International Journal of Economics, Business and Innovation Research
https://e-journal.citakonsultindo.or.id/index.php/IJEBIR
E-ISSN : 2964-0865
IJEBIR

The Impact Of Illegal Gold Mining On The Environmental And Socioeconomic Conditions Of Communities In Timbolasi Village Bathin III Ulu District Indonesia

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Abstract

*T*his study aims to examine the practices of illegal gold mining and its environmental and socioeconomic impacts on the community of Timbolasi Village, Bathin III Ulu District, Bungo Regency, Indonesia. A qualitative descriptive approach was employed, with data collected through observations, in-depth interviews, and documentation involving local miners, gold collectors, and village government officials. The findings indicate that illegal gold mining activities involve several stages, including land clearing, excavation, mineral separation, the use of mercury in gold processing, purification, and the distribution of gold to collectors. These activities are carried out without legal authorization and with limited environmental management, leading to deforestation, river pollution, soil erosion, sedimentation, and the degradation of agricultural land. In addition, mercury use and gold-burning processes contribute to air pollution and pose health risks, including respiratory disorders, eye irritation, and skin diseases. From a socioeconomic perspective, illegal gold mining provides higher and faster income than traditional agricultural activities; however, it also increases economic dependence on mining, widens social inequality, intensifies community conflicts, and reduces interest in agriculture, particularly among younger generations. Overall, while illegal gold mining offers short-term economic benefits, its long-term environmental degradation and adverse socioeconomic consequences pose significant challenges to the sustainable development of Timbolasi Village.

Keywords: Illegal Gold Mining, Environmental Impacts, Socioeconomic Impacts

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INTRODUCTION

Illegal gold mining (IGM), commonly referred to in Indonesia as *Penambangan Emas Tanpa Izin* (PETI), has become a major environmental and socioeconomic challenge in many regions, including Timbolasi Village, Bathin III Ulu District, Bungo Regency. The continuous increase in global gold prices has encouraged local communities to engage in illegal mining activities as an alternative source of income despite the absence of legal permits (Sudiyarti et al., 2021). In Timbolasi Village, mining is conducted manually and with heavy equipment through community-based arrangements, while weak law enforcement and limited government supervision have allowed these activities to continue openly. Although illegal gold mining generates substantial short-term financial benefits for local households, it has simultaneously accelerated environmental degradation and created complex socioeconomic consequences for the surrounding communities (Anggraini, 2020).

The environmental impacts of illegal gold mining are increasingly evident. Data from the Environmental and Forestry Agency of Bungo Regency indicate that the area affected by illegal mining expanded from 350 hectares (14.0%) in 2019 to 950 hectares (38.0%) in 2023 (Efendi et al., 2023). Similar conditions are observed in Timbolasi Village, where mining activities have resulted in deforestation, river pollution, soil erosion, sedimentation, and the degradation of productive agricultural land (Fardilla et al., 2025). Furthermore, the extensive use of hazardous substances such as mercury during gold extraction threatens water quality, biodiversity, and public health through long-term contamination of air and water resources.

Beyond environmental degradation, illegal gold mining has significantly transformed the socioeconomic structure of the local community. Compared with traditional occupations such as farming, plantation work, and daily labor, mining provides substantially higher monthly income, making it an attractive livelihood option for rural households (Saam & Karnila, 2021). However, these economic benefits are accompanied by increasing dependence on mining activities, widening social inequality, labor shortages in the agricultural sector, conflicts over mining areas, and declining interest among younger generations in pursuing sustainable agricultural livelihoods (Putri, 2022). Consequently, the economic gains derived from illegal mining are largely temporary and are offset by considerable long-term environmental and social costs.

Although Indonesia has established a comprehensive legal framework for mineral and coal mining through Law No. 3 of 2020, illegal mining activities remain widespread because of limited law enforcement, inadequate monitoring, and the lack of viable alternative employment opportunities in rural areas. This situation creates a dilemma between improving household income and preserving environmental sustainability (Junaidi, 2022). Addressing this issue requires not only stricter regulatory enforcement

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but also sustainable economic development strategies that provide alternative livelihoods for mining-dependent communities (Firmansyah, 2021).

Previous studies have consistently reported that illegal gold mining contributes to environmental degradation, river pollution, biodiversity loss, health risks, social conflicts, and economic dependency (Rafi & Nugraha, 2025). Nevertheless, most existing studies primarily emphasize either environmental or socioeconomic impacts separately. Limited attention has been given to comparing the financial benefits of illegal gold mining with those of formal occupations while simultaneously examining how these economic incentives shape community dependence despite severe environmental consequences. Therefore, this study fills this research gap by analyzing both the practices of illegal gold mining and its environmental and socioeconomic impacts on the community of Timbolasi Village, Bathin III Ulu District, Bungo Regency. The findings are expected to provide empirical evidence for developing policies that balance environmental conservation with sustainable rural economic development.

LITERATURE REVIEW

Illegal gold mining (IGM), commonly known in Indonesia as *Penambangan Emas Tanpa Izin* (PETI), has become a significant issue in many mineral-rich regions due to its complex environmental, economic, and social implications. Illegal gold mining refers to mining activities conducted without official permits and outside the legal framework established by the government (Putri, 2022). Unlike regulated mining operations, illegal mining generally lacks environmental management, occupational safety standards, and post-mining land rehabilitation. Consequently, these activities frequently result in severe environmental degradation while simultaneously providing short-term economic opportunities for local communities (Hilson, 2016). Environmental impacts commonly associated with illegal gold mining include deforestation, river sedimentation, soil degradation, biodiversity loss, and contamination caused by hazardous chemicals such as mercury and cyanide (UNEP, 2019). From a socioeconomic perspective, illegal mining often improves household income in the short term but also generates economic dependence, social inequality, health problems, and conflicts over natural resources (Firmansyah, 2021).

Numerous previous studies have investigated the environmental and socioeconomic consequences of illegal gold mining in developing countries. Research consistently demonstrates that illegal mining contributes significantly to environmental degradation through the destruction of forest ecosystems, declining water quality, land degradation, and increased ecological vulnerability (Hilson, 2016). Other studies have reported that mercury contamination from artisanal and illegal gold mining poses serious risks to human health, aquatic ecosystems, and agricultural productivity (UNEP, 2019).

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In addition, several empirical investigations have revealed that although illegal mining increases household income and employment opportunities, these economic gains are generally temporary and accompanied by long-term environmental costs and declining community resilience. Previous research has also documented increasing social conflicts, livelihood transformation, labor migration, and weakening agricultural sectors in communities heavily dependent on illegal mining activities (Pattimahu et al., 2021)

Despite these important contributions, several research gaps remain within the existing literature. Most previous studies have primarily emphasized either environmental degradation or socioeconomic outcomes independently, with limited attention given to the interaction between these two dimensions within rural communities. Furthermore, many studies employ quantitative approaches that measure environmental or economic indicators but provide limited understanding of how local communities perceive, experience, and respond to illegal mining activities in their daily lives (Putri, 2022).. Another limitation concerns the relatively small number of qualitative case studies examining the dilemma between short-term economic benefits and long-term environmental sustainability, particularly in rural areas where illegal gold mining has become the dominant livelihood strategy (Hilson, 2016).

RESEARCH METHOD

This study employed a qualitative research approach using a descriptive case study design to obtain an in-depth understanding of the practices of illegal gold mining and its environmental and socioeconomic impacts on the community of Timbolasi Village, Bathin III Ulu District, Bungo Regency, Indonesia. A qualitative approach was selected because it enables researchers to explore social phenomena, community experiences, and environmental issues within their natural settings while capturing participants' perceptions and interpretations of illegal mining activities. The case study design was considered appropriate because it allows for a comprehensive investigation of a contemporary phenomenon within its real-life context, particularly in rural communities where illegal gold mining has become an integral part of local socioeconomic life (Yin, 2018).

The study was conducted in Timbolasi Village, Bathin III Ulu District, Bungo Regency, Jambi Province, one of the areas experiencing significant illegal gold mining activities. Data were collected from both primary and secondary sources. Primary data were obtained through in-depth interviews with key informants, including illegal gold miners, gold collectors, village government officials, community leaders, farmers affected by mining activities, and local residents living near mining sites. These participants were selected using purposive sampling because they possessed direct knowledge and experience related to illegal gold mining practices and their impacts (Suryani, 2023)..

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Secondary data were gathered from government reports, village statistical records, environmental monitoring reports, relevant legislation, previous research articles, and official publications concerning illegal mining and environmental management.

Data collection techniques consisted of in-depth interviews, field observations, and document analysis (Firmansyah, 2021). Semi-structured interviews were conducted to allow participants to describe their experiences, perceptions, and opinions regarding illegal gold mining practices, environmental degradation, and socioeconomic changes within the community. Direct observations were carried out at mining locations, surrounding agricultural land, rivers, and residential areas to document environmental conditions and community activities associated with illegal mining. Documentation analysis involved reviewing government regulations, environmental reports, village records, photographs, and other supporting documents to strengthen data triangulation and improve the credibility of the research findings .

The inclusion criteria comprised individuals who had direct involvement in or substantial knowledge of illegal gold mining activities in Timbolasi Village, including miners, community members affected by mining operations, village officials, and local stakeholders. Participants were required to have lived in the village for at least five years to ensure adequate understanding of the environmental and socioeconomic changes resulting from illegal mining. Individuals without direct experience or knowledge of mining activities were excluded from the study. Secondary sources were selected based on their relevance, credibility, and consistency with the research objectives.

The unit of analysis in this study was the community of Timbolasi Village, with particular emphasis on the interactions between illegal gold mining practices, environmental conditions, and socioeconomic livelihoods (Firmansyah, 2021).. The analysis focused on understanding how illegal mining activities influence environmental sustainability, community welfare, livelihood strategies, social relationships, and local economic conditions. This unit of analysis was chosen because illegal gold mining affects not only individual miners but also the broader social and ecological systems within the village.

Data analysis was conducted using thematic analysis following the interactive model proposed by Miles in (Ridwan et al., 2026) The analytical process consisted of data collection, data condensation, data coding, data display, theme development, and conclusion drawing. Interview transcripts, observation notes, and documentary evidence were systematically coded to identify recurring patterns and emerging themes related to illegal gold mining practices, environmental degradation, and socioeconomic impacts. To enhance the trustworthiness of the findings, data triangulation was performed by comparing information obtained from different participants, observation results, and documentary sources. Member checking and prolonged engagement in the field were

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also employed to ensure the credibility, dependability, and confirmability of the research findings.

RESULTS

Based on the qualitative data obtained through in-depth interviews, field observations, and document analysis, several major themes emerged regarding the practices of illegal gold mining and its environmental and socioeconomic impacts in Timbolasi Village, Bathin III Ulu District, Bungo Regency. The analytical process followed the stages of data reduction, coding, categorization, and theme development, resulting in six major themes: (1) the characteristics of illegal gold mining practices, (2) environmental degradation caused by illegal mining, (3) socioeconomic benefits and livelihood dependence, (4) social consequences and community transformation, (5) institutional and regulatory challenges, and (6) community perspectives on sustainable livelihood alternatives.

The first theme reveals that illegal gold mining has become an established livelihood strategy among many households in Timbolasi Village. Interview findings indicate that mining activities are conducted without official permits and involve several operational stages, including land clearing, excavation, mineral separation, mercury-based gold extraction, gold purification, and marketing through local collectors. Mining operations are performed using both manual techniques and collectively rented heavy equipment, depending on miners' financial capacity. Most participants acknowledged that mining activities are undertaken because they generate substantially higher income than traditional occupations such as farming or plantation work. Nevertheless, the majority of respondents also recognized that these activities violate government regulations and pose considerable environmental risks. The findings further indicate that limited employment opportunities and unstable agricultural income have encouraged local residents to perceive illegal mining as the most accessible source of livelihood despite its legal and environmental consequences.

The second theme concerns the environmental impacts resulting from prolonged illegal mining activities. Field observations and documentary evidence demonstrate continuous environmental degradation throughout the study area. The affected mining area increased significantly between 2019 and 2023, indicating an expansion of mining activities across agricultural land and forest ecosystems. Participants described extensive land excavation, riverbank destruction, sediment accumulation, and declining water quality as the most visible environmental changes. Farmers reported decreasing agricultural productivity due to soil degradation and reduced irrigation quality caused by river sedimentation. In addition, the widespread use of mercury during gold processing was identified as one of the most serious environmental concerns because it

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contaminates surface water and potentially threatens aquatic ecosystems and human health. Several participants also reported respiratory disorders, skin irritation, and eye discomfort associated with prolonged exposure to mercury vapor during gold burning processes. These findings demonstrate that environmental degradation extends beyond physical landscape alteration and directly influences ecosystem sustainability and community well-being.

The third theme highlights the socioeconomic benefits generated by illegal gold mining while simultaneously illustrating the growing dependence of local communities on mining activities. Interviews revealed that illegal mining provides average monthly earnings considerably higher than those obtained from agriculture, daily labor, or small-scale trading. This increased income enables households to finance children's education, improve housing conditions, purchase motor vehicles, and meet other household needs. Consequently, many families perceive mining as the fastest pathway toward economic improvement. However, participants also emphasized that mining income is highly uncertain because it depends on gold availability, weather conditions, and operational costs. Furthermore, many respondents expressed concern that excessive dependence on mining has gradually reduced community interest in agricultural production, resulting in declining food security and increasing vulnerability to fluctuations in gold prices. These findings suggest that although illegal mining temporarily improves household welfare, it simultaneously weakens long-term economic sustainability by discouraging livelihood diversification.

The fourth theme identifies substantial social transformations resulting from illegal gold mining activities. Community members reported increasing social inequality between households participating in mining and those relying on agriculture. Families engaged in mining generally experienced rapid improvements in their economic conditions, whereas households outside the mining sector often faced relatively stagnant incomes. Participants also described frequent disputes regarding mining boundaries, unequal distribution of mining profits, and competition over productive mining locations. Village leaders acknowledged that these conflicts occasionally disrupted community cohesion and traditional cooperation practices. Moreover, respondents observed declining participation of younger generations in agricultural activities because mining was perceived as more financially attractive than farming. This gradual shift in occupational preferences raises concerns regarding the long-term sustainability of rural agricultural development and food production in Timbolasi Village.

The fifth theme focuses on institutional and regulatory issues associated with illegal mining. Interviews with village officials revealed that government supervision remains relatively limited because of geographical constraints, insufficient institutional resources, and the extensive distribution of mining sites. Although Indonesian mining

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regulations clearly prohibit unauthorized mining activities, enforcement efforts have been inconsistent, allowing illegal operations to continue over extended periods. Several participants perceived law enforcement as selective and ineffective, reducing public confidence in government intervention. Village authorities also emphasized that enforcement alone is insufficient because many households rely heavily on mining income for their daily survival. Consequently, respondents suggested that sustainable policy interventions should combine stricter environmental regulation with employment creation, agricultural revitalization, vocational training, and community economic empowerment programs.

The sixth theme reveals community perceptions regarding sustainable alternatives to illegal gold mining. Most participants acknowledged that environmental degradation has become increasingly severe and recognized the importance of protecting natural resources for future generations. Nevertheless, respondents consistently argued that abandoning mining activities would be difficult without realistic alternative sources of income. Community members suggested strengthening agricultural productivity through improved technology, expanding access to microfinance, developing community-based agribusiness, promoting ecotourism, and establishing legally regulated small-scale mining schemes as potential long-term solutions. Village leaders further emphasized the importance of collaborative governance involving local government, environmental agencies, universities, and local communities to achieve a balance between environmental conservation and rural economic development.

Overall, the findings demonstrate that illegal gold mining in Timbolasi Village represents a multidimensional phenomenon characterized by complex interactions between environmental degradation, economic necessity, social transformation, and institutional challenges. While mining activities significantly improve household income in the short term, they simultaneously accelerate environmental deterioration, increase social vulnerability, weaken agricultural livelihoods, and create long-term sustainability challenges. These findings indicate that effective solutions require integrated policy approaches that simultaneously address environmental protection, rural economic development, and community livelihood diversification rather than relying exclusively on legal enforcement.

DISCUSSION

The findings of this study indicate that illegal gold mining has become a major livelihood strategy for the community of Timbolasi Village due to limited employment opportunities and unstable agricultural income. Although illegal mining provides substantially higher short-term earnings than farming and plantation activities, it has resulted in significant environmental degradation, including deforestation, land

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degradation, river sedimentation, mercury contamination, and declining agricultural productivity. These findings demonstrate that the economic benefits obtained by local communities are accompanied by serious environmental and social costs, supporting the study's objective of examining both the practices and impacts of illegal gold mining.

From a theoretical perspective, these findings are consistent with the Sustainable Livelihoods Framework**,** which explains that rural households tend to adopt livelihood strategies that maximize economic survival when alternative income sources are limited (Chambers & Conway, 1992). At the same time, the findings support the Environmental Externalities Theory (Pigou, 1920), which argues that economic activities often generate environmental and social costs that are not borne by producers but transferred to society. In Timbolasi Village, miners receive immediate financial benefits, while the broader community experiences long-term consequences through environmental degradation, declining ecosystem quality, and increasing health risks.

The findings are consistent with previous studies reporting that illegal gold mining contributes to deforestation, river pollution, and declining agricultural productivity while simultaneously improving household income in the short term (Hilson & McQuilken, 2014; UNEP, 2019). Similar to the studies of (Rafi & Nugraha, 2025), (Junaidi, 2022), (Saptawartono et al., 2024) this research confirms that illegal mining creates economic dependence, social inequality, conflicts among community members, and reduced interest in agriculture, particularly among younger generations. However, this study extends previous research by providing a more integrated understanding of how environmental degradation, livelihood transformation, and institutional weaknesses interact within the local context of Timbolasi Village.

The scientific contribution of this study lies in integrating environmental and socioeconomic perspectives to explain the persistence of illegal gold mining through a qualitative case study approach. Rather than examining environmental or economic impacts separately, this study demonstrates that both dimensions are closely interconnected through community livelihood decisions and weak institutional governance. The findings suggest that illegal mining should not be viewed solely as an environmental issue but also as a rural development challenge requiring integrated policy responses.

Despite its contributions, this study has several limitations. The findings are based on a single case study and therefore cannot be generalized to all illegal mining areas in Indonesia. Furthermore, the analysis primarily reflects community perceptions and experiences, which may differ from institutional or regulatory perspectives. Future studies are recommended to conduct comparative research across multiple mining regions and combine qualitative findings with quantitative environmental assessments to provide a more comprehensive understanding of illegal mining impacts.

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The practical implications of this study emphasize that reducing illegal gold mining requires more than law enforcement. Sustainable solutions should integrate environmental restoration with livelihood diversification, agricultural development, vocational training, community empowerment, and stronger institutional collaboration. Such integrated strategies are expected to reduce community dependence on illegal mining while promoting environmental sustainability and long-term socioeconomic resilience.

CONCLUSION

This study concludes that illegal gold mining has become an important livelihood strategy for communities in Timbolasi Village, Bathin III Ulu District, primarily due to limited employment opportunities, unstable agricultural income, and the higher financial returns generated by mining activities. Although illegal gold mining provides substantial short-term economic benefits, its practices are conducted without legal authorization and rely on environmentally harmful methods, including deforestation, land excavation, river sedimentation, and mercury use. Consequently, these activities have accelerated environmental degradation while transforming the traditional livelihood structure from agriculture toward mining dependency.

The findings further demonstrate that the environmental and socioeconomic impacts of illegal gold mining are closely interconnected. Environmental degradation has reduced land productivity, contaminated water resources, threatened public health, and weakened ecosystem sustainability, while the socioeconomic impacts include increased household income, growing dependence on mining activities, social inequality, community conflicts, and declining interest in agriculture, particularly among younger generations. These findings highlight that the short-term economic advantages of illegal mining are outweighed by its long-term environmental and social consequences.

The primary contribution of this study lies in providing a comprehensive understanding of illegal gold mining by integrating environmental and socioeconomic perspectives through a qualitative case study approach. The findings emphasize that addressing illegal mining requires integrated policy interventions combining stronger environmental governance, effective law enforcement, livelihood diversification, agricultural development, and community empowerment. Future research is encouraged to conduct comparative studies across different mining regions and integrate qualitative findings with quantitative environmental assessments to strengthen evidence-based policy development for sustainable rural resource management.

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