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Environmental Accounting and Economic Valuation of Natural Resources: The Impact of Commodity Extraction on Human Development in Producing Regions

Hastarini Dwi Atmanti[1]*
[1]*Diponegoro University, Indonesia
*Co e-mail: hastarinidwiatmanti@live.undip.ac.id[1]

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ABSTRACT

The paradoxical nexus between natural resource abundance and socio-economic progression remains a critical hurdle for extractive-dependent economies. This investigation scrutinizes the impact of commodity extraction on human development within producing regions through environmental accounting and economic valuation. Utilizing an explanatory longitudinal-cross-sectional design, the research evaluates secondary data from 64 regencies in Indonesia, synthesizing fiscal realization reports from the Ministry of Finance (Oil, Gas, and Mineral Revenue Sharing/DBH) with Human Development Index (HDI) metrics from Statistics Indonesia (BPS). The study employs panel data regression with fixed effects and double-log transformation to measure revenue-to-welfare elasticity. Results reveal a significant yet inelastic correlation ($\beta = .128, p < .05$), indicating substantial revenue inflows fail to proportionately catalyze human welfare advancements. By calculating Net Present Value (NPV) of ecosystem service losses, findings identify an "ecological debt" of 10.5%, where unrecorded environmental degradation costs (12%) significantly exceed regional reclamation allocations (1.5%). The study underscores diminished fiscal incentives and allocative inefficiencies as primary impediments to wealth transmission into social progress. Policy implications necessitate restructuring fiscal transfer formulas to integrate environmental performance and HDI efficiency as weighting variables. This research concludes that institutionalizing Natural Capital Accounting (NCA) is essential to internalize natural asset depreciation and prevent post-extraction structural insolvency in resource-producing regions.

***Keywords**: Environmental Accounting, Economic Valuation, Human Development Index, Resource Curse, Fiscal Decentralization*

INTRODUCTION

1. Theoretical and Practical Disjunctions in Natural Resource Valuation

The intensive exploitation of natural resources (NR) over the last decade has sparked a rigorous global discourse regarding the actual efficacy of extractive sectors in fostering local societal welfare. A primary practical challenge observed in commodity-rich territories is the structural misalignment between Gross Regional Domestic Product (GRDP) growth driven by extractionand the tangible quality of life experienced by the populace (Fitrianasari, 2024). This discrepancy is often intensified by a heavy fiscal reliance on central transfers, which creates a facade of economic expansion that masks the lack of equitable wealth distribution at the local level.From a theoretical standpoint, environmental accounting emerges as a critical mechanism to rectify market failures in valuing degraded ecological assets; however, its integration into sub-national fiscal frameworks within emerging economies remains strikingly peripheral (Jachmann, 2024). Recent international studies indicate that accounting practices in extractive industries often fail to translate into meaningful environmental and social improvements despite extensive disclosure efforts (Meditari Accountancy Research, 2022).

This disconnection facilitates a systemic hazard where inflated economic growth figures within regional financial statements obscure the irreversible depletion of non-renewable natural capital. Recent meta-synthesis research confirms that environmental accounting has become essential for integrating sustainability into financial systems, yet its implementation remains uneven across regions (Sustainability Journal, 2024). To scholars outside this specialized domain, this phenomenon is identified as a failure in economic valuation, culminating in skewed budgetary determinations (Balaka, 2023). In the absence of accounting frameworks that quantify natural asset depreciation, resource-producing regions become vulnerable to a "fiscal illusion," where short-term revenue gains are mistaken for sustainable wealth. Absent a precise economic valuation of negative externalities, regional administrations frequently succumb to a temporary illusion of fiscal prosperity while neglecting long-term human capital development (Mosquera, 2022). The inability to internalize ecological degradation costs into regional balance sheets results in suboptimal Natural Resource Revenue Sharing (DBH) distributions, ultimately precipitating social disparities within mining and drilling vicinities.

2. State-of-the-Art: Contemporary Inquiries into Extraction and Human Progress

Academic inquiries conducted within the 2020–2025 horizon indicate that heavy reliance on extractive industries tends to stifle economic diversification and diminishes the impetus for local governments to prioritize investments in education and public health. This underscores a critical need for a paradigm shift in regional policy, prioritizing the conversion of extractive dividends into resilient human capital before these non-renewable assets reach total depletion. Research synthesized by Sadeghi et al. (2021) underscores that the "resource curse" at the sub-national tier is frequently exacerbated by commodity price volatility, which is rarely mitigated by adequate fiscal reserves (Sadeghi, 2021). Furthermore, the mechanisms governing the allocation of Revenue Sharing Funds (DBH) in Indonesia, as documented in the rigorous datasets of the Ministry of Finance, demonstrate extreme fluctuations dictated by global oil, gas, and mineral market dynamics (Indonesia, 2024). Empirical evidence from recent international research further shows that mining activities often fail to significantly improve human capital outcomes or achieve sustainable development goals in resource-rich regions (Cogent Economics & Finance, 2024).

Recent scholarly contributions further emphasize that in the absence of stringent environmental accounting standards, extractive corporations are incentivized to report only financial yields while externalizing the costs of ecosystem decay. This ecological fallout directly correlates with the decline of

public health indices in producing regions. Empirical data suggests that environmental degradation systematically erodes life expectancy in communities adjacent to extraction sites, effectively undermining the health pillars of the Human Development Index (HDI). Although green accounting instruments have been proposed to harmonize government financial reporting with actual environmental conditions, their execution is hindered by raw data scarcity and valuation complexities (United Nations Environment Programme (UNEP), 2022).These findings validate the premise that transparency in ecological cost reporting is the foundational requirement for averting human development failures in resource-abundant jurisdictions.

3. Identification of Research Gap: The Nexus Between Fiscal Policy and Human Metrics

The prevailing research lacuna resides in the lack of synchronization between public sector accounting data specifically the realization of Revenue Sharing Funds (DBH) and macro socio-economic indicators at the municipal level. Most antecedent studies have tended to bifurcate the economic valuation of resources from micro-level social impact assessments. There is a profound disconnect between the market value of extracted commodities recorded in central fiscal balance systems and the quality of life (Human Development Index/HDI) metrics published by the Indonesian Bureau of Statistics (BPS) in affected regions (Statistics Indonesia (Badan Pusat Statistik – BPS), 2023).

This informational gap fosters a state of "fiscal laziness," wherein regional governments lack the incentive to innovate or optimize local tax revenues due to the guaranteed influx of natural resource sharing funds.This informational asymmetry ensures that regional budgetary policies often overlook the environmental liabilities remaining long after the commodities have been exhausted. This study seeks to bridge this divide by embedding environmental accounting frameworks into the analysis of official secondary data. The objective is to ascertain whether suppressed HDI levels in resource-rich areas stem from valuation inaccuracies or from inefficiencies in regional fiscal governance (Statistics Indonesia, 2023). Additionally, there is a dearth of literature that specifically utilizes raw Expenditure Realization Report (LRA) data to deconstruct the correlation between extractive revenues and public sector spending dedicated to human capital enhancement.

4. Research Objective and Theoretical Novelty

In light of the identified gaps, this investigation aims to evaluate the repercussions of commodity extraction on human development in producing regions through the analytical lens of precision environmental accounting. The central inquiry examines the extent to which fluctuations in the valuation of natural resource extraction influence the constituent components of the Human Development Index (HDI) in regions receiving Mining and Oil & Gas DBH (Debonheur, 2023). This research explicitly investigates the premise of "immiserizing growth," where increased extractive revenues might paradoxically lead to a decline in local ecological and social well-being if strict green accounting is absent.

The novelty of this research lies in its integrative methodology, which synthesizes raw public sector budgetary data from the Ministry of Finance with the most recent human development metrics from BPS to formulate a more equitable economic valuation model. This study transcends mere growth analysis by offering a novel perspective on how environmental accounting serves as a risk mitigation instrument for socio-economic stability in producing zones. Consequently, this research provides strategic policy recommendations for regional authorities to manage extractive dividends more effectively, ensuring a profound impact on human capital fortification before the eventual depletion of natural assets.

METHODS

1. Research Approach and Study Design

This inquiry adopts an explanatory quantitative methodology centered on a longitudinal cross-sectional study design. The primary analytical objective is to scrutinize the causal linkages between public sector accounting variables specifically natural resource revenues and human development metrics utilizing panel data. The choice of this design is critical for capturing the "time-lag" effect, where changes in extractive revenue realization may not immediately manifest in social welfare indicators. The conceptual framework of this study is anchored in environmental accounting theory, which posits that the extraction of physical natural assets must be systematically offset by investments in human capital to prevent the net wealth depreciation of a jurisdiction. This approach facilitates a more nuanced "weak sustainability" analysis, evaluating whether the depletion of natural capital is effectively compensated by the accumulation of produced and human capital.

2. Subjects of the Study, Population, and Sampling

The research population encompasses all regencies and cities within the Indonesian archipelago that are designated recipients of Natural Resource Revenue Sharing Funds (DBH SDA), with a specific focus on the Oil, Gas, and Mineral/Coal (Minerba) sectors. A purposive sampling technique was implemented, utilizing the following stringent criteria:

a. Jurisdictions consistently documented as recipients of Natural Resource DBH by the Ministry of Finance throughout the observation window.
b. Regions possessing comprehensive Human Development Index (HDI) datasets within the Statistics Indonesia (BPS) repository.
c. Districts where the extractive sector contributes over 20% to the Gross Regional Domestic Product (GRDP).

Based on these parameters, the final sample consists of 64 Regencies/Cities predominantly located in resource-intensive provinces such as East Kalimantan, Riau, South Sumatra, and West Papua. This sample size is statistically robust for panel data analysis, ensuring that the findings represent diverse geographical and fiscal contexts within Indonesia. The raw datasets were retrieved directly from official government portals to ensure the empirical integrity of the findings.

3. Research Procedure and Data Collection

This investigation relies exclusively on Official Secondary Data that is fully traceable and verifiable. The data acquisition process was conducted through several stages:

a. Fiscal Data Acquisition: Accessing the official portal of the Directorate General of Fiscal Balance (DJPK) under the Ministry of Finance RI to extract Expenditure Realization Reports (LRA) concerning the actual disbursement of Natural Resource DBH. This step ensures the data reflects actual cash inflows rather than mere budgetary projections.
b. Human Development Metrics: Utilizing the Statistics Indonesia (BPS) database to obtain longitudinal HDI figures and their constituent indicators, including Life Expectancy, Expected Years of Schooling, and Per Capita Expenditure.
c. Economic Valuation Framework: Adopting parameters from the seminal text The Economics of Natural Resources and the Environment to determine the capital substitution ratios between natural assets and human development. This framework is utilized to quantify the "ecological debt" incurred by regional administrations during the extraction process.

4. Instruments and Data Analysis

The primary analytical instrument employed in this study is a panel data regression model processed via advanced statistical software. The analysis serves to evaluate the elasticity of the HDI in response to incremental units of revenue derived from commodity extraction. To maintain scientific precision, the study undergoes classical assumption testing, comprising normality, multicollinearity, and heteroskedasticity assessments (Mardiasmo, 2021). The Fixed Effect Model (FEM) or Random Effect Model (REM) selection is determined through the Hausman Test to ensure the most consistent estimator for the relationship between DBH and HDI.

The mathematical model utilized to examine the hypotheses is formulated as follows:

$$HDI_{it} = \alpha + \beta_1 \ln(DBH\_SDA_{it}) + \beta_2 \ln(Health\_Exp_{it}) + \epsilon_{it}$$

Where HDI represents the Human Development Index and DBH_SDA signifies the economic valuation of commodity extraction. The use of a double-log model allows for the interpretation of coefficients as elasticities, providing a clear percentage-based impact of resource revenue on human development. The application of the natural logarithm (ln) is intended to normalize the data distribution, which frequently exhibits a wide numerical range.

5. Data Integrity and Research Ethics

In compliance with international scientific publication protocols, all datasets utilized in this research are publicly accessible via the Ministry of Finance and BPS repositories. The researchers did not perform any interventions involving human or animal subjects; consequently, formal medical ethical approval was not required. However, the study strictly adheres to data integrity principles by ensuring no data manipulation occurred during the logarithmic transformation or regression phases. Nonetheless, the investigators have ensured that data interpretation remains entirely objective, devoid of any conflicts of interest with extractive industry entities.

RESULTS

1. Comprehensive Analysis of Revenue Sharing Realization and Human Development Exclusion

Empirical evidence extracted from the Ministry of Finance's Expenditure Realization Reports (LRA) reveals an asymmetrical pattern in the distribution of Natural Resource Revenue Sharing Funds (DBH). The findings indicate that jurisdictions with high extractive dependency exhibit extreme budgetary volatility, with revenue standard deviations 24% higher than those of non-producing regions (Ministry of Finance RI, 2024). This fiscal instability severely undermines the strategic planning of long-term human development initiatives.

a. Sectoral Analysis and Revenue Volatility

Data suggests that within the 64-region sample, the average contribution of Natural Resource DBH to total regional expenditure peaked during the 2022–2023 period, driven by global commodity price surges. However, budgetary tracking shows that these surpluses were predominantly diverted toward personnel expenses and administrative physical infrastructure rather than strengthening primary health services. This empirical trend corroborates the theory that resource abundance is frequently accompanied by inefficiencies in public sector accounting (Mardiasmo, 2021). specifically in the failure to prioritize long-term social investment over immediate operational costs.

b. HDI Disparities Between Core Extraction Zones and Peripheral Areas

Observations from the BPS (Statistics Indonesia) dataset uncover sharp internal disparities. In districts rich in mineral resources, Human Development Index (HDI) scores at the village level specifically those in direct proximity to extraction sites demonstrate life expectancy figures that are .15 lower than in villages furthest from the sites. This spatial discrepancy confirms that negative environmental externalities remain uncompensated by the economic gains accrued by the local populace (Statistics Indonesia, 2023).

2. Statistical Analysis and Mathematical Formulations

To quantitatively assess the impact with high precision, this study employs a panel data regression model with fixed effects. The use of a Fixed Effects Model (FEM) accounts for time-invariant characteristics unique to each regency, providing a more robust estimation of the impact of DBH on HDI.

Estimation results indicate a β coefficient of .128 with a p-value of .041, suggesting that the elasticity of natural resource revenue relative to human development is highly inelastic. This coefficient implies that for every 10% increase in natural resource revenue sharing, the HDI only improves by approximately 1.28%. The R^2 statistic of .18 shows that while the model is statistically significant, the explanatory power of DBH variables regarding welfare improvement is limited to 18% (Balsalobre-Lorente et al., 2023).

Further significant findings emerged from the t-test between oil/gas and mineral producing regions. It was found that $t_{oil/gas} > t_{mineral}$, indicating that oil and gas regions are significantly more effective at converting revenues into HDI growth than mineral-producing districts. This statistical difference is attributed to the presence of more integrated socio-environmental reporting standards in the hydrocarbon sector, which often include mandatory Corporate Social Responsibility (CSR) synchronization with local development goals.

3. Secondary Data Tables and Effectiveness Classification

Table 1. Cross-Sectional Analysis of Natural Resource DBH and HDI Indicators (Official Data 2023–2024)

Cluster	Sample Region	DBH Realization (Million IDR)	HDI Score	SDA-HDI Efficiency Ratio
High Yield	Kutai Kartanegara Reg.	5,240,300	74.12	.0141
	Bengkalis Reg.	3,120,500	74.55	.0238
Moderate	Bojonegoro Reg.	2,850,200	70.15	.0246
	Muara Enim Reg.	1,450,150	69.85	.0481
Resource-Stressed	Mimika Reg.	1,950,400	73.20	.0375
	Morowali Reg.	980,600	72.45	.0738
National Avg.	Non-SDA Regions	120,500	75.10	.6232

Source: Secondary Data Processed from Ministry of Finance LRA and BPS Statistical Reports (2024)

The analysis in Table 1 identifies an accounting anomaly: regions with the lowest DBH (Non-SDA) actually exhibit the highest human development efficiency ratio (.6232). This statistically proves that reliance on natural resources fosters "fiscal laziness," where regional governments become less

innovative in seeking sustainable funding sources based on public taxation, which typically correlates more strongly with public accountability.

4. Supplementary Findings: Environmental Degradation Valuation

Utilizing an environmental accounting approach, it was discovered that land degradation values in the 64 sampled districts average 12% of the total value of extracted commodities. However, in regional financial reports, reclamation funds are only allocated at 1.5% of the total received DBH (United Nations Environment Programme, 2022). This creates a massive valuation gap. This gap of 10.5% represents an "ecological debt" burdened upon future generations, acting as a hidden liability which will systematically diminish future HDI scores once natural resources are depleted (Sadeghi et al., 2021).

DISCUSSION

1. Interpreting the Resource Curse Through a Public Accounting Lens

The empirical evidence synthesized in this investigation corroborates the existence of the "paradox of plenty" or the resource curse at Indonesia's sub-national level. The observed inelasticity between natural resource revenues and the Human Development Index (HDI) suggests that financial inflows from extractive activities do not automatically translate into improved social capital. This quantitative finding is statistically linked to the low coefficient (β = .128) reported in the results, confirming that wealth accumulation in the extractive sector has a disproportionately small impact on human welfare. From a public sector accounting standpoint, this can be attributed to decreased fiscal incentives among regional governments receiving substantial Revenue Sharing Funds (DBH). As articulated by Mardiasmo (2021), an over-reliance on central government transfers frequently erodes local tax collection initiatives, which subsequently diminishes governmental accountability toward the citizenry.

Theoretically, these results align with the hypothesis that natural resource wealth often fosters a "fiscal illusion." Jurisdictions benefiting from high DBH tend to prioritize capital expenditures in physically visible infrastructure to secure political capital, rather than investing in intangible essential services such as teacher quality improvement or primary healthcare infrastructure. This prioritisation of physical over human capital explains the "accounting anomaly" observed in Table 1, where high-yield regions like Kutai Kartanegara exhibit significantly lower efficiency ratios compared to non-SDA regions. This misallocation of resources explains why HDI scores in these territories remain stagnant at moderate levels despite having a fiscal capacity that far exceeds the national average (Ministry of Finance RI, 2024).

2. Economic Valuation and the Failure to Internalize Ecological Costs

The identification of an "ecological debt" amounting to 10.5% highlights the fundamental failure of conventional accounting systems to safeguard future societal welfare. This gap, derived from the discrepancy between the 12% degradation cost and the 1.5% reclamation allocation, suggests that current regional balance sheets are overstating net economic gain. Within the framework of environmental accounting, profits reported from the extractive sector are considered "illusory" if they are not adjusted for the depreciation of natural assets (Balsalobre-Lorente et al., 2023). Our findings regarding the reduction in life expectancy within the immediate vicinity of mining operations (Ring-1) validate the premise that negative externalities namely pollution and land degradation exert a direct deleterious impact on the health variables within the HDI.

This discourse extends the findings of Alrawad et al. (2022), which argue that without the standardization of green accounting, resource-producing regions will continue to experience a systemic depletion of net wealth. The data indicates that the current reclamation fund allocation is statistically insufficient to restore ecological carrying capacity, thereby creating a long-term liability. Practically, regional authorities must transition toward Natural Capital Accounting (NCA) to ensure that every unit of physical extraction is compensated by an equivalent enhancement in human capital through local-level sovereign wealth funds.

3. Global Comparative Analysis and Policy Implications

When contrasted with global studies by Sadeghi et al. (2021), the Indonesian context reveals a unique scenario where fiscal decentralization provides regional autonomy, yet bureaucratic capacity remains a significant bottleneck. The superior performance of oil and gas regions (where $t_{oil/gas} > t_{mineral}$) suggests that institutional frameworks and more stringent oversight in the hydrocarbon sector can partially mitigate the resource curse. This is likely due to the more stringent international CSR and environmental standards embedded in hydrocarbon production-sharing contracts (United Nations Environment Programme, 2022).

The policy implications of this discussion necessitate a reform of the DBH formula. To bridge the efficiency gap identified in Table 1, the Ministry of Finance should consider integrating "Environmental Performance Indicators" and "HDI Achievement" as weighting variables in the fiscal transfer mechanism. This shift would provide a fiscal incentive for regional governments to improve their efficiency ratios by linking revenue sharing to tangible human development outcomes rather than extraction volumes alone.

4. Limitations and Future Research Trajectories

This study is constrained by its reliance on secondary data at the regency level, which limits the granularity of the socio-economic impact analysis. Future inquiries should incorporate primary data to validate public perceptions of resource revenue utilization. Additionally, while the current panel data model establishes causality, the integration of Computable General Equilibrium (CGE) models could provide predictive insights into the long-term shifts of a comprehensive environmental accounting policy in Indonesia.

CONCLUSIONS

1. Public Accounting Pathologies and the Resource Curse

Empirical evidence confirms an allocative failure in Indonesia's sub-national natural wealth management. The observed inelasticity between revenue and the Human Development Index (HDI) indicates that massive extractive cash flows are not effectively transformed into resilient human capital. This is quantitatively supported by the low explanatory power of revenue variables on welfare improvement. Rather than strengthening education and health, budgetary surpluses are often absorbed by unproductive administrative operational costs. Furthermore, high dependency on revenue sharing diminishes incentives for local fiscal innovation, creating an accountability gap where regional governments prioritize central transfers over constituent needs.

2. Ecological Debt and Accounting Failures

A critical finding is the unrecorded "ecological debt" of 10.5%, resulting from the gap between actual environmental degradation (12%) and meager reclamation allocations (1.5%). Current

accounting systems fail to record the depreciation of natural assets, leading to an overstatement of regional fiscal health. This informational asymmetry masks the reality that economic gains are being achieved at the expense of local health and ecosystems. Without integrating Natural Capital Accounting, resource-producing regions face long-term insolvency as their natural capital is exhausted without equivalent human capital compensation.

3. Sectoral Dynamics: Oil & Gas vs. Minerals

The study identifies a clear divergence in effectiveness between sectors. Statistical tests reveal that oil and gas regions are more effective in converting revenues into HDI growth compared to mineral-rich areas. This difference is attributed to the more stringent oversight and mature environmental disclosure standards inherent in the hydrocarbon sector. Conversely, the mineral sector demonstrates a negative correlation with local environmental quality, suggesting that revenue increases in this area often result in "immiserizing growth" that suppresses the health components of the HDI.

4. Policy Reform and Future Directions

To bridge the gap between wealth and development, fiscal policy must transition from a production-based model to a sustainability-performance model. The revenue sharing formula should integrate environmental quality and human development efficiency as key weighting variables. Future research should utilize real-time satellite imagery to validate degradation figures. Ultimately, environmental accounting must serve as a vital economic defense instrument to prevent producing regions from falling into structural poverty once their natural resources are depleted.

REFERENCES

Balaka, M. Y. (2023). Study of Environment Economics According to Depletion and Degradation Values of Utilization of Natural Resources in the Regional Economy. *International Journal of Energy Economics and Policy*. doi:https://doi.org/10.32479/ijeep.14837

Cogent Economics & Finance. (2024). Mining activities and human capital development in resource-rich regions. Cogent Economics & Finance, 12(1), 2386401. https://doi.org/10.1080/23322039.2024.2386401

Collazos-Ortiz, M. A. (2023). Avoiding a natural resource curse? The impact of administrative efficiency on Colombian municipalities' fiscal effort. *Local Government Studies*. doi:https://doi.org/10.1080/03003930.2023.2282565

Debonheur, K. D. (2023). The effect of natural resources rents on human development in selected African countries. *Natural Resources Forum*. doi:https://doi.org/10.1111/1477-8947.12341

Fitrianasari, R. N. (2024). Does Natural Resource Revenue Contribute to Achieving Inclusive Growth? *Futurity Economics & Law, 4*(4), 185–203. doi:https://doi.org/10.57125/fel.2024.12.25.11

Indonesia, M. o. (2024). Realization Report of Natural Resource Revenue Sharing (DBH) by Region.

Jachmann, H. S. (2024). How natural capital accounting frameworks fail ecosystem services. *European Journal of Environmental Sciences, 14*(2), 63–71. doi:https://doi.org/10.14712/23361964.2024.7

Meditari Accountancy Research. (2022). Accounting practices and sustainability disclosure in extractive industries. Meditari Accountancy Research. https://doi.org/10.1108/MEDAR-11-2023-2229

Ministry of Finance of the Republic of Indonesia. (2024). *Report on Regional Fiscal Transfer and Village Fund Performance.* Jakarta: Directorate General of Fiscal Balance (DJPK).

Mosquera, R. (2022). The long-term effect of resource booms on human capital. *Labour Economics*. doi:https://doi.org/10.1016/J.LABECO.2021.102090

Sadeghi, A. G. (2021). Natural Resource Abundance and Human Development: A Global Perspective. *Resources Policy, 74*. doi:https://doi.org/10.1016/j.resourpol.2021.102287

Sarfo, E. A. (2024). Mineral wealth paradox: health challenges and environmental risks in African resource-rich areas. *BMC Public Health, 24*(1), 724. doi:https://doi.org/10.1186/s12889-024-18137-1

Statistics Indonesia (Badan Pusat Statistik – BPS). (2023). *Human Development Index by Regency/City (New Method) 2020–2023.* Jakarta: BPS.

Sustainability. (2024). Environmental accounting and sustainability integration: A meta-synthesis approach. Sustainability, 16(21), 9341. https://doi.org/10.3390/su16219341

United Nations Environment Programme (UNEP). (2022). *Natural Capital Accounting for Sustainable Development.* UNEP Publishing.