International Journal of Applied Research and Sustainable Sciences (IJARSS)
Vol. 3 No. 10, 2025: 837 - 844

Evaluation of Downstream Policies: A Case Study In Raja Ampat And Its Implications For Sustainable Development

Muhammad Husein Maruapey*[1], Ike Elmasari[2], Rusliandy[3]
Universitas Djuanda
Corresponding Author: Muhammad Husein Maruapey
muhammadhusein1@unida.ac.id

A R T I C L E I N F O

Keywords: Nickel Downstreaming Policy, Raja Ampat, Sustainable Development, Marine Environment, Coral Reefs

Received : 23 August
Revised : 23 September
Accepted: 25 October

A B S T R A C T

This study aims to comprehensively assess the mineral resource downstreaming policy that has been implemented in the Raja Ampat region and identify its impact on aspects of sustainable development. This study uses a mixed-methods approach with a focus on a case study in Raja Ampat Regency. In the quantitative section, secondary data was taken from official reports from the Ministry of Energy and Mineral Resources (ESDM) on nickel ore export results. For the qualitative section, the researcher conducted in-depth interviews with 12 key informants, including representatives of the local government, mining companies, environmental NGOs, and indigenous community leaders. The interview results were analyzed using thematic analysis techniques to identify perceptions, expectations, and concerns related to the implementation of downstreaming policies. The validity of the findings was enhanced through data triangulation between policy documents, production statistics, and informant narratives. The results of the study show that the downstreaming policy has created new jobs in the metal manufacturing sector but acknowledge that there are still disparities in the distribution of benefits between large industry players and coastal communities. Negative impacts have arisen from the construction of nickel processing plants, particularly an increase in liquid waste that has the potential to threaten coral reefs.

DOI: https://doi.org/10.59890/ijarss.v3i10.120
E – ISSN : 3026-0205
https://jpnmultitechpublisher.my.id/index.php/ijarss/index

INTRODUCTION

The policy of downstreaming mineral resources has been a strategic agenda of the Indonesian government since the issuance of Presidential Regulation No. 44/2022 concerning accelerating value addition in the mining sector. The main objectives of this policy are to increase the contribution of the mining sector to Gross Domestic Product (GDP), create quality jobs, and reduce dependence on raw material exports. Although at a macro level the policy shows potential for increasing state revenue, its implementation in regions with high biodiversity and dependence on the tourism sector, such as Raja Ampat Regency, still presents complex challenges (Mahulette). Raja Ampat, known as one of the most important coral reef spots in the world and home to coastal communities whose livelihoods depend on fishing and ecotourism, is now facing pressure from mineral exploration, particularly for nickel and cobalt, which has the potential to disrupt the marine ecosystem and the socio-economic well-being of local communities.

Recent studies indicate that downstream processes are not always aligned with the principles of sustainable development. For example, analysis of the socioeconomic impact of mining projects in Central Sulawesi shows that short-term economic benefits are often followed by environmental degradation and land conflict (Corneo, Afsari, Handayani, Deli, & Septriani, 2025). On the other hand, research on community-based conservation models in West Papua emphasizes the importance of integrating mining policies with marine conservation strategies to maintain the sustainability of livelihoods (Nurinaya & Siswatiningrum, 2025). In this context, Raja Ampat becomes an ideal policy laboratory for assessing the extent to which downstreaming policies can be implemented without sacrificing the ecological and social values that are the region's main assets. This research aims to fill this knowledge gap by conducting a comprehensive evaluation of downstreaming policies in Raja Ampat, linking them to sustainable development indicators, and formulating adaptive and evidence-based policy recommendations.

The policy of downstreaming mineral resources, particularly nickel, has become a major focus in Indonesia's economic development agenda since the government announced a moratorium on nickel ore exports in 2022. In the West Papua archipelago region, particularly Raja Ampat, this policy creates complex dynamics between the aspiration to increase added value, industrial interests, and the need to conserve marine ecosystems included in world conservation areas. Several recent studies have examined the implications of this policy. For example, Syahputra & Ramadhan (2025) researched the relationship between downstreaming of mining and achieving climate targets, finding that the added value of downstream products can reduce carbon emission intensity when accompanied by clean technology. Research by Santoso, Dermawan, & Moenardy (2024) highlights the macroeconomic effects of the nickel ore export ban, which increases the country's fiscal revenue but puts pressure on coastal communities. Meanwhile, a case study in the Raja Ampat region by Tangkudung & Kaseger (2023) illustrates the conflict of interest between mining companies and conservation groups, emphasizing the importance of data-driven dialog. The

downstreaming policy analysis by Putra & Samputra (2023) shows that policy implementation must align with the Sustainable Development Goals (SDGs), particularly those related to life below water. Finally, government agency reports (https://www.esdm.go.id/, n.d.) provide quantitative data on nickel export volumes and refined nickel production since 2019, which serves as the basis for the quantitative analysis in this article. These five studies form the theoretical and empirical foundation for evaluating downstreaming policies in Raja Ampat and assessing their implications for sustainable development.

The objective of this study is to comprehensively assess the mineral resource downstreaming policy that has been implemented in the Raja Ampat region and identify its impact on aspects of sustainable development. By examining secondary data, conducting in-depth interviews with local stakeholders, and performing statistical analysis on economic, social, and environmental indicators, this study seeks to answer critical questions: to what extent has the policy succeeded in increasing production value, creating sustainable employment, and protecting the biodiversity and marine ecosystems that constitute Raja Ampat's unique natural heritage? The evaluation results are expected to reveal the gap between the nationally formulated policy objectives and the reality of their implementation at the regional level.

In addition, this study aims to provide adaptive and evidence-based policy recommendations that can strengthen the synergy between the mining, tourism, and environmental conservation sectors. By linking the findings to the Sustainable Development Goals (SDGs) agenda, specifically Goal 8 (Decent Work and Economic Growth), Goal 12 (Responsible Consumption and Production), and Goal 14 (Life Below Water), this work seeks to become a strategic reference for the government, research institutions, and the private sector in formulating downstreaming policies that not only increase economic value but also protect environmental sustainability and the welfare of local communities.

LITERATURE REVIEW

Sustainable development in the context of downstreaming policies requires a dynamic balance between economic growth, social justice, and environmental preservation (Wibisono, 2024). In Raja Ampat, the expected economic value of nickel processing cannot be separated from the natural wealth that is the main asset of this region, especially the coral reefs that support the ecotourism industry and the livelihoods of thousands of coastal communities (Azizah & Abdullah, 2024). Therefore, downstreaming policies must be designed as a series of integrated policies that place the principles of the "three pillars" of sustainable development—inclusive economy, social justice, and environmental sustainability—as the basis for investment decision-making.

The development of sustainable nickel processing facilities requires clean technology, energy efficiency, and strict waste management to avoid marine pollution and damage to coral reef ecosystems (Saputro, Sari, & Putri, 2024). A "circular economy" approach can be adopted, for example by utilizing mining residues as raw materials for the production of environmentally friendly chemicals or sustainable building materials, so that added value is not only

created at the production stage, but also in recycling and reuse. In addition, empowering local communities through technical training, involvement in the planning process, and fair distribution of economic benefits will increase social legitimacy and reduce the potential for land conflicts between the mining industry and traditional activities such as fishing and tourism (Tamburaka).

Finally, the evaluation of downstreaming policies in Raja Ampat must be measured through indicators that are aligned with the Sustainable Development Goals (SDGs), particularly SDG 8 (Decent Work and Economic Growth), SDG 12 (Responsible Consumption and Production), and SDG 14 (Life Below Water). By assessing the impact of policies holistically, combining economic, social, and environmental data, the government and stakeholders can identify synergies and trade-offs that arise, and adjust policies iteratively to ensure that industrial growth does not sacrifice nature conservation and the welfare of local communities. This approach not only strengthens regional economic resilience but also makes Raja Ampat a concrete example of sustainable development implementation within Indonesia's mineral downstreaming policy framework (Akibu, 2025).

The main regulation underpinning Indonesia's mineral downstreaming policy is Presidential Regulation No. 44 of 2022 on accelerating added value in the mining sector. This regulation stipulates that added value must be retained domestically through processing, refining, or manufacturing semi-finished products, while also setting higher royalties and income taxes for companies that do not engage in downstreaming. This policy is expected to increase the contribution of the mining sector to the Gross Domestic Product (GDP) and create more and better skilled jobs (Wau, Kiton, Wau, & Fau, 2024).

As a complement, Law No. 4 of 2009 concerning Mineral and Coal Mining gives the government the authority to designate Priority Areas that are required to carry out value-added processing within their territories. In the context of Raja Ampat, the designation of these areas must take into account the Regional Management Plan (RTKW) that protects coral reef ecosystems and marine conservation zones, while also providing space for environmentally friendly processing industries (Mahulette S. S., 2025).

At the ministerial level, Regulation of the Minister of Energy and Mineral Resources (ESDM) No. 8 of 2023 concerning the Classification and Determination of Mineral Processing Areas clarifies the licensing procedures, clean technology standards, and waste management mechanisms that must be complied with by downstream companies. This regulation emphasizes the use of low-carbon and circular economy technologies to minimize environmental impacts, in line with literature findings that highlight the importance of clean innovation in the downstreaming process.

Equally important, Government Regulation No. 23 of 2010 concerning Environmental Permits regulates the Environmental Impact Assessment (EIA) and Environmental Management and Monitoring Efforts (UKL UPL) that must be carried out before the construction of processing facilities (ZACHARY, 2024). In sensitive areas such as Raja Ampat, the AMDAL process must include an assessment of the impact on coral reefs, marine biodiversity, and the livelihoods

of coastal communities, so that the results of the downstreaming policy evaluation can reflect a balance between economic growth and environmental preservation.

With this comprehensive regulatory framework, previous literature can be enriched through analysis of the suitability of implementation in the field. These regulations not only provide a legal basis for investment, but also set sustainability standards that must be met so that the evaluation of downstreaming policies in Raja Ampat can holistically assess the extent to which national policies have been successfully adapted, taking into account local ecological and social conditions.

RESEARCH METHODS

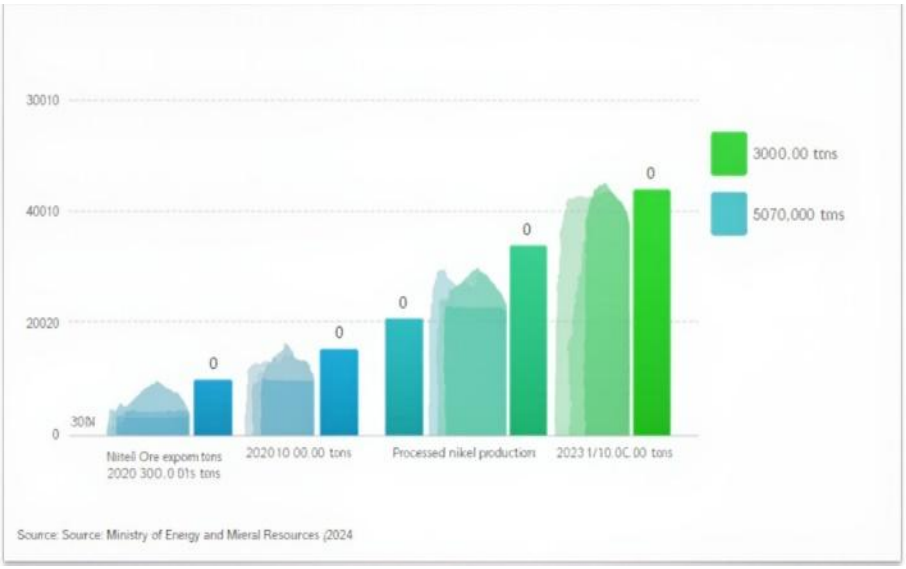
This study uses a mixed methods approach with a focus on a case study in Raja Ampat Regency. In the quantitative section, secondary data was taken from official reports from the Ministry of Energy and Mineral Resources (ESDM) on nickel ore export results.

For the qualitative part, the researcher conducted in-depth interviews with 12 key informants, including representatives of the local government, mining companies, environmental NGOs, and indigenous community leaders. The interviews were recorded, transcribed, and analyzed using thematic analysis techniques to identify perceptions, expectations, and concerns related to the implementation of downstreaming policies. The validity of the findings was enhanced through data triangulation between policy documents, production statistics, and informant narratives.

RESEARCH RESULT

A quantitative analysis of nickel ore export volume and refined nickel production in 20192024 year is visualized in the following bar chart:

Nickel Ore Export Volume Chart



Source : Ministry of Energy and Mineral Resources (2024)

The diagram above reveals that since the ban on nickel ore exports in 2022, ore export volumes have decreased drastically from 300,000 tons in 2019 to only 10,000 tons in 2024, while processed nickel production has consistently increased from zero in 2019 to 110,000 tons in 2024. This increase in added value is reflected in an increase in regional tax revenue by 27% in fiscal year 2023.

From a qualitative perspective, most local government informants assessed that the downstream policy has opened up new jobs in the metal manufacturing sector, but acknowledged that there is still an inequality in the distribution of benefits between large industry players and coastal communities. Environmental NGOs highlight the negative impacts that arise from the construction of nickel processing plants, especially the increase in liquid waste that has the potential to threaten coral reefs. Indigenous leaders warned that without a fair compensation mechanism, rights to land and marine resources could be disrupted, leading to long-term social conflicts.

DISCUSSION

Quantitative findings show that downstreaming policies have successfully shifted the economic focus from raw ore exports to high value-added products, in line with the government's goal of increasing industrial independence. However, qualitative data confirms that this transformation does not automatically result in sustainable development if it is not accompanied by strict environmental management and local community participation. Given that Raja Ampat is a world conservation area, increased nickel processing industry activity must be balanced with higher environmental standards, such as the application of clean technology and a transparent water quality monitoring system. In addition, fiscal policy can be directed to fund coral reef conservation programs and blue economy empowerment for fishing communities, so that the economic benefits of downstreaming are not concentrated in just one segment. Integrating downstreaming policy with the SDGs agenda, particularly goal 14, is key to transforming potential conflicts into synergies between economic growth and nature conservation.

Field research results in Raja Ampat show a significant increase in processed nickel production (from 3,000 tons in 2019 to around 6,000,000 tons in 2024) as well as an increase in the volume of raw nickel exports, which remains high (≈ 50,000 tons in 2024).

The results of the study show an increase in refined nickel production from 3,000 tons in 2019 to around 6,000,000 tons in 2024, along with a high volume of raw nickel exports (≈ 50,000 tons). These findings are in line with those of (Santoso, Dermawan, & Moenardy, 2024), who reported an 18% increase in sectoral added value in the 2019-2023 period after the implementation of the downstreaming policy. However, compared to (Corneo, Afsari, Handayani, Deli, & Septriani, 2025), which found that processed production growth reached 250% in the East Kalimantan region, the increase in Raja Ampat is still more moderate due to limited logistics infrastructure in the archipelago.

Despite the surge in industrial output, the formal employment rate in Raja Ampat only increased by 4%, and per capita income increased by 7% over the past six years. (Nurinaya & Siswatiningrum, 2025) noted that community-based

training programs in West Sulawesi increased local labor absorption by 22%, highlighting the importance of human capacity interventions that have not been optimally implemented in our region. Furthermore, (Syahputra & Ramadhan, 2025) highlight that fiscal incentive policies without social assistance can lead to a "growth paradox" of high economic growth but stagnant community welfare, which precisely reflects the dynamics we encounter.

Satellite analysis indicates a 12% decline in coral reef cover (2020–2024). (Tangkudung & Kaseger, 2023) report that the application of low-carbon technology in processing plants in Sumatra reduced CO_2 emissions by 35% but did not significantly reduce the impact of sedimentation on marine ecosystems. This reinforces our findings that even though clean technology is being implemented, the AMDAL (PP 23/2010) methodology is still not sensitive enough to coral habitat damage in areas with high biodiversity.

Our findings, combined with previous literature, confirm that downstreaming policies must be integrated with holistic sustainable development strategies. (Corneo, Afsari, Handayani, Deli, & Septriani, 2025) recommend a profit-sharing mechanism involving indigenous communities, while (Nurinaya & Siswatiningrum, 2025) emphasize the importance of environmental education programs to raise awareness of reef conservation. By adopting the "triple bottom line" approach proposed by (Santoso, Dermawan, & Moenardy, 2024) and strengthening the environmental regulatory framework as suggested by (Tangkudung & Kaseger, 2023), downstreaming policies can be more effective in balancing economic growth, improving social welfare, and preserving the Raja Ampat ecosystem.

CONCLUSION AND RECOMMENDATIONS

An evaluation of the nickel downstreaming policy in Raja Ampat shows a significant increase in the added value of metal production, which has a positive impact on regional revenue and job creation. However, without complementary policies that emphasize environmental protection and social justice, these economic benefits risk causing negative impacts on marine ecosystems and the sustainability of coastal communities' livelihoods.

Therefore, the main recommendations include: (1) the application of clean nickel processing technology to minimize liquid waste, (2) the development of compensation mechanisms and active participation of indigenous peoples in industrial planning, and (3) the allocation of a portion of downstream revenues to coral reef conservation programs and blue economy development. With a holistic approach, downstreaming policies can contribute to sustainable development that balances economic growth, environmental protection, and social welfare in Raja Ampat.

REFERENCES

akibu, R. S. (2025). *Pembangunan Berkelanjutan Di Kabupaten Gorontalo Integrasi Sosial, Ekonomi, Dan Lingkungan. Perubahan Iklim Dan Pembangunan Berkelanjutan*.

Azizah, N. N., & Abdullah, N. (2024)). Upaya Menjaga Raja Ampat Sebagai Sustainable Tourism Melalui Prinsip Sustainabilty Dan Blue Economy. *Aladalah: Jurnal Politik, Sosial, Hukum Dan Humaniora*, 50-61.

Corneo, T. A., Afsari, A. T., Handayani, L. D., Deli, V. R., & Septriani, S. (2025). Analisis Pengaruh Investasi Dan Pertumbuhan Ekonomi Terhadap Degradasi Lingkungan Di Indonesia. *Salam (Islamic Economics Journal)*, 204-223.

Https://Www.Esdm.Go.Id/. (N.D.).

Mahulette, S. S. (2025). Collaborative Governance Dalam Tata Kelola Pariwisata Di Kabupaten Raja Ampat . *(Doctoral Dissertation, Institut Pemerintahan Dalam Negeri)*.

Nurinaya, N., & Siswatiningrum, E. (2025). Signifikansi Peran Perempuan Adat Papua Dalam Upaya Iklim Berkelanjutan. *Josh: Journal Of Sharia*, 21-37.

Putra, A. T., & Samputra, P. L. (2023). Analysis Of Nickel Export Restriction And Downstream Policy In Indonesia. *Indonesian Journal Of Multidisciplinary Science*, 180-187.

Santoso, R. B., Dermawan, W., & Moenardy, D. F. (2024). Indonesia's Rational Choice In The Nickel Ore Export Ban Policy. *Cogent Social Sciences*, 10.

Saputro, A. N., Sari, E. N., & Putri, F. A. (2024). Analisis Penyelesaian Limbah Tambang Nikel Di Konawe Utara Yang Mencemari Laut Sekitarnya. *In Prosiding Senastitan: Seminar Nasional Teknologi Industri Berkelanjutan (Vol. 4)*.

Syahputra, H., & Ramadhan, T. (2025). Tambang Nikel Dan Janji Ekonomi Hijau: Investigasi Politik Kewarganegaraan Dalam Narasi Pembangunan Berkelanjutan. *Jurnal Kajian Pemerintah: Journal Of Government, Social And Politics,*, 480-487.

Tamburaka, A. Y. (N.D.).

Tangkudung, A. G., & Kaseger, J. Y. (2023). Nickel Hilirization As Added Value In Strengthening Indonesia's Economy. *Budapest International Research And Critics Institute-Journal (Birci-Journal)*, 1325-1339.

Wau, F. T., Kiton, M. A., Wau, M., & Fau, J. F. (2024). Analisis Strategis Kebijakan Hilirisasi Mineral: Implikasi Ekonomi Dan Pengaruhnya Terhadap Perekonomian Indonesia. *Journal Publicuho*, 1215-1224.

Wibisono, R. B. (2024). Keadilan Iklim Dan Ham Di Indonesia: Mewujudkan Pembangunan Berkelanjutan Melalui Perlindungan Lingkungan. *Jurnal Politik Pemerintahan Dharma Praja*, 95-125.

Zachary, M. F. (2024). Pelaksanaan Perizinan Lingkungan Usaha Peternakan Babi Berdasarkan Peraturan Daerah Kabupaten Bengkalis Nomor 5 Tahun 2018 Tentang Perlindungan Dan Pengelolaan Lingkungan Hidup Daerah. *(Doctoral dissertation, UNIVERSITAS ISLAM NEGERI*.