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MORALITY BEFORE KNOWLEDGE

Impacts of natural resource exploitation and its implications for the environment, society, and the economy

Vadila Hanin[1,*]
[1] *Department of Environmental Science, Graduate School of Sustainable Development, Universitas Indonesia, Jakarta, Central Jakarta, 10430, Indonesia.*
*Correspondence: vadila.hanin@ui.ac.id

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ABSTRACT

Background: Indonesia is widely recognized as a country with abundant natural resources and high biodiversity, consisting of wide variety of flora and fauna that play an important role in maintaining environmental ecosystems. However, the increasing intensity of natural resource exploitation has exceeded sustainable limits, particularly through practices such as illegal logging and deforestation, which contribute to ecosystem degradation and biodiversity loss. This deforestation is carried out for land clearing that is subsequently used for plantations, mining activities, and the expansion for residential areas. Furthermore, their loss has had negative impacts on conservation efforts and the environmental sustainability of surrounding communities. **Methods:** This study aims to examine and analyze the impacts of natural resource exploitation on environmental, social, and economic aspects in Indonesia. The method used in this study is a qualitative method through a literature review, utilizing a range of national and international scholarly articles as well as relevant policy documents concerning natural resource exploitation in Indonesia. **Findings:** The results reveal that intensive exploitation of natural resources produces multidimensional impacts encompassing environmental, social, and economic aspects, which are interconnected within a dynamic system. Based on these three aspects, a cyclical feedback relationship emerges in which environmental degradation contributes to reduced economic performance and worsens social conditions, while economic and social pressures, in turn, encourage more intensive exploitation of natural resources. Therefore, natural resource exploitation should not be understood in a fragmented way, but rather as part of an interconnected and integrated system. **Conclusion:** Addressing deforestation and exploitation requires shifting from fragmented interventions toward holistic, system-based environmental policy. **Novelty/Originality of this article:** This study introduces an integrated systems framework that conceptualizes natural resource exploitation in Indonesia not as isolated sectoral damages, but as a dynamic, cyclical feedback system interlinking environmental degradation, economic decline, and social pressure.

KEYWORDS: economy; environment; exploitation; implications; natural resources; society.

1. Introduction

Indonesia is recognized as a country with abundant natural resources and significant biodiversity, reflected in the wide range of flora and fauna that play a vital role in sustaining ecological balance. However, these natural assets are frequently exploited in an unsustainable manner, particularly through practices such as illegal logging and deforestation, which disrupt ecosystems and contribute to the decline of forest biodiversity. Moreover, this situation is often accompanied by conflicts of interest between economic development and environmental conservation. Therefore, greater attention is required to

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promote sustainable natural resource management, ensuring that biodiversity can be preserved and utilized for the benefit of future generations (Sinta et al., 2024).

In recent years, the rate of forest exploitation has risen significantly, largely driven by population growth and increasing economic pressures. The intensification of activities such as excessive logging has resulted in a notable reduction in forest cover, thereby compromising ecosystem sustainability and threatening the livelihoods of communities that rely on forest resources. The large scale removal of forest ecosystems disrupts ecological balance and diminishes the capacity of the environment to support human wellbeing. From an economic standpoint, unsustainable forest exploitation can lead to substantial financial losses for local governments. The depletion of forest resources reduces revenue derived from taxes and royalties, while also undermining the livelihoods of local populations whose economic activities depend on forest ecosystems. In many developing countries, including Indonesia, the exploitation of natural resources, particularly forests, is often viewed to accelerate economic growth. However, this perspective frequently prioritizes short term economic gains while neglecting long term environmental and socioeconomic consequences. Over time, continued exploitation contributes to biodiversity loss, land degradation, and climate change. These impacts collectively reduce environmental quality and have broader implications for both local and global economies. The degradation of ecosystem services, such as soil productivity, water regulation, and climate stability, further constrains sustainable development. Therefore, although forest exploitation may provide immediate economic benefits, its long term effects underscore the importance of adopting sustainable and integrated approaches to natural resource management (Rinjani et al., 2024).

Human tendencies toward excessive consumption constitute a key factor driving the overexploitation of natural resources. Poor and short term management practices, especially those that ignore the time needed for natural resources to recover, increase pressure on resource use and threaten long term sustainability. Such practices not only speed up the depletion of natural resources but also damage the stability of ecosystems. Therefore, ensuring sustainable natural resource management requires strong collaboration among government institutions, the private sector, and civil society. An integrated and cooperative governance approach is essential to promote responsible resource use that prioritizes long term sustainability over immediate economic gains. By emphasizing collective responsibility and forward looking strategies, resource management can better support environmental integrity and the wellbeing of present and future generations (Sinta et al., 2024). Deforestation in Indonesia has significant impacts on forest ecosystems, influencing ecological, social, and economic aspects. It not only results in the loss of biodiversity habitats but also disturbs the environmental balance of nearby communities. A key consequence of deforestation is the deterioration of atmospheric quality along with a rise in carbon emissions. Moreover, the economic gains from agricultural activities developed on cleared forest land are often outweighed by the loss of carbon value caused by deforestation (Khaliza et al., 2026).

The increasing intensity of resource exploitation raises critical concerns about the resilience limits of forest ecosystems. Once these thresholds are surpassed, the resulting environmental damage can become irreversible or extremely difficult to restore. Moreover, exploitation activities such as deforestation extend beyond local impacts, contributing to global climate change and affecting not only nearby communities but also broader environmental systems at the global level. Wolff et al. (2021) highlight that deforestation worsens climate change, leading to negative consequences for the health and wellbeing of populations in tropical regions such as Indonesia. Consequently, forest restoration is essential to address and mitigate these impacts.

Growing economic needs often lead to increased use of natural resources, while environmental protection is often ignored. Unsustainable practices can cause many problems, such as damage to ecosystems, lower air and water quality, and loss of biodiversity. In general, the environment and natural resources have limited capacity, so

economic development that depends too much on resource use without considering sustainability can harm the ecosystem (Hidayat et al., 2025).

1.1 Implications of natural resources exploitation

Tropical forests in Indonesia are among the largest in the world and are characterized by their rich biodiversity. Despite this, they have faced significant degradation caused by deforestation, which affects ecological functions, climate stability, and the socioeconomic conditions. Beyond serving as habitats for diverse species, these forests play a vital role in sustaining ecosystem balance at local, regional, and global levels. This importance is reflected in their contribution to the global carbon cycle, climate change mitigation, and the regulation of hydrological processes. The widespread clearing of forests for agricultural expansion, plantation development, mining, and infrastructure projects has caused extensive loss of forest cover. Consequently, this has resulted in declining biodiversity and increased carbon emissions into the atmosphere, further accelerating climate change (Damiti et al., 2025). According to Wiyatmi et al. (2022), such actions reflect an anthropocentric perspective that positions humans as the most important beings, prioritizing their interests over those of other living organisms and the natural environment. This viewpoint creates an imbalanced relationship, as it is dominated by human interests and involves the one sided exploitation of nature. As a result, natural resources are used mainly for profit, without considering environmental sustainability. Consistent with Rusetuka (2023), while deforestation may address human needs, it also leads to significant harmful impacts. These include social conflicts, the loss of biodiversity, and climate change, whose impacts are not confined to local areas but extend to a global scale.

Land cleared through deforestation can experience soil degradation over time. As soil fertility declines, it becomes more vulnerable to erosion and surface runoff, resulting in the loss of essential nutrients. These environmental changes negatively affect local communities whose livelihoods depend on agriculture, forest resources, and river systems. For instance, rivers that were previously clear can turn turbid during the rainy season due to sediment from abandoned mining areas entering the water. Moreover, agricultural lands may become inundated, leading to reduced crop productivity for local farmers (Abdillah, 2025). According to Wang & Yuan (2026), mining activities and agricultural practices following forest clearing contribute to an increased ecological footprint, driven by soil erosion, biodiversity loss, water pollution, and carbon emissions. In addition, natural resources can influence the quality of governance, potentially leading to corruption, weak regulatory frameworks, and inadequate environmental planning. These findings suggest that the abundance of natural resources does not necessarily guarantee sustainable development.

1.2 Drivers of natural resources exploitation

The increasing demand for development across various sectors, driven by population growth and economic pressures, has led to significant land use changes. According to Tasya (2025), deforestation is largely driven by rapid population expansion. As the population grows, the demand for housing, infrastructure such as roads, and agricultural land for food production also increases. In addition to its impacts on human needs, large scale deforestation poses serious threats to wildlife, as many species rely heavily on forest ecosystems for their survival. Wahyuni & Suranto (2021) state that the reduction in forest area leads to habitat loss for wildlife, making them more vulnerable to hunting and illegal trade. This decline in forest cover is primarily driven by land conversion for infrastructure development, settlements, agriculture, plantations, and mining activities.

1.3 Forest ecosystems functions

Based on data from Global Forest Watch, Indonesia has experienced significant forest loss in recent years. In 2024, approximately 260,000 hectares of forest were lost, corresponding to an estimated release of around 190 million tons of CO_2 emissions. These figures indicate that deforestation not only reduces forest cover but also contributes substantially to global climate change (Global Forest Watch, 2025). Forests not only provide habitats for diverse species but also fulfill critical ecological roles in maintaining environmental stability. They are fundamental to air quality, as they generate oxygen through the process of photosynthesis. Moreover, forests support the hydrological cycle, reduce soil erosion, and help regulate the climate by absorbing excess carbon dioxide from the atmosphere.

Table 1. Deforestation rate in Indonesia 2018-2022 (ha/year)

Indonesia	2018-2019	2019-2020	2020-2021	2021-2022
	462,458.50	115,459.80	120,705.80	104,032.50

(Statistics Indonesia (BPS), 2023)

The degradation or loss of forest areas impacts not only biodiversity but also human quality of life. A decline in biodiversity can disrupt food webs and weaken the ability of forest ecosystems to filter pollutants and sustain natural balance. Consequently, forest conservation is essential not only for preserving plant and animal life but also for securing the sustainability of human existence (Tasya, 2025). Forests play an important role in sustaining human livelihoods.

According to Rusetuka (2023), forest resources extend beyond timber to include various products derived from other components of the forest ecosystem, such as vegetation, fungi, wildlife, and insects. The availability of this biodiversity directly contributes to improving community wellbeing through the provision of ecosystem services. The intensive and continuous exploitation of natural resources to meet human needs, without considering environmental sustainability for future generations, leads to water, soil, and air pollution, ecosystem degradation, and the loss of biodiversity (Rinjani et al., 2024). According to Prasetyo et al. (2025), forms of natural resource exploitation include deforestation for mineral mining activities, as well as large scale expansion of agricultural and plantation lands. Natural resource exploitation not only has adverse environmental impacts but also produces significant social economic consequences for surrounding communities. In economic terms, there may be short term benefits for local populations near mining areas, such as increased income due to job creation.

However, these benefits are accompanied by longterm tradeoffs that undermine community welfare in other aspects. These include environmental degradation that leads to declining public health conditions, as well as the loss of traditional livelihoods in agriculture and fisheries due to contaminated and damaged land and water resources. However, according to Rinjani et al. (2024) there are also adverse economic impacts resulting from natural resource exploitation beyond the degradation of mining related resources. One of these impacts is an increase in unemployment, as forests that previously served as a primary source of livelihood for local communities can no longer sustain employment opportunities for those who depend on them. From a social perspective, such activities also generate social conflicts between local communities and mining operators. These conflicts arise due to the environmental impacts of mining activities and the deterioration of public infrastructure, such as damaged roads caused by heavy duty trucks transporting mining materials.

Overall, natural resource exploitation demonstrates a strong and interrelated connection between environmental degradation and the social and economic impacts experienced by surrounding communities. Exploitation carried out without proper environmental management and without considering ecological aspects has a high potential

to cause significant environmental degradation. Ultimately, these conditions affect the quality of life of local communities and give rise to various social and economic problems.

Many studies on natural resource exploitation tend to examine only a single aspect in isolation, focusing either on environmental, social, or economic dimensions separately. For instance, some research highlights ecological impacts such as land degradation and biodiversity loss resulting from deforestation. However, there is still limited attention given to how these environmental changes are linked to social and economic transformations within affected communities. These include issues such as community welfare, alternative livelihoods, and social conflicts arising from shifts in access to natural resources. A focus solely on ecological aspects, without considering their interconnections with social and economic dimensions, provides an incomplete understanding of how exploitation affects human life comprehensively. Human livelihoods that depend on natural resources have been significantly affected by environmental degradation, leading to the loss of income generating activities and ultimately reducing community welfare due to declining household incomes. Furthermore, these conditions may also trigger social conflicts due to competition over increasingly limited natural resources.

The present study introduces a novel contribution by integrating the analysis of natural resource exploitation impacts on ecosystems through ecological, social, and economic dimensions. Unlike previous research that mostly addresses these aspects separately, often focusing only on environmental impacts without integrating their social and economic linkages, this study adopts a more holistic perspective. In addition to combining these three dimensions, the research also investigates the interactions and dynamic interrelationships among them in an integrated framework. This enables a more comprehensive understanding of the reciprocal effects between environmental degradation caused by resource exploitation and the resulting social and economic conditions experienced by communities living in proximity to affected areas. Moreover, the study is expected to generate policy relevant recommendations for natural resource management based on multidimensional interconnections, emphasizing the importance of considering ecological, social, and economic interdependencies in an integrated manner. Prasetyo et al. (2025) state that several measures can be undertaken, including strengthening law enforcement through regular monitoring of exploitation activities, implementing land reclamation and rehabilitation efforts such as reforestation, adopting mitigation technologies, as well as engaging local communities in active environmental management oversight and economic empowerment initiatives. This study aims to identify ecological, social and economic impacts of natural resources exploitation, integrate these three aspects, and formulate natural resource management recommendations based on the integration of these aspects.

2. Methods

2.1 Research approach and design

This research adopts a qualitative approach to comprehensively examine the relationship between natural resource exploitation and changes within ecosystems. This method enables a more in depth explanation of how exploitation affects environmental processes, as well as how these changes are connected to human life within the system. Activities such as mining and land use conversion driven by natural resource exploitation generate a range of impacts that extend beyond ecological dimensions. These include environmental degradation, reduced soil and water quality, and a decline in biodiversity. These ecological impacts subsequently have implications for the social and economic conditions of human populations that depend on these resources.

This study adopts a literature review design aimed at examining and synthesizing previous research on natural resource exploitation and its overall impacts on ecosystems. This approach provides a broader perspective on the various effects of resource exploitation on both environmental systems and human populations within the same

ecosystem. The data used are secondary sources obtained from scientific publications selected based on relevance to the topic, publication year, and their contribution to explaining the relationship between natural resource exploitation and ecosystem changes. The selected articles were carefully filtered to ensure alignment with the research focus so that the data correspond with the study objectives. In addition to academic publications, reports from government and relevant institutions were also used as supporting sources to strengthen information on natural resource management.

Articles were collected from academic databases such as Google Scholar, Scopus, and other relevant platforms using keywords related to the research topic. The inclusion criteria were limited to studies published within the last five years, with approximately 15–20 representative articles included in the analysis. Using search keywords such as natural resources exploitation, socio-economic impacts The analysis process was carried out systematically by first identifying and classifying the articles into three impact categories of natural resource exploitation, namely environmental, social, and economic dimensions. Each study was then reviewed in detail, followed by data synthesis through comparative analysis of findings across studies to identify patterns and relationships. Finally, conclusions were drawn to provide a comprehensive understanding of the interconnections between environmental, social, and economic aspects of natural resource exploitation in an integrated framework.

This research further applies a comparative analysis approach by examining and contrasting findings from previous studies to identify patterns in the impacts of natural resource exploitation across environmental, social, and economic dimensions. The analysis focuses on three main aspects. First, the types of exploitation activities, including deforestation, mining, and forest conversion. Second, the resulting environmental impacts, such as land degradation, loss of biodiversity, and air and water pollution. Third, the social and economic conditions of communities in affected areas, including shifts in livelihoods, changes in welfare levels, and the emergence of social conflicts. By systematically classifying and comparing these dimensions, the relationship between exploitation activities and their consequences becomes more evident. This approach is expected to provide a more comprehensive understanding of natural resource exploitation and the interconnections among ecological, social, and economic factors, offering an integrated perspective on its effects on human life.

2.2 Data collection

Data collection in this literature review was conducted by examining various relevant scientific sources related to the environmental, economic, and social impacts of natural resource exploitation. The required literature was obtained from multiple academic sources with relevant topics, including national and international journal articles as well as reports from related government institutions. The selected literature was limited to publications from the last five years, with clear methodologies and a specific focus on the relationship between various forms of natural resource exploitation, such as mining, deforestation, forest conversion, and other extractive activities and their associated impacts. Irrelevant literature was excluded from the analysis.

The collected data were then categorized into three main groups. First, environmental impacts, including land degradation, air and water pollution, loss of biodiversity, and ecosystem alteration. Second, economic impacts, which include short term increases in regional income and employment opportunities, but are often followed by economic inequality and reduced productivity in other sectors such as agriculture and forestry. Third, social impacts, particularly conflicts arising from competition over resource access, unequal distribution of benefits, and shifts in local livelihoods.

Following categorization, it becomes evident that environmental degradation caused by natural resource exploitation directly affects the economic conditions of surrounding communities, especially those who depend on these resources prior to exploitation. Declining soil and water quality leads to reduced agricultural productivity and decreased

fishery yields due to pollution in affected areas, ultimately resulting in lower community incomes. Environmental damage resulting from exploitation also frequently triggers social tensions, particularly when communities experience economic losses or lose access to resources that previously supported their livelihoods. In addition, weak regulations and poor natural resource governance further worsen the potential for conflict between local communities and companies.

Therefore, the collected data do not merely present the isolated direct impacts of natural resource exploitation, but also highlight the interrelated connections between environmental change, economic dynamics, and social conflict within society. Overall, exploitation activities demonstrate a strong linkage between environmental degradation and shifts in the social and economic conditions of local communities. Extensive and uncontrolled exploitation leads to environmental deterioration, which subsequently has direct economic consequences for affected populations, ultimately reducing social welfare. Therefore, this integrated approach is important to provide a more comprehensive understanding in supporting efforts toward sustainable development.

2.3 Data analysis techniques & method justification

This research adopts a qualitative approach using a literature review method to examine the impacts of natural resource exploitation in relation to environmental, social, and economic dimensions. The analytical methods applied include content analysis and thematic analysis. Content analysis is conducted to critically review each selected scientific publication in order to extract key information, concepts, and relevant findings that align with the scope of this study. In contrast, thematic analysis is used to organize the data into main categories, namely environmental, social, and economic aspects.

The data analysis process begins with data reduction, which involves selecting and simplifying information obtained from the literature. Only relevant data related to natural resource exploitation are retained for further analysis. This is followed by data presentation, where the extracted information from various sources is systematically arranged according to predefined categories. This step enables easier identification of patterns, relationships, similarities, and differences across the findings from the selected studies.

The next stage is data interpretation, which emphasizes the interconnections among the three analyzed dimensions. In this context, environmental degradation caused by natural resource exploitation is not viewed solely from an ecological perspective but is also examined in relation to its social and economic impacts on surrounding communities. Environmental damage resulting from such exploitation disrupts local livelihoods, thereby affecting economic conditions and potentially triggering social conflicts. Therefore, the analysis is conducted in an integrated manner to provide a holistic understanding of the causal relationships among the variables under study.

The use of a qualitative method with a literature review approach aligns with the objective of this research, which is to obtain a comprehensive or holistic understanding of the impacts of natural resource exploitation in terms of the interrelationships between environmental, social, and economic aspects. This method enables a systematic and comprehensive examination to identify patterns and gaps in previous studies. In addition, thematic analysis facilitates the organization of data into a well structured format, making it easier to observe the relationships among environmental, social, and economic dimensions as consequences of natural resource exploitation. Therefore, through this analytical approach, the study is expected to produce an integrated understanding of the three dimensions, rather than presenting them as separate and isolated impacts of natural resource exploitation.

3. Results and Discussion

3.1 Initial results and data description

Based on the results of the literature review, the initial findings indicate that intensive natural resource exploitation can affect key dimensions that are categorized into three main aspects: environmental, social, and economic. Activities such as deforestation, mining, and forest land conversion act as driving factors that contribute to the decline in environmental quality. Initial analysis from various studies shows a causal relationship between the pressures of natural resource exploitation and environmental degradation, which subsequently affects the social and economic conditions of communities living near exploitation sites.

Large scale and continuous exploitation of natural resources to meet human needs, without considering environmental sustainability for future generations, results in water, soil, and air pollution, ecosystem damage, and loss of biodiversity (Rinjani et al., 2024). Unsustainable and excessive dependence on natural resource utilization may lead to the phenomenon known as the resource curse, where the economic benefits gained are not proportional to the environmental damage and social problems generated. Therefore, it can be concluded that environmental conservation should not be viewed as an obstacle, but rather as a fundamental requirement for achieving comprehensive, equitable, and sustainable economic growth for the future (Naila et al., 2025).

The availability of natural resources has the potential to increase the return on investment from their utilization. In theory, there is a positive relationship between natural resource abundance and economic growth, indicating that greater resource availability can enhance economic performance and improve community welfare. However, in practice, countries with abundant natural resources often experience slower economic growth compared to those with limited resource endowments (Amalia & Emalia, 2022).

According to Ahakwa & Tackie (2024), environmental pollution tends to increase alongside economic growth in its early stages, making anticipatory environmental management necessary. Governments are therefore expected to implement strict and effective environmental regulations during economic development processes. The adoption of sustainable practices is crucial to navigate the early phases of economic expansion without causing severe environmental degradation. Businesses can also support sustainable economic development by adopting green innovation, benefiting from tax incentives for environmentally friendly activities, and receiving subsidies for clean energy. Zeng et al. (2023) note that mineral exploitation often conflicts with environmental protection efforts. This is reflected in the tension between the high demand for mineral resources to support economic growth and local governments' ambitions to achieve ecological civilization.

Rinjani et al. (2024) report that natural resource exploitation generates adverse economic impacts beyond the extraction of mining resources, particularly an increase in unemployment, as forests that previously served as a primary source of livelihood for local communities can no longer provide employment opportunities. From a social perspective, mining activities also give rise to conflicts between local communities and miners, driven by environmental degradation and damage to public infrastructure, such as roads degradation due to heavy transport vehicles. Maulana & Ferdian (2025) further emphasize that conflicts related to natural resources are not solely triggered by the presence of resources themselves, but are largely shaped by how access, utilization, and distribution are governed. Inequitable access, unsustainable exploitation practices, and unequal distribution of benefits and environmental burdens are key factors that intensify social conflict. Therefore, fair, sustainable, and comprehensive resource management is required by involving local communities and respecting traditional knowledge in order to minimize social conflict while maintaining a balance between economic development and environmental sustainability.

According to the One Planet Network, the impacts of natural resource use resulting from unsustainable consumption and production patterns can generate significant social and economic consequences globally. Environmental degradation and resource depletion

threaten livelihoods, particularly for farmers, ultimately contributing to economic instability. In addition, soil, water, and air pollution caused by unsustainable production practices lead to serious health problems. The declining availability of natural resources and the loss of resource dependent livelihoods can threaten human rights, exacerbate environmental degradation, destroy livelihoods, and negatively affect human health. These social and economic impacts also widen inequality, as communities most dependent on natural resources often have the least capacity and support to cope with these consequences.

Overall, the initial findings of this study indicate a strong interrelationship among ecological, social, and economic dimensions. Environmental degradation resulting from natural resource exploitation does not only affect ecosystem conditions, but also triggers changes in social dynamics and community economic activities, which are closely interconnected. Environmental deterioration can negatively affect community welfare, which in turn influences local economic stability and may lead to social conflicts.

3.2 Analysis of results based on criteria or variable

The analysis based on the defined criteria indicates that natural resource exploitation has a significant impact on the interconnections between ecological, social, and economic dimensions. The main variables considered in this analysis include the level of resource exploitation, environmental quality, community social welfare, and economic performance. The results reveal a reciprocal relationship among these three dimensions, forming an interdependent socio-ecological-economic system in which each component influences and is influenced by the others.

From an ecological perspective, the level of natural resource exploitation shows an inverse relationship with environmental quality. Excessive exploitation activities, such as deforestation, mining, and industrialization, contribute to the deterioration of ecosystem quality, including water and air pollution as well as soil degradation. Studies indicate that economically driven approaches that neglect environmental considerations have resulted in substantial ecosystem damage, including widespread deforestation and pollution (Mubarok et al., 2025). This condition reduces environmental carrying capacity and disrupts ecosystem balance, ultimately threatening the sustainability of the resources themselves.

From an economic perspective, natural resource exploitation may generate short term positive impacts. Variables such as increased regional income, economic growth, and job creation tend to rise in areas with high levels of exploitation activity. In a case study on oil and gas mining, Halimatussa'idah et al. (2025) found that resource exploitation can increase local revenue and stimulate regional economic development. However, further analysis reveals a trade off between economic growth and environmental sustainability. Excessive exploitation and resulting environmental degradation can reduce long term economic productivity. For instance, data reported by MataKalteng (2020) show that oil and mining activities increased regional original revenue (PAD) in Central Kalimantan from IDR 531 billion to IDR 951 billion within one year, representing an increase of approximately 79%.

From a social perspective, community welfare exhibits varying outcomes. Natural resource exploitation may increase household income through the creation of new employment opportunities. However, the unequal distribution of benefits often leads to social disparities. Social conflicts frequently arise due to competition over access to and control of natural resources. Maulana & Ferdian (2025) demonstrate that inequality and injustice in resource access can trigger intergroup conflicts and further worsen environmental degradation. In addition, environmental impacts such as pollution also adversely affect public health and overall quality of life.

The interaction among ecological, social, and economic criteria reveals a cyclical cause and effect relationship. Environmental degradation caused by excessive resource exploitation can reduce economic productivity, such as declining agricultural and fishery yields due to pollution. These impacts subsequently affect social conditions, including loss of livelihoods and economic instability. Conversely, economic pressures and increasing

social demands may drive more intensive exploitation, thereby further worsening environmental degradation (Mubarok et al., 2025). This indicates the existence of a reinforcing feedback loop that tends to amplify negative impacts if not managed sustainably.

Beyond these criteria, governance plays a critical role as a controlling factor that determines the direction of exploitation outcomes. Natural resource management that is not supported by strong regulations and lacks community participation tends to intensify environmental degradation. In contrast, the implementation of sustainability oriented policies can mitigate the negative impacts of resource exploitation (Mubarok et al., 2025). This highlights that institutional quality and policy frameworks are key determinants in maintaining a balance among economic, social, and ecological interests.

Table 2. Synthesis table

Aspects	Findings	References
Ecological	Water, soil, and air pollution, ecosystem damage, and loss of biodiversity	Rinjani et al. (2024)
	Deforestation worsens climate change, leading to negative consequences for the health and wellbeing of populations in tropical regions such as Indonesia.	Wolff et al. (2021)
Economic	In economic terms, there may be short term benefits for local populations near mining areas, such as increased income due to job creation.	Prasetyo et al. (2025)
	On oil and gas mining, found that resource exploitation can increase local revenue and stimulate regional economic development.	Halimatussa'idah et al. (2025)
	There is a trade off between economic growth and environmental sustainability. Excessive exploitation and resulting environmental degradation can reduce long term economic productivity.	
	Environmental pollution caused by resource exploitation can reduce productivity and slow economic growth, a phenomenon commonly referred to as the resource curse.	Sun et al. (2021)
	Short term economic gains are often used to rapid economic development, but they rarely contribute to long term sustainability and inclusive growth.	Foteinis (2026)
Social	The unequal distribution of benefits often leads to social disparities. Social conflicts frequently arise due to competition over access to and control of natural resources	Maulana & Ferdian (2025)
	Inequality and injustice in resource access can trigger intergroup conflicts and further worsen environmental degradation.	
Feedback Loop	Economic pressures and increasing social demands may drive more intensive exploitation, thereby further worsening environmental degradation.	Mubarok et al. (2025)

Overall, the results of the analysis demonstrate that natural resource exploitation generates multidimensional impacts across ecological, social, and economic systems. Imbalances in one dimension can trigger disturbances in others, underscoring the need for an integrated approach to resource management. Without such integration, resource exploitation has the potential to cause long term, difficult to reverse damage to both the environment and community welfare. The relationship between those three aspects is illustrated in the Table 2.

3.3 Comparison with previous studies

The results of this study indicate that natural resource exploitation generates impacts across multiple, interrelated dimensions, namely environmental, social, and economic

aspects. These findings are consistent with previous studies, which demonstrate that resource exploitation does not affect a single dimension in isolation but instead creates interconnected relationships between ecological systems and human livelihoods. In general, prior research also emphasizes that natural resource exploitation tends to produce short term economic benefits while generating long term ecological and social consequences.

From an environmental perspective, the findings of this study align with previous research indicating that natural resource exploitation leads to environmental degradation. Xiong et al. (2023) report that deforestation contributes to water and air pollution as well as soil quality deterioration. The resulting environmental damage has exceeded ecological carrying capacity due to its severe impacts. Similarly, Amer et al. (2024) found that intensive resource use reduces environmental quality, including increased carbon emissions, climate change, and ecosystem degradation. These findings are consistent with the results of this study, which show that resource exploitation reduces environmental carrying capacity and disrupts ecosystem balance. However, it should be noted that the magnitude of environmental impacts varies depending on geographical conditions, technological levels, and governance quality across regions. Therefore, although the impact patterns are similar, their intensity and scale may differ.

From an economic perspective, the findings are also consistent with previous studies that highlight the dual effects of natural resource exploitation. In the short term, exploitation activities may stimulate economic growth through increased income and employment opportunities. Nguyen et al. (2023) support this view, stating that resource exploitation can contribute to economic expansion and income growth. However, other studies indicate that unsustainable exploitation in the long term may hinder economic development. Sun et al. (2021), in a study conducted in China, found that environmental pollution caused by resource exploitation can reduce productivity and slow economic growth, a phenomenon commonly referred to as the resource curse. These findings correspond with the results of this study, which reveal a trade off between economic growth and environmental sustainability, where environmental degradation ultimately constrains economic productivity. This phenomenon is more likely to occur in regions with weak governance and high dependence on natural resources.

Finally, from a social perspective, this study aligns with previous findings on the impacts of resource exploitation on community welfare. Although natural resource exploitation may create employment opportunities and increase income, unequal distribution of benefits often leads to social inequality and conflict. UNEP (2016) notes that resource extraction generates not only direct impacts in surrounding areas but also secondary effects arising from infrastructure development, population displacement, and changes in local economic conditions. According to Socio.Health (2024), uncontrolled resource exploitation deteriorates quality of life through environmental pollution and declining public health conditions.

Based on the reviewed literature, most previous studies tend to analyze the impacts of natural resource exploitation in a fragmented manner. In contrast, the findings of this study integrate environmental, social, and economic dimensions by examining their reciprocal relationships, forming an interconnected system characterized by feedback mechanisms. This approach highlights differences in analytical perspectives and frameworks, as this study integrates all three dimensions, whereas previous studies generally focus on only one or two aspects.

According to literature review, most prior studies have typically examined the impacts of natural resource exploitation in a fragmented way. In contrast, this study integrates environmental, social, and economic dimensions by exploring their reciprocal relationships, thereby forming an interconnected system driven by feedback mechanisms. This highlights a difference in analytical perspective and framework, as the present study considers all three dimensions simultaneously, whereas earlier research generally focuses on one or two aspects only.

3.4 Implications of findings and in-depth discussion

The findings of this study indicate that intensive natural resource exploitation generates broad impacts across environmental, social, and economic dimensions, all of which are dynamically interconnected and mutually influential. These results reinforce existing literature suggesting that resource exploitation does not affect a single sector in isolation, but rather creates complex linkages between human activities and environmental sustainability. Amer et al. (2024) emphasize that excessive exploitation of natural resources is a major driver of global environmental degradation, including increased carbon emissions, pollution, and ecosystem destruction.

From an environmental perspective, the implications include a decline in environmental quality, which poses challenges for long term sustainability. Resource exploitation, particularly in fossil fuel-based energy and mining sectors, contributes to rising CO_2 emissions and ecological footprints. This is consistent with the findings of Tahir et al. (2024), who report that levels of resource consumption and exploitation are directly associated with environmental degradation, especially in highly industrialized countries. Accordingly, this study demonstrates that without sustainable management, natural resource exploitation can accelerate environmental damage that is difficult to reverse, including climate change and biodiversity loss.

Another important issue is the trade off between economic growth and environmental sustainability. Zhu et al. (2024) state that natural resources play a significant role in driving economic growth and increasing gross domestic product. However, their utilization also leads to environmental deterioration as industrial activity and energy consumption intensify. This reflects a contradictory relationship in which economic growth often occurs at the expense of environmental quality. Therefore, this study highlights the need for a transition toward more sustainable development models, such as the green economy. According to Hermanto & Rosidi (2026), the green economy is a development approach that reduces dependence on excessive exploitation of natural resources, while emphasizing efficient resource use, environmental conservation, and long term sustainability. This concept has emerged as a response to conventional development models that tend to overexploit natural resources and contribute to environmental degradation and climate change.

From an economic perspective, the findings of this study indicate that natural resource exploitation generates short term benefits, such as increased regional revenue, job creation, and industrial sector growth. However, in the long term, environmental degradation resulting from large scale exploitation may reduce economic productivity. Huang & Ren (2024) argue that the expansion of economic activities dependent on natural resource exploitation also contributes to rising carbon emissions, which ultimately affect the sustainability of the global economy.

From a social perspective, the implications are related to community welfare levels and social inequality. Although natural resource exploitation can improve incomes through the creation of new employment opportunities, the unequal distribution of benefits often leads to social conflict and injustice. He (2024) highlights that natural resource exploitation is closely linked to issues of health, welfare, and social stability, particularly in developing countries. In addition, environmental impacts such as pollution also affect quality of life, especially among vulnerable groups whose livelihoods depend directly on natural resources.

Furthermore, this study reveals a bidirectional relationship between environmental, social, and economic dimensions that forms a feedback system. Environmental degradation can reduce economic productivity, which in turn affects community livelihoods and increases social pressure. Conversely, economic pressures may encourage more intensive resource exploitation, thereby exacerbating environmental degradation. These findings are consistent with Saeedian et al. (2024), who emphasize a system dynamics approach in which human environment interactions evolve simultaneously and continuously over time.

Another important implication relates to the role of governance in shaping the direction of resource exploitation impacts. He (2024) also shows that technological innovation and sustainability oriented policies are crucial in mitigating the negative effects of exploitation. Without strong regulatory frameworks and effective monitoring, natural resource exploitation tends to become unsustainable. Therefore, strengthening institutions, improving transparency, and enhancing community participation are essential to promote sustainable resource management.

Overall, the results of this study have important implications for development policy formulation. A holistic approach is required, one that balances environmental sustainability with social and economic considerations. This includes the implementation of sustainability oriented policies and increased public awareness regarding the importance of natural resource conservation. In this way, natural resource utilization can be optimized without compromising long term sustainability.

3.5 Synthesis of discussion and research limitations

The synthesis of the findings indicates that natural resource exploitation cannot be understood separately, but rather should be viewed as an integrated system encompassing environmental, social, and economic dimensions. These three dimensions are interrelated and form dynamic reciprocal interactions. Zaehringer et al. (2024) emphasize that natural resource exploitation generates complex impacts within socio ecological systems, where human economic activities not only directly affect environmental conditions but are also in turn influenced by environmental changes.

In terms of environmental aspects, the synthesis reveals that continuous resource exploitation is associated with environmental degradation, including pollution of water, soil, and air, as well as ecosystem disruption. Touati & Ben-Salha (2024) report that increasing exploitation activities contribute to a higher ecological footprint, indicating growing pressure on environmental carrying capacity. Poorly managed resource exploitation may exceed the environment's regenerative limits, resulting in long term and difficult to reverse impacts. Xiong et al. (2023) also highlight that mining and resource extraction activities can cause widespread environmental contamination and degradation, ultimately disrupting ecosystem balance.

From an economic perspective, the impacts of resource exploitation present a dual effect. In the short term, such activities contribute to economic growth and increased regional revenue. However, in the long term, environmental deterioration may reduce economic productivity, particularly in sectors dependent on environmental quality such as fisheries and agriculture. Tarigan et al. (2024) state that although extractive industries contribute to regional income, the resulting economic benefits do not necessarily translate into equitable improvements in community welfare. This suggests that resource based economic growth has inherent limitations and may lead to unsustainable economic dependence.

From a social perspective, natural resource exploitation has a dual impact. On the one hand, exploitation activities can generate employment opportunities that increase community income. On the other hand, unequal distribution of benefits, along with environmental impacts, often triggers social conflicts and reduces overall quality of life. Zaehringer et al. (2024) note that mining activities can restrict community access to natural resources, degrade water quality, and negatively affect public health.

The synthesis of these aspects reveals a reinforcing feedback mechanism of exploitation impacts. Environmental degradation leads to reduced economic productivity, which in turn increases social pressures such as declining welfare and rising conflicts. These social and economic pressures may drive more intensive resource exploitation as a survival strategy, thereby further exacerbating environmental damage. Local communities, particularly those directly dependent on natural resources, tend to experience these impacts more severely than actors who primarily benefit economically. Saeedian et al. (2024) state that human environment relationships are co-evolutionary, where changes in

one dimension simultaneously trigger changes in others. Therefore, an integrative approach is essential for understanding and managing the impacts of natural resource exploitation.

Fig. 1. Feedback loop cycle of the impacts of natural resource exploitation

Based on Fig. 1, intensive use of natural resources creates a relationship where environmental, economic, and social aspects influence each other in a dynamic system. In early stages, activities such as deforestation, mining and land conversion can bring short term economic benefits, such as increasing income and more job opportunities. However, these activities also reduce environmental quality by causing pollution in water, air and soil, and damaging ecosystems. This environmental degradation has a direct impact on the economy, especially for the community who depend on natural resources. The productivity of agriculture and fisheries sectors decreases due to land degradation and water pollution, ultimately leading to lower incomes. This situation has triggered social pressures, such as rising unemployment and the emergence of conflicts caused by competition over increasingly limited resources.

Furthermore, the economic and social pressures experienced by communities actually encourage more intensive exploitation as a survival strategy. Increasing dependence on natural resources leads to exploitation without consideration for environment's carrying capacity. As a result, environmental damage becomes more severe and reinforces a negative cycle that continues to repeat itself.

Nevertheless, this study also has several limitations that should be acknowledged. The study relies on a conceptual approach and literature review, and therefore it is not yet fully supported by comprehensive empirical data across various regions. This limitation may affect the level of generalizability of the findings, as the dynamics of natural resource exploitation are strongly influenced by geographical conditions and the quality of governance.

In addition, most of the literature used in this study is still focused on specific case studies, meaning it does not fully capture the complex relationships among variables on a broader scale. This indicates the need for further research adopting a multidisciplinary approach to obtain a more comprehensive understanding. Moreover, because this study is based on a literature review approach, the results may not fully represent all conditions across different regions. Furthermore, this study has not deeply examined the role of governance in controlling the impacts of natural resource exploitation. According to Petavratzi et al. (2022), the quality of institutions, policies, and monitoring significantly influences the success of sustainable natural resource management. Based on these limitations, future research is recommended to develop a more comprehensive approach

by incorporating field data or conducting inter regional comparisons to strengthen the findings, as well as considering contextual factors such as governance and community participation. In addition, applying a system dynamics approach may serve as an alternative to better understand the interactions between environmental, social, and economic aspects in greater depth.

4. Conclusions

Based on the findings of the analysis and discussion, it can be inferred that the intensive use of natural resources leads to impacts across environmental, social, and economic dimensions, all of which are interrelated within a dynamic system. From an environmental perspective, excessive exploitation activities, such as deforestation for land conversion, have been shown to result in environmental degradation, including pollution of water, soil, and air, damage to ecosystems, loss of biodiversity, and a reduction in environmental carrying capacity, such as declining soil quality and disrupted water balance. Moreover, these effects not only threaten the sustainability of natural resources but also have the potential to disturb ecosystems over the long term.

From an economic aspect, exploitation activities can provide short term benefits, such as increased regional income, economic growth, and the creation of employment opportunities. However, in the long term, the environmental damage can reduce economic productivity, especially in sectors that are highly dependent on environmental conditions. This highlights a tradeoff between economic growth and environmental sustainability, where short term gains may lead to future economic losses if not managed sustainably. In terms of the social aspect, excessive use of natural resources has both positive and negative impacts. On one side, the exploitation of natural resources can enhance community wellbeing through higher income and the creation of employment opportunities. On the other hand, unequal distribution of benefits, along with environmental impacts, frequently triggers social conflict and can impact the community health. This indicates that thee gains from exploitation are not equally shared among all groups in society.

Overall, based on these three aspects create a cyclical and interrelated pattern, where environmental degradation leads to declining economic performance and worsens social conditions, while economic and social pressures can drive more intensive exploitation of natural resources. Therefore, natural resource exploitation should not be viewed separately but, must be understood as an integrated system. The utilization of natural resources needs to consider a sustainability perspective for future generations. Excessive and uncontrolled use may decrease future availability and quality of resources, restricting future generations' ability to fulfill their basic needs.

Based on these conclusions, the implementation of sustainable development principles in natural resource management is essential to ensure a balance among environmental, social, and economic aspects. This can be accomplished by restricting excessive resource exploitation, adopting environmentally friendly technologies to reduce environmental impacts, and rehabilitating degraded areas. Furthermore, post exploitation reclamation should be enforced as a mandatory requirement, while incentives should be offered to companies that practice sustainable natural resource management. Furthermore, the government should strengthen governance in natural resource management by enforcing stricter regulations, implementing more effective monitoring mechanisms, and improving transparency and accountability. In addition, public participation should also be increased to ensure that natural resources management is conducted in a more inclusive and equitable way. As noted by Kinda & Thiombiano (2021) to support corporate environmental management, stakeholders must improve ineffective regulations in exploration and exploitation contracts, so that environmental compensation at least equal to the marginal damage caused by the extractive industries.

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Biography of Author

Vadila Hanin, Department of Environmental Science, Graduate School of Sustainable Development, Universitas Indonesia, Jakarta, Central Jakarta, 10430, Indonesia

- Email: vadila.hanin@ui.ac.id
- ORCID: N/A
- Web of Science ResearcherID: N/A
- Scopus Author ID: N/A
- Homepage: N/A