatial meaning – a process through which social and symbolic spaces are detached from their ecological contexts. Within the *anthropology of mining* framework (Godoy, 1985; Jacka, 2018), this condition represents a transformation of the *moral economy*, wherein labor and nature are no longer perceived as integral to social life but as instruments of production. Industrialization thus produces not only physical displacement but also ecological and cultural alienation, deepening the community’s social dependency on industrial structures.

#### 4. Conflict, Adaptation, and Resistance

The rapid socio-ecological changes in Lelilef have produced diverse responses among local residents. Three main forms of conflict emerged. First, agrarian disputes between villagers and the company over unclear

boundaries of compensation land, often blurred within concession maps. Second, internal social tensions between pro-mining groups – those who gained employment – and those who lost land without adequate compensation. Third, ecological conflicts manifested in protests over water pollution and coastal reclamation.

Amid these tensions, some villagers developed adaptive strategies. A number of households established new farming groups on remaining plots to cultivate short-cycle vegetables, while women’s groups initiated small-scale food businesses catering to industrial workers. These actions represent pragmatic forms of adaptation, though limited in scope and unable to offset the long-term economic losses resulting from industrial expansion.

Symbolic forms of resistance also emerged through cultural practice. Some customary elders continue to perform rituals at *jere* – sacred sites now fenced within the industrial zone – as a moral act of reclaiming ancestral land. Such practices exemplify *everyday resistance* (Scott, 1985), where villagers preserve dignity and the spiritual meaning of their living space through prayers, symbols, and daily acts of defiance.

*“We still perform the rituals. We must feed the guardian spirits of the land. Our ancestors’ souls are still here; they haven’t gone – they’re just unseen. If we stop the rituals, disaster will come to us all. The mine’s arrival has already brought misfortune. I’m old now; maybe I won’t be here much longer. But I pray for my children and grandchildren, that our village stays safe. The trouble doesn’t come from us – it’s the company, bringing all kinds of dark spirits here.” (RZ, interview, 21 September 2025)*

This analysis illustrates that nickel industrialization generates complex social dynamics encompassing acceptance, adaptation, and resistance. Within the framework of *unintended consequences* (Merton, 1936), the rational project of development produces unforeseen effects – social fragmentation, moral contestation, and ecological anxiety. A policy designed to enhance national welfare, at the local level, has instead fostered inequality, conflict, and the erosion of meaning in everyday life.

Thus, the people of Lelilef Waibulan are not merely passive victims but active agents continually negotiating their position and identity within the extractive regime. Beneath the narrative of “progress” lies a fractured social reality, where a development agenda promising modernity reproduces new forms of dependency and ecological vulnerability.

#### 5. Development as the Production of Spatial Power

The transformation of the agrarian–coastal landscape in Central Halmahera reveals that nickel industrialization cannot be understood merely as an economic phenomenon, but as a political–ecological process that produces new configurations of power. Within the framework of *political ecology* (Bryant & Bailey, 1997; Escobar, 1995), the

expansion of the Indonesia Weda Bay Industrial Park (IWIP) demonstrates how state authority and global capital converge in what Escobar terms a *regime of nature production*—a system that reorganizes human–nature relations, spatial arrangements, and ecological meanings to serve capital accumulation.

The state functions simultaneously as facilitator and legitimizer of corporate expansion, deploying the discourse of “green development” to frame mining as part of the national future. Yet at the local level, this discourse operates paradoxically: it erases the ecological meanings embedded in Lelilef Waibulan’s living space and replaces them with a technocratic logic centered on investment value. As one village official explained:

*“People should also be grateful for the mining company. Our village has become lively. Villagers can work at the mine or sell goods at the market – something we never had before. The company also helps us; during COVID, they gave a lot of assistance. Thanks to the mine, they say our economy has improved. So I see the mine as an opportunity. Those protests, that’s just a communication problem, really.” (IL, interview, 27 August 2025)*

The conversion of agrarian–coastal space into an industrial zone thus reflects a *territorialization of capital*, wherein the state and corporations jointly produce spatial orders that displace subsistence economies. This phenomenon aligns with Li’s (2014) and Bebbington et al.’s (2018) observations that postcolonial development politics often operate through the *will to improve*, yet in practice generate new social and ecological inequalities.

Nickel industrialization, therefore, is far from a neutral developmental enterprise—it represents a hegemonic practice that embodies political and economic interests rather than purely technological progress. In Central Halmahera, physical space has become an arena of power: no longer a place of dwelling, but a contested field of meaning, access, and control over resources.

## 6. Regimes of Access and Exclusion in the Extractive Economy

The development of the nickel industrial zone illustrates how power operates subtly through mechanisms of access (Ribot & Peluso, 2003). In Lelilef Waibulan, villagers did not lose formal ownership of their land, but rather the *means, relations, and processes* that once enabled them to benefit from it.

Access to land is now mediated by political and economic relations controlled by corporate actors and local elites. Compensation schemes and recruitment systems have become instruments for reproducing power, where economic opportunities are distributed through networks of patronage rather than through any notion of ecological or civic entitlement. Consequently, new social hierarchies have emerged—structured not by agrarian contribution or customary status, but by proximity to corporate power.

*“It’s not easy to get a job in the mine, especially for people like me who didn’t finish high school. They still ask for a diploma, even for manual jobs like digging or carrying pipes. And there are many university graduates competing for the same work. People say locals are prioritized, but that’s just a few. Sometimes there’s favoritism at the village office. Maybe not everywhere – but it’s tough.” (AL, interview, 3 September 2025)*

Within the framework of the *theory of access*, this situation reflects a fundamental shift: from an ownership-based to a relation-based economy. Those who benefit from nickel industrialization are not necessarily the landowners, but those embedded within the networks of power that control access to production. As a result, the people of Lelilef experience what may be termed *exclusion without expropriation*—they remain the formal “owners” of the land, yet have lost the substantive capacity to use, manage, and derive value from it.

This condition exemplifies *uneven access to development*: development does not unfold evenly, but through relational structures that consolidate the dominance of state and corporate actors. Consequently, an emerging form of *extractive citizenship* has taken shape—one in which social belonging and livelihood security are defined not by ecological rights or cultural attachment, but by one’s participation within the extractive economy itself.

## 7. Extractivism and Moral Dislocation

Within the *anthropology of mining*, Godoy (1985) and Jacka (2018) emphasize that mining is never a purely economic activity—it always carries profound moral and social implications. In Central Halmahera, these implications manifest through shifts in the moral economy of work, solidarity, and the meaning of place. Mining labor has been introduced as a symbol of modernity—embodying discipline, wage rationality, and industrial efficiency—values that stand in tension with the agrarian ethics grounded in ecological rhythms and communal interdependence.

Field observations reveal that local workers often describe mining as both a “pathway to progress” and “work that makes us forget our own land.” This ambivalence captures a moral tension between the promise of prosperity and the lived experience of loss.

*“Working in the mine is fine, I guess. When the pay is good, that’s good. But the expenses are also high, so it’s really the same. Big wages, but everything’s expensive – so in the end, we lose. You know why? Because they’ve damaged our land. They’ve taken it and built over it. In the mine, everything is by command. You have to be on time. Miss work or break the rules, and you’re warned – or fired. Honestly, farming was better. With coconut, clove, or nutmeg, we worked on our own rhythm. But what can we do? The mine is backed by the government, even though it’s mostly run by the Chinese.” (OB, interview, 16 September 2025)*

This transformation produces what Tsing (2005) terms *friction*—the encounter between global capitalist logics and

local moral worlds. In Lelilef Waibulan, this friction generates not only adaptation but also *moral dislocation*, as the ethical foundations of agrarian life—*gotong royong* (mutual cooperation), ecological taboos, and ritual stewardship—are displaced by industrial values of productivity and profit.

Thus, extractivism in Central Halmahera extends beyond material exploitation. It restructures moral landscapes, redefines social obligations, and produces new subjectivities tethered to wage labor and capitalist temporality. In this sense, the mining economy does not merely transform land; it transforms the moral order that once bound people, labor, and nature into a coherent world.

### 8. The Paradox of Development and Its Unintended Consequences

The integration of *progress of the victim* (Bodley, 2011) and *unintended consequences* (Merton, 1936) offers a reflective lens through which to interpret the unfolding dynamics of nickel industrialization. What was intended as a project of growth and equality has instead produced the opposite: widening inequality, social fragmentation, and ecological degradation.

This paradox arises from a narrowly rational framework of development that measures progress through economic indicators while neglecting the social-ecological complexities underpinning local life. In Merton's terms, this reflects the *imperious immediacy of interest*—a policy drive to achieve short-term objectives without understanding the long-term systemic effects. In Central Halmahera, downstream industrialization has generated *rational goals* at the national level but *irrational outcomes* at the local one. Communities have lost their living spaces, ecosystems have weakened, and social cohesion has eroded.

As one informant described regarding land compensation:

*"In this village, people have grown suspicious of each other. Some were paid high for their land, others cheap – and some haven't been paid at all. The compensation rules are unclear. Some say it follows district regulations, others say the company decides. If we follow the government, we lose – it's too low. Company people came to see me several times, offering a price I couldn't accept. Too cheap. I told them, maybe if they offered me three cars, I'd think about it. My land is worth billions – it's in three separate plots. For now, I'm still holding on."*  
(AZ, interview, 29 September 2025)

Bodley (2011) reminds us that modernization projects often position local communities as the "victims of progress." In Central Halmahera, the people of Lelilef embody this very paradox: they are invoked as beneficiaries of national progress yet excluded from decision-making power. Development thus operates with a double function—it serves as a national symbol of modernization while simultaneously acting as a mechanism of local marginalization.

This paradox reveals that the failure of nickel development does not stem from technological insufficiency but from the absence of ecological justice within its policy framework. Industrialization has produced impressive material progress and, at the same time, deepened socio-ecological inequality—two inseparable faces of the same extractive modernity.

## D. CONCLUSIONS

The transformation of Lelilef Waibulan from an agrarian-coastal village into a nickel industrial zone demonstrates that extractive development reshapes not only the physical environment, but also social relations, local economies, and cultural meanings attached to land and sea. The expansion of IWIP has accelerated land conversion, reduced access to forests and coastal resources, weakened customary ecological practices, and increased dependence on unstable wage labor. These changes have produced new forms of social inequality between groups connected to industrial networks and those excluded from them.

This study finds that the socio-ecological crisis in Lelilef Waibulan is characterized by three interconnected processes. First, industrial expansion fragments ecological space and disrupts the continuity between forests, settlements, rivers, and coastal ecosystems that previously sustained community livelihoods. Second, the transition from subsistence-based livelihoods to industrial wage labor creates economic dependency and weakens local autonomy. Third, the enclosure of customary spaces and the erosion of ritual practices generate what this study identifies as a loss of living landscape, namely the gradual disconnection between community identity, ecological knowledge, and ancestral territory. Unlike previous studies that primarily emphasized environmental pollution or livelihood impacts, this research shows that nickel industrialization also transforms the moral and symbolic dimensions of everyday life, where land is no longer understood as a shared ecological inheritance but increasingly treated as an industrial commodity.

The findings suggest that development policies centered solely on downstream industrial growth risk reproducing socio-ecological inequality if they neglect community-based ecological governance. Therefore, the government needs to strengthen environmental supervision, ensure transparent and participatory land governance, and establish independent monitoring mechanisms involving local communities, customary institutions, and civil society organizations. Policies related to compensation, recruitment, and corporate social responsibility should also prioritize social equity and long-term livelihood sustainability rather than short-term economic integration into the mining sector.

At the community level, strengthening local adaptive capacity is equally important. Support for small-scale agriculture, coastal fisheries, and community-based economic initiatives is needed to reduce dependency on extractive industries. The revitalization of customary ecological practices and local knowledge systems should

also be recognized as part of environmental governance and cultural protection in mining-affected areas.

Theoretically, this study contributes to political ecology by demonstrating that extractive industrialization in Central Halmahera operates not only through material dispossession, but also through the transformation of living landscapes—spaces where ecological, social, and spiritual relations are historically interconnected. In Lelilef Waibulan, industrialization has produced a condition in which communities remain physically present in their territory while gradually losing ecological control, cultural attachment, and social autonomy over their living environment. This finding offers a more grounded understanding of how extractive development generates socio-ecological vulnerability in everyday life and expands current discussions on mining, space, and ecological justice in Indonesia.

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