JURNAL PENELITIAN GEOGRAFI
Vol (13), No (1), (2025), pp. 87-98
Doi: http://dx.doi.org/10.23960/jpg

Original Article

The Impact of Gold Mining on the Community in Nagari Tambang, Salido District, Pesisir Selatan Regency

Rika Despica[1]*, Elvi Zuriyani[2], Arie Zella Putra Ulni[3*]

[1]Department of Geography Education, Faculty of Social Sciences and Humanities, Universitas PGRI Sumbar, Padang City, Indonesia

*Cooresponding E-mail: rikadespika@gmail.com

ABSTRACT
The main objective in carrying out this research is to determine the impacts of gold mining activities on environmental sustainability and society. Overall, gold mining activities can have positive and negative impacts. This research examines the impact on the environment and community economy. This research uses a qualitative method which involves interviewing mining communities and people who live in river areas and gold mining locations in Nagari Tambang, Salido District, Pesisir Selatan Regency. The results of this research are 1). The impact of gold mining on the miners' economy has experienced a tremendous increase in the economy of the mining community because mining is a source of additional income for them, while the impact on the community in Nagari Tambang who are not miners economically has no impact at all. 2). The impact of gold mining on the environment in the mining area has a big impact because this activity causes long-term environmental damage in the form of changes in the landscape, landslides and erosion, as well as water pollution in the mining location.

KEYWORDS
Gold Mining; Economy; Environmental Impact

Received: May 15, 2024 **Acepted**: March 3, 2025 **Published**: June 3, 2025

Citation:
Despica, R., Zuriyani, E., & Ulni, A. Z. P. (2025). The impact of gold mining on the community in Nagari Tambang, Salido District, Pesisir Selatan Regency. *Jurnal Penelitian Geografi*, *13*(1), 87–98. https://doi.org/10.23960/jpg.v13.i1.29816

INTRODUCTION

The environment is a unified space containing all objects, forces, conditions, and living beings, including humans and their behavior. The environment cannot be separated from the ecosystem or ecological system. An ecosystem is a life unit consisting of a community of living organisms (from various species) together with various non-living objects that form a system. Humans are part of the ecosystem (Setiadi in Rusdiana, 2012).

However, from an environmental perspective, mining activities are considered the most damaging compared to other natural resource exploitation activities, as mining work essentially involves digging into the earth to extract mining objects (Hulukati & Isa, 2020).

Mining activities in Indonesia still carry a negative stigma among the public, mainly due to illegal mining or mining without permits, which causes more negative impacts. PETI (Illegal Gold Mining) is mining activity carried out by some communities or other parties without government permission. PETI refers to mining activities

that do not have official permits from the government as the holder of state authority over mining materials. Regardless of whether the mining is done by local communities based on customs or other reasons, the mining is still labeled PETI if it lacks official permits (Dondo et al., 2021).

The tradition of illegal gold mining by the local population naturally causes significant environmental impacts. Therefore, the issue of gold mining deserves to be studied as a problem because many regions in Indonesia use gold found in riverbeds as an economic livelihood (Hulukati & Isa, 2020).

Since ancient times, Sumatra Island has been known as Svarnadwipa, a Sanskrit term meaning "Island of Gold," suspected to be Ophir or the "Mountain of Gold." Records about Ophir began with a Portuguese national poet named Luiz de Camoens (1524-1580) in his poem *Os Lusiadas*. This information was reportedly brought by Arab sailors he met. Pesisir Selatan Regency is among the regions where the community conducts gold mining for sale to support local development needs.

The village of Tambang was formerly known as Tambang Salido or Mount Arum Mine, which is the oldest gold mine in Indonesia, located in Salido Ketek Village, Nagari Tambang, Pesisir Selatan Regency, West Sumatra. An old gold mine operated by the Dutch East India Company (VOC) ran there for about 150 years. In the area, there are remains of 300 stone steps leading up the hill and a 300-meter-long tunnel left by the Dutch.

Under the leadership of Commandeur Jacob Jorizoon Pits (1557-1678), the VOC explored gold mining in Salido Ketek Village. The Heeren XVII sent two geologists to investigate the gold deposits. Later, the VOC brought forced laborers from Madagascar and prisoners of war from surrounding regions to exploit the gold deposits in 1669. (Source: https://prospectorunited.com/sejarah-tambang-emas-indonesia.html/ accessed May 10, 2024)

People in Nagari Tambang, Salido Subdistrict, Pesisir Selatan Regency, conduct mining at several points along the riverbanks near their homes. The local community only focuses on economic gain without considering the sustainability of the environment and surrounding society. A major problem at illegal and unpermitted gold mining sites is that miners dredge the entire riverbed, causing water turbidity. There is no supervision from local or village government authorities to regulate and monitor the gold mining activities carried out by the community. Moreover, mining activities are not conducted in accordance with applicable regulations, and they neglect environmental sustainability aspects.

The main objective of this research is to identify the impacts of sand mining activities on environmental sustainability and the local community. Overall, gold mining activities can cause both positive and negative impacts. This study examines both types of impacts. After identifying the positive and negative impacts, the research will explore the causes. Then, regulations can be established and enforced for miners to ensure mining activities have positive effects and minimize negative impacts on environmental sustainability and the local economy. The rules need to be strictly applied so that gold mining does not cause further environmental damage and the community's economy improves through environmentally friendly mining.

Many studies on the impact of gold mining in this area have focused mostly on the miners' economic aspects. However, this research focuses more on the economic impact on the community and the environmental impact. Sand mining activities cause serious environmental damage if viewed only from the public's perspective, so further research on the impacts of this activity is necessary.

In relation to these issues, the author conducted this research entitled "The Impact of Gold Mining on the Community in Nagari Tambang, Salido Subdistrict, Pesisir Selatan Regency, West Sumatra Province."

LITERATURE REVIEW

Impact of Gold Mining on Community Economy

Gold mining, whether legal or illegal, has a significant impact on the community economy. Several studies have shown that although gold mining can provide economic benefits, the long-term impacts are more complex and not always beneficial. Increased Income and Livelihoods, Gold mining provides direct economic benefits to individuals involved in the mining process. In many cases, it is the main source of income, especially in less developed areas. According to Barlow et al. (2017), gold miners in Africa and Asia often experience significant increases in income in the short term. This allows them to improve their quality of life, buy basic necessities, and pay for education and health costs.

Employment Creation, As explained by Hentschel, et al. (2003), gold mining, especially in developing countries, can create jobs not only for miners, but also for traders and other related service providers. In many cases, gold mining also opens up opportunities for side

economic activities, such as trading in mining equipment, transportation, and logistics.

Economic Dependence and Social Instability, Although gold mining brings economic benefits, there is a high economic dependency on this sector. Research by Hilson (2002) shows that this dependency makes it vulnerable to gold price fluctuations. When the price of gold falls, communities that are completely dependent on gold mining can experience a drastic decrease in income, triggering social instability and increasing poverty levels. Inflation and Increase in Prices of Goods, A study conducted by Cawley (2010) shows that increased income due to gold mining can cause inflation in the prices of basic necessities. Although communities involved in mining benefit economically, they are often unable to avoid price spikes that occur as a result of increased demand.

The Environmental Impact of Gold Mining

Gold mining, especially when conducted without adequate supervision, can cause significant adverse effects on the environment. These impacts vary widely, ranging from water pollution and soil degradation to the loss of biodiversity. The use of mercury and cyanide in the gold extraction process is one of the primary causes of environmental contamination. Buurman and Evers (2011) explain that many traditional gold mining operations use mercury to bind gold particles, which leads to pollution of water and soil. Mercury-contaminated water not only endangers aquatic ecosystems but also threatens human health, particularly in areas that depend on rivers and lakes as sources of clean water. Furthermore, Lebel et al. (2014) found that soil contamination resulting from illegal gold mining causes degradation of soil quality, reduces soil fertility, and inhibits agriculture reliant on such soil.

Gold mining often requires large-scale land clearing, which causes deforestation and destruction of natural habitats for flora and fauna. Research by Gómez et al. (2007) reveals that gold mining in the Amazon region, for example, has caused extensive deforestation and threatens the biodiversity of tropical rainforests. Macdonald (2010) also notes that gold mining permanently alters landscapes, resulting in the loss of native vegetation and threatening wildlife dependent on these ecosystems. As a consequence, many species become endangered, and forest ecosystem functions are disrupted.

Gold mining also contributes to severe soil erosion. Sullivan (2011) demonstrates that gold mining causes structural damage to soil, which increases erosion and reduces the soil's ability to absorb water, leading to more frequent flooding and disrupting agriculture and settlements.

Gold mining results in the loss of biodiversity in many areas. Burgess et al. (2012) report that gold mining practices cause serious damage to various plant and animal species inhabiting areas around mining sites. Pollution, deforestation, and ecosystem disturbances threaten species dependent on these ecosystems, putting some at risk of extinction.

In addition to impacts on water and soil, gold mining also causes air pollution. Mining processes involving fuel use and combustion can produce exhaust gases and dust that degrade air quality. Zhang et al. (2008) report that gold mining areas are frequently exposed to air pollution, which endangers the health of miners and local communities.

Efforts to Reduce Negative Impacts

To reduce the negative impacts of gold mining on the economy and environment, various efforts can be made:

1. Implementation of Sustainable Mining Practices, Hilson (2002) proposed the implementation of sustainable and environmentally friendly mining practices, including the use of more efficient technology in managing mining waste and reducing mercury and cyanide pollution.
2. Improved Policy and Regulation, stricter policies from the government and more effective supervision of mining activities can help reduce environmental damage. Hentschel et al. (2003) suggested that the government and authorities be more proactive in supervising and controlling mining activities, as well as providing training to the community on environmentally friendly mining techniques.
3. Development of Economic Alternatives, along with the high dependence on mining, the development of sustainable economic alternatives, such as organic farming or ecotourism, can help communities adapt to the impacts of mining and reduce their dependence on this sector. Macdonald (2010) noted that increasing the

diversity of community livelihoods can reduce dependence on gold mining.

Thus, it can be stated that gold mining provides significant economic benefits to communities, both in terms of increased income and job creation. However, its long-term impacts, such as economic dependency and inflation, may lead to social and economic instability. From an environmental perspective, gold mining especially illegal or inadequately supervised operations causes water pollution, deforestation, and ecosystem degradation. Therefore, improved policies, the implementation of sustainable practices, and the development of alternative economic activities are necessary to mitigate the negative impacts of gold mining.

METHOD

This study is designed using a qualitative research approach. According to Sugiyono (2013), qualitative methods are employed to obtain in-depth data, data that contains meaning. The research object concerns gold mining activities in Nagari Tambang, Salido Subdistrict, Pesisir Selatan Regency, and their impacts on environmental sustainability as well as the socio-economic effects on the local community, which are expressed in the form of words, sentences, paragraphs, and documents rather than numerical data. The research object is not manipulated, allowing it to remain in its natural condition, which is one of the criteria for qualitative research (Hulukati & Isa, 2020).

To obtain data relevant to the research problem, the researcher uses an informant selection technique known as Snowball Sampling. According to Sugiyono (2013), snowball sampling is a sampling technique that begins with a small number of initial samples, who then select their acquaintances to become further samples, and so forth, thus increasing the sample size. This process is metaphorically compared to a snowball rolling and growing larger over time. The key informants in this study are the Head of Nagari Tambang and the Youth Leader.

Research Location

This study was conducted at the gold mining site in Nagari Tambang, Salido Subdistrict, Pesisir Selatan Regency, West Sumatra Province.

Research Approach

This research employs a qualitative approach to obtain in-depth data, data that contains meaning. The object of this study concerns gold mining activities in Nagari Tambang, Salido Subdistrict, Pesisir Selatan Regency, and their impacts on environmental sustainability as well as the socio-economic effects on the local community. These impacts are expressed in the form of words, sentences, paragraphs, and documents rather than numerical data. Data will be collected through direct observation, in-depth interviews, and focus group discussions (FGD).

Research Procedure

The steps involved in this study are as follows:

1. Observation. Observation refers to the activity of watching, focusing on objects, events, movements, or processes. Sutrisno Hadi, as cited in Sugiyono (2013), explains that observation is a complex process composed of various biological and psychological processes, among which observation and memory are the most important. The observation conducted by the researcher involves direct monitoring of the impacts of sand mining activities in Tumbihe Village, Kabila Subdistrict, on environmental sustainability to obtain the necessary information for this study. The objects observed include (1) sand mining activities, and (2) the environmental impacts of sand mining.
2. Interview. According to Esterberg in Sugiyono (2013), an interview is a meeting between two people to exchange information and ideas through questions and answers, enabling the construction of meaning on a particular topic. This technique is used as a data collection method complemented by other methods. Through interviews, the researcher aims to gain insights into the research object. The key aspects of the interview focus on (1) sand mining activities, and (2) the environmental impacts of sand mining.
3. Documentation. Documentation in this study is used to investigate written documents to obtain data about sand mining activities in Tumbihe Village, Kabila Subdistrict, and their impacts on environmental sustainability. Documents used may include written regulations, images/photos, videos, field observation notes, audio recordings, and various other types of documents.
4. Data Reduction. Data reduction involves carefully

and thoroughly recording the extensive data collected from the field. The reduced data provides a clearer picture and facilitates the researcher in subsequent data collection and retrieval if needed.

5. Data Presentation. Data presentation is the activity of organizing a set of information to enable drawing conclusions and decision-making. Qualitative data presentation may take the form of narrative texts such as field notes, matrices, graphs, networks, and charts. These forms combine information in a coherent and accessible manner, making it easier to understand the ongoing situation, assess the accuracy of conclusions, or conduct further analysis.
6. Conclusion Drawing. This step is used to draw the main thread of the study and produce findings based on the phenomena observed.

Data Collection Instruments

We employed the interview technique to collect in-depth data in the field, aiming to explore individual perspectives regarding the impacts of gold mining. These interviews will be conducted with various stakeholders, including miners, local community members, government officials, and environmental experts.

Table 1. In-depth Research Instrument Construct

Informant	Indicator	Interview Questions
Miners	Economic	1. How does working in gold mining affect your family's income? 2. What changes have you experienced in your quality of life since you started working in the gold mine? 3. How does gold mining affect other livelihoods of miners besides mining (e.g., agriculture or trade)? Considering the long-term economic impact on individual and community livelihoods, what do you anticipate?
	Environmental	1. What environmental changes (such as soil, water, or air degradation) have you observed around the mining area? 2. How is the condition of water around the mining site? Is there contamination from mercury or other chemicals used in the mining process?
Local Community	Economic	1. How does gold mining activity affect the livelihoods of miners? 2. Have there been any changes in the prices of goods or services around the mining area? 3. What are the socio-economic impacts of gold mining presence on the local community?
	Environmental	1. What are the most significant environmental impacts of gold mining felt around the mining community? 2. What types of environmental damage (such as deforestation, water pollution, or air quality degradation) have resulted from gold mining? 3. Are there any efforts or policies from the government or community groups to address environmental problems caused by gold mining?
Government or Relevant Institutions	Economic	1. What government policies exist to support the local economy in relation to gold mining? 2. How do legal and illegal gold mining activities affect the regional economy? 3. Are there any positive impacts of gold mining on infrastructure development in the area?
	Environmental	1. How does the government manage the environmental impacts of gold mining activities? 2. Are there regulations governing the exploitation of natural resources, and how are these policies implemented on the ground? 3. What measures has the government taken to mitigate the negative environmental impacts of mining?

1. Data Preparation and Collection

The first step involves carefully gathering all relevant data from various sources such as in-depth interviews, field observations, and questionnaires. Interviews are transcribed accurately to capture every detail of the conversations. This transcription forms the foundation for the analysis. After transcription, an initial coding is conducted where key words or phrases related to economic and environmental aspects are highlighted. This preparation ensures that the data is ready for a thorough and systematic analysis.

2. Data Cleaning

Once data is collected, it must be cleaned to remove any irrelevant or redundant information that does not contribute to the research objectives. This process involves filtering out unnecessary data and organizing the remaining information into coherent categories. By cleaning the data, the researcher can focus on the most meaningful and useful data, which simplifies subsequent analysis.

3. Coding Process

Coding is a central step in qualitative data analysis. It involves labeling portions of the data to identify and group similar ideas or concepts. Coding can be done inductively, where codes and themes emerge naturally from the data without preconceived notions, or deductively, where codes are predetermined based on existing theories or frameworks. This step helps in systematically organizing the data and identifying patterns relevant to the study.

4. Categorization and Theming

After coding, the next step is to organize the codes into broader categories and themes. This categorization helps to structure the data into meaningful groups such as "Economic Impact" or "Environmental Impact." From these categories, main themes are derived that reflect the core issues being studied. This process allows the researcher to focus on the larger picture and key insights emerging from the data.

5. Thematic Analysis

Thematic analysis involves a detailed examination of the identified themes to explore patterns and relationships within the data. The researcher interprets how these themes relate to the research questions and the broader context. This analysis also involves constructing a narrative that integrates direct quotes and observational data, providing a rich, in-depth understanding of the study's findings.

6. Data Triangulation

To strengthen the validity of the research findings, triangulation is used by comparing data from multiple sources such as interviews, observations, and questionnaires. Additionally, involving more than one researcher in the analysis process helps reduce bias. Triangulation may also include comparing findings with relevant theoretical frameworks to ensure a comprehensive and balanced interpretation.

7. Validity and Reliability Measures

Ensuring the credibility of the research is achieved through techniques such as member checking, where preliminary findings are shared with participants for confirmation and feedback. Keeping an audit trail that documents all decisions and steps in the analysis process helps maintain transparency. Researchers also engage in reflexivity by acknowledging their own potential biases and how these may influence the interpretation of data.

8. Development of Findings and Drawing Conclusions

The final step involves synthesizing the analysis into clear and coherent findings that explain the economic and environmental impacts of gold mining. This includes highlighting community and government responses as well as identifying opportunities for policy interventions or actions to mitigate negative consequences. The conclusions drawn from the research provide valuable insights and recommendations based on the data collected and analyzed.

RESULTS AND DISCUSSIONS

Mining operations encompass some or all stages of activities related to the exploration, management, and exploitation of minerals and coal. These stages include general surveys, exploration, feasibility studies, construction, mining, processing and refining, transportation and sales, as well as post-mining activities (Article 1 point 6 of Law No. 4 of 2009 concerning Mineral and Coal Mining). Social impacts refer to the consequences or influences occurring within socio-economic and environmental events that bring both positive and negative effects on community life. Based on the comprehensive results of interviews and observations, the researcher found that the economic impact of gold mining management in Nagarai Tambang, Salido District, Pesisir Selatan Regency has contributed to

improving the local economy. However, it has also caused environmental damage, including landslides. These impacts can be classified as follows:

The Impact of Gold Mining on the Economy of the Community in Nagari Tambang

Economic conditions refer to the reality or situation perceived by human senses regarding an individual's awareness and ability to meet their needs. The economic problem faced by a person is the effort or attempt to fulfill their needs in order to achieve prosperity. In daily life, a person's socio-economic condition is influenced by two interrelated factors: the sources of family income (earnings), which are limited, and the unlimited nature of family needs in both quantity and quality. Employment determines socio-economic status because through work, all needs can be fulfilled. Work not only has economic value but also represents human efforts to gain satisfaction and receive compensation or wages, in the form of goods and services necessary for living. A person's job affects their economic capability; thus, working is essential for every individual because it provides both physical satisfaction and the fulfillment of life needs.

Economics is a primary issue in community life, and various efforts are made to meet economic needs, ranging from small-scale to large-scale enterprises. One such effort to support the economy of Nagari Tambang's community is through mining activities. Social changes in the community do not only occur during the mining process but also continue through the utilization of post-mining land. Social transformations such as changes in livelihood and community development continue to take place after mining activities have ended. These changes greatly contribute to improving social welfare.

Gold mining, which has promising prospects, essentially aims to combat poverty and achieve prosperity for all layers of society. For the majority of people in Nagari Tambang, gold mining is their primary daily occupation, while farming is secondary. Some community members from Nagari Tambang as well as migrants from other areas have shifted their livelihoods to mining work. This shift is due to declining income from farming or other traditional livelihoods and a lack of available employment opportunities, especially since most miners have only completed elementary education.

Despite the various risks involved in illegal mining, it remains an attractive job for the people of Nagari Tambang. The economic impact is evident through the increased income of miners, who earn an average of IDR 2,500,000 per month from mining activities, compared to farming which averages about IDR 1,800,000 per month. This is because mining serves as the main source of income for the community in Nagari Tambang.

Gold mining can have a significant economic impact on the people of Nagari Tamin, both positive and negative. Based on in-depth interviews with miners and the surrounding community, as well as the results of field observations, several key findings were found related to the economic impact of gold mining activities in this region:

1. Increase in Short-Term Income, Most miners admit that their income has increased since they started mining gold. This is especially true for small miners or traditional miners who work on a small scale. In some cases, gold mining activities have increased the income of mining families, leading to temporary improvements in quality of life. They can buy better basic necessities and improve household facilities. Where when farming they get an average income of Rp.1,800,000 per month, but since mining their income has increased to Rp.2,500,000.
2. Job Creation, Gold mining in Nagari Tambang also creates jobs for the local community. In addition to the main miners, there are many supporting jobs emerging, such as transport workers, traders, and other support services (e.g. fuel and mining equipment providers).
3. Reliance on Mining, Although gold mining increases income in the short term, many miners and families have become heavily dependent on mining activities as their sole source of income. This dependence causes its vulnerability to fluctuations in gold prices and the sustainability of natural resources.

Gold mining activities often cause social tensions between miners, local communities, and other stakeholder groups. In addition, the emergence of illegal miner groups has led to problems of insecurity and a decline in the quality of life for the local community. This also applies to areas other than the mining country judging from the results of research by others including According to Apriani (2012) that the number of members is closely related to the responsibility of the head of the family to earn a living, because the higher the number of family dependents, the greater the need.

This mining activity can relatively overcome the family economy, by mining gold some people in Nagari

Tambang can improve the family economy. With an increase in economic income from previous jobs, workers can build and repair houses, make stalls, buy vehicles (motorcycles and cars), can save for the future, are able to finance their children's education or school from elementary school to college, and help their relatives financially.

This is in agreement with the results of research conducted by Raamlah, Bahtiar and Bakri Yusuf (2019) on the Impact of the Existence of Gold Mines on the Socio-Economic Conditions of Farming Communities (Study in Rau-Rau Village, Rarowatu District, Bombana Regency), This study evaluates the impact of the existence of gold mines on the socio-economic conditions of the farming community in Rau-Rau Village, Bombana Regency, Overall, the existence of gold mines has a positive impact that significant, especially in encouraging and driving the community's economy. However, on the other hand, mining activities also trigger a number of social unrest. To overcome this problem, the community seeks preventive measures by educating about religious education in the family and community environment, as well as establishing good cooperation with law enforcement.

Meanwhile, the results of the research of Wahyudi E, Slameto, (2014) "The negative impact of unlicensed gold mining activities (crates) on the environment and socio-economy of the community in Central Kalimantan Province". This article examines the negative impact of unlicensed gold mining on the environment and socio-economy of the community in Central Kalimantan, The current rampant gold mining activities have caused problems related to the practice of unlicensed gold mining (PETI) by the community. PETI activities that are not properly managed have a negative impact on both the environment and the socio-economic aspects of the community. Some of the negative impacts that arise include: (1) a decrease in soil quality; (2) increased risk of erosion and landslides; (3) reduced to loss of ground cover vegetation; (4) sedimentation, pollution, and soil quality degradation; and (5) shrinking land cover area in forest areas.

In addition, this practice also triggers violations of the law, social conflicts, and disturbances to public safety. To overcome the problems caused by PETI activities, measures to control pollution and environmental damage that occur are needed. This includes providing special locations for people's mining, the application of mining technology that suits their needs, while still prioritizing the local wisdom of the local community. In addition, simplification of regulations for people's mining activities, as well as strict supervision and law enforcement are also very necessary.

Demiakian was also proposed by Setiana (2018) in a study titled the impact of gold mining on the socio-economic life and environment of the community in Beutong District, Nagan Raya Regency**.** This study analyzes the impact of gold mining on the socio-economic life and environment of the community in Beutong District, Nagan Raya Regency, the results of the study reveal that gold mining brings a social impact in the form of shifting people's jobs, who turn into gold miners, as well as an increased risk of accidents and deaths in these activities. From an economic point of view, this mining activity contributes to increasing people's income. However, on the environmental side, the impacts that arise include damage to agricultural land and an increased risk of floods or landslides.

The Impact of Gold Mining on the Environment

Mining activities can cause serious environmental damage in an area or region. These impacts can be seen physically such as deforestation, river water pollution, changes in soil structure, and others. The main environmental impact of mining is at the time of exploitation and its use for what can be used as energy (oil, gas and coal). Environmental pollution is a situation that occurs due to unfavorable changes in environmental conditions (soil, air and water) (damaging and detrimental to humans, animals and plants) caused by the presence of foreign objects (such as garbage, industrial waste, oil, hazardous metals, etc.) The larger the scale of mining activities, the larger the impact area, the form of damage at the location can be seen in Figure 1.

Changes in the shape of the environment due to mining activities can be permanent, or cannot be returned to their original state. Land that was previously used for gardening but can no longer be used due to river erosion and soil loss of fertility, this activity is actually realized by the community and workers, there are some workers who understand the environment but due to economic pressure they are forced to continue to make decisions to work in mining because they do not get other jobs. Mining that is not carried out according to environmental protection standards can damage the existing soil vegetation and genetic profile, so that the soil that was originally fertile can turn dry and barren.

Fig.1. forms of environmental damage due to gold mining activities in nagari Tambang

Inappropriate land use can also permanently change the general topography of the mining area which can result in landslides. The destruction of nature or the environment has now reached the most alarming point for all of humanity. The destruction of the environment is mainly caused by the unstoppable human desire to utilize the environment or nature for the sake of improving the standard and quality of human life. The difference between damaging soil structure and forest structure is that soil structure destruction is a process that changes the soil structure from hill to flat, from a towering mountain to hollow. Meanwhile, damage to forest structures is damaging forest cover, meaning that there are wooden stands or trees that become arid and deforested, so that it damages the forest structure.

Gold mining in mining countries, both large-scale and small-scale, causes more environmental damage, severe in mining countries because in its implementation they need to empty large areas, dig deep holes and underground passages and move an extraordinary amount of excavated soil. By doing so, it can damage the construction of the soil, the condition allows the entry of one or more chemical, physical, or biological objects into the soil where these objects can damage the soil structure and make it difficult for plants to adapt. This gold mining activity causes soil damage due to mineral exploitation. This gold mining has a high environmental risk for the environment in the mining country and must receive special attention by the public.

The environmental factor that is this area has been for hundreds of years the mining legitimacy has occurred resulting in this being a common thing done by the mining community, but this is a crucial problem that needs to be intensively supervised with mining activities that are almost unsupervised. The forms of environmental damage that have had an impact today in the long term are in the form of landscape changes, landslides and erosion, as well as water pollution (water flows have been contaminated by mercury used by miners) and agricultural land that has been damaged and the loss of soil humus resulting in a decrease in land production (land degradation). This impact will be felt not only by the current generation, but also by generations and generations of children and grandchildren. Like the mountainous land in the Nagari Tambang area is believed to contain abundant gold, for the people in Nagari Tambang and the mine is a field of sustenance for the community.

Based on field observations and interviews with environmental experts and local communities, we found some key findings related to the environmental impact of gold mining activities can be summarized as follows:

1. Limited Natural Resource Management:, Some legal gold mining follows stricter guidelines related to environmental management. Large mining companies sometimes carry out reforestation, soil restoration, and better waste management. However, this is more limited to large gold mining that follows environmental regulations.
2. Water and Soil Pollution, The use of mercury and cyanide in the gold extraction process causes water and soil pollution. River water and local water sources are often contaminated with mercury, which can affect the quality of water used by communities for daily needs. Some traditional miners complain about pollution that reduces their water sources and causes damage to crops and

soil. In some locations, this pollution has an impact on freshwater ecosystems, including the death of fish and other living creatures that depend on those ecosystems.

3. Deforestation and Habitat Destruction, Uncontrolled gold mining causes forest destruction and deforestation. Miners often clear land in search of gold, which leads to the loss of vegetation and natural habitat for wildlife. It also reduces the soil's ability to absorb water, increasing the risk of flooding and soil erosion.
4. Damage to Ecosystems and Biodiversity, Irresponsible gold mining can disrupt the balance of local ecosystems. Mining practices that are not environmentally friendly, such as illegal mining and the use of hazardous chemicals, damage local biodiversity, reduce soil quality, and contaminate plants and wildlife around mines.
5. Air Quality Degradation, Mining processes that involve burning fuel or using large machinery can also cause air pollution. Dust and exhaust gases from mining machines cause a decrease in air quality around the mining area, which can have a detrimental impact on human and animal health. This has been done in many studies by researchers, which include:

As a result of Asril's (2014) research, mining business activities are activities that are sure to cause damage and environmental pollution is something that cannot be denied. Therefore, to take or acquire certain excavated materials, it is certain that excavation, meaning that there will be an overhaul or change in the earth's surface, in accordance with the characteristics of the formation and existence of the excavated material, which is genetically or geologically in its formation or occurrence must meet certain geological conditions and must be below the earth's surface, sea and/or earth's surface, especially as secondary or alluvial deposits. But on the other hand, it must be realized that mining activities are industries that provide basic raw materials for downstream industries. Thus, the excavation activities continue to take place, as long as human civilization exists in the world.

This research was conducted by Nurhasanah (2022) stating that the results of the study showed that the mining process was carried out relying on traditional methods, miners used simple tools to make holes or wells, and took excavated materials without the help of machines. Separation, refining, and grinding are done manually, while filtration is done without strict safeguards, so it can be directly contaminated by humans. The extraction process also involves combustion. This condition has a significant impact on the environment around the gold mining site. Some of the changes that occurred included the conversion of land from plantations to gold processing units, which had an impact on soil and vegetation. In addition, there are subsidence around gold processing units, soil pollution in residential environments, and pollution of river water and residents' wells due to the disposal of mercury waste, which can no longer be properly accommodated by existing shelters.

While environmental damage due to gold mining is mercury according to Paradise (2023), in the process of amalgamation mercury (Hg) is also released to the environment in the washing process. Some of the mercury bound to gold is filtered and will separate the gold and mercury separately. The rest of the mercury from this filter can usually still be used again. The remaining gold will usually be burned to obtain pure gold, burning in the open will cause mercury vapor emissions resulting in air pollution. The steam from burning gold will be wasted into the environment by 25-30% (Veiga et al., 2009). Therefore, it can be ascertained that the source of mercury pollution occurs in water, soil and air.

The same thing is also expressed in the results of Sugianti's (2014) research, the results of the study revealed that mercury levels were detected in 72% of locations, while cyanide levels in water were found in 66.7% of sampling locations. The analysis showed that the mercury content in the soil exceeded the permissible threshold, as well as the cyanide content in the water. In addition, in natural grass samples, the measured mercury content reached 0.05 ppm. The large area of mercury and cyanide pollution in the environment and animal feed can result in low exposure to the community and surrounding livestock. Therefore, it is necessary to take anticipatory measures to reduce negative impacts and dangers that can threaten human health and livestock.

In addition, the results of the research of Ismail, et al, (2016) show a positive impact in the form of increasing labor absorption, economic growth and increasing new transportation routes. The negative impacts felt by the community are land damage, mercury pollution, increasing infectious diseases and mercury poisoning and the emergence of environmental conflicts due to injustice in mining management. The enactment of Law Number 23 of 2014 concerning Regional Government makes the authority of mining licensing shift to the Provincial

Government while in Law Number 4 of 2009 concerning Mineral and Coal Mining, the authority lies with the Regency/City Government which is in accordance with a deeper understanding of the conditions in the mining area. The authority of districts/cities over mining management was revoked along with the enactment of Law Number 23 of 2014. This condition marginalizes local wisdom that is better understood by districts/cities. Therefore, it is necessary to have a judicial review of Law Number 23 of 2014. The model of handling the impact of gold mining in West Kalimantan Province on the environment and society will be effective with a communicative tripartite model that involves elements that play a role in mining business activities, namely the government, the community, and mining entrepreneurs in a communication based on local wisdom because of the most substantial interaction between entrepreneurs and the community.

CONCLUSION

Based on the discussion of research results related to the formulation of problems about economic impact, environmental impact and health impact of Gold Mine Management in Nagari Tambang, Salido District, South Pesisir Regency, gold mining has a dual impact on the community and the environment. Positive economic impacts can be seen in short-term income increases and job creation, but negative impacts such as dependence on mining become a long-term problem. From the environmental side, although there are few better management efforts in large gold mining, illegal and unsupervised mining causes water pollution, deforestation, and ecosystem damage, then it can be concluded if (1) The economic impact that has increased in the form of the income of the mining community, the income if mining reaches an average of 2,500,000 per month compared to farming or farming which has an average income of Rp. 1,800,000 per month. This is because mining is a source of income for the people in Nagari Tambang; (2) Environmental impacts that cause long-term environmental damage in the form of landscape changes, landslides and erosion, and river water pollution in mining sites so as to damage the environmental ecosystem at the mining site.

Acknowledgement: The author would like to express sincere gratitude to all parties who contributed to this research, especially the people of Nagari Tambang, the interviewees, and the relevant institutions for their support and valuable information. This research would not have been completed successfully without their cooperation and assistance.

Conflict of Interest: The authors declare that there are no competing interests relevant to the content of this article.

REFERENCES

Alaji, I. A. 2022. Tingkat Pencemaran dan Rekomendasi Pengelolaan Lingkungan Akibat Pencemaran Merkuri Pada Area Pengolahan Emas Rakyat Sungai Sangon Kelurahan Kalirejo, Kulon Progo, DI Yogyakarta (Doctoral dissertation, Universitas Gadjah Mada).

Alwan, M. D. 2021. Analisis Konsentrasi Hg Pada Sedimen Sungai Di Lokasi Tambang Emas Tradisional, Kulon Progo, Yogyakarta.

Antara News.com (2015). BPMPD Ungkap Potensi Pertambangan di Kalteng. https://kalteng.antaranews.com/berita/242072/bpmpd-ungkap-potensi-pertambangan-di-kalteng.

Banunaek, Zofar Agluis (2016) Pencemaran Merkuri Di Lahan Pertambangan Emas Rakyat Dan Strategi Pengendaliannya. Masters thesis, Institut Teknologi Sepuluh Nopember Surabaya.

Barlow, C., et al. (2017). "Impacts of artisanal gold mining on rural livelihoods: A global perspective." Resources Policy

Dondo, S. M., Kiyai, B., & Palar, N. (2021). Dampak sosial pengelolaan tambang emas di Desa Bakan Kabupaten Bolaang Mongondow. Jap, 7(101), 63–72.

Gerakkalteng.com (2018). Penambang Jangan Kucing-Kucingan Dengan Polisi. https://gerakkalteng.com/2018/02/penambang-jangan-kucing-kucingan-dengan-polisi.

Hasanah, umi, nur 2022. Analisis Dampak Kegiatan Pertambangan Emas Terhadap Lingkungan Fisik Di Desa Paningkaban Kecamatan Gumelar Kabupaten Banyumas Tahun 2021, Indonesian Journal of

Environment and Disaster (IJED) ISSN: 0000-0000 Vol. 1, No. 1 (April 2022) Page. 18-23.

Hulukati, M., & Isa, A. H. (2020). Dampak Penambangan Pasir Terhadap Kelestarian Lingkungan Di Kelurahan Tumbihe. 1(2), 44–53.

Hentschel, T., et al. (2003). "Artisanal and small-scale mining: A global overview and policy implications." World Bank.

Hilson, G. (2002). "The environmental impact of small-scale gold mining in Ghana: Identifying problems and possible solutions." The Geographical Journal.

Ismail. Nurhasan , dkk (2016) dalam di sertasi Universitas Gajah Mada, Model Penanganan Dampak Pertambangan Emas Terhadap Lingkungan dan Masyarakat di Provinsi Kalimantan Barat.

Nandang Sudrajat, Teori dan Praktik Pertambangan Indonesia, Yogyakarta, Penerbit Pustaka Yustisia,2013.cet.ke-1 hal.1.

Morshed, M. M., & Haseeb, A. S. M. A. (2009). Physical and Chemical Characteristics of Commercially Available Brake Shoe Lining Materials: A Comparative Study. Dhaka: Materials and Metallurgical Department. Bangladesh University of Engineering and Technology

Macdonald, A. (2010). "Mining and the environment: From ore to metal." Springer.

Metode Penelitian Manajemen: Pendekatan,Kuantitatif, Kualitatif, Kombinasi (Mixed Methods), Penelitian Tindakan (Action Research), Penelitian Evaluasi (2013).

Media Indonesia (2018). Solusi Atasi Limbah Merkuri. https://mediaindonesia.com/humaniora/163120/solusi-atasi-limbah-merkuri

Pudjuastuti, Tri nuk. 2009. Dampak kegiatan penambangan emas terhadap Budaya dan Ekonomi Masyarakat di Bombana.

Raamlah,Bahtiar dan Bakri Yusuf (2019) Tentang Dampak Keberadaan Tambang Emas Terhadap Kondisi Sosial Ekonomi Masyarakat Petani (Studi Di Desa Rau-Rau Kecamatan Rarowatu Kabupaten Bombana), jurnal Neo Societal vol 4 no 4.

Sullivan, C. (2011). "The social and environmental impact of gold mining." Springer.

Setiana (2018) dalam penelitian dengan judul dampak penambangan emas terhadap kehidupan sosial ekonomi dan lingkungan masyarakat di kecamatan beutong kabupaten nagan raya. Junal Ilmiah Mahasiswa Ekonomi Universitas Syiah Kuala vol 3 no 4.

Sari, H. 2022. Analisis Dampak Sosial Ekonomi Dan Lingkungan Pertambangan Emas Skala Kecil (Studi Kasus Desa Hutabargot Setia Kabupaten Mandailing Natal) (Doctoral dissertation, Universitas Andalas)

Sugianti, G. S. Astiti and T (2014) tentang Dampak Penambangan Emas Tradisional pada Lingkungan dan Pakan Ternak di Pulau Lombok, jurnal Sains Peternakan Vol. 12 (2), September 2014: 101-106 ISSN 1693-8828

Waniatri, W., Muslihudin, M., & Lestari, S. (2022). Dampak Sosial, Ekonomi dan Lingkungan Pertambangan Pasir di Desa Luragung Landeuh Kuningan, Jawa Barat. Jurnal Ilmu Lingkungan, 20(2), 279–290. https://doi.org/10.14710/jil.20.2.279-290

Wahyudi E, Slameto,(2014) Dampak negatif kegiatan penambangan emas tanpa izin (peti) terhadap lingkungan dan sosial-ekonomi masyarakat di provinsi kalimantan Tengah, jurnal teknik pertambangan (JTP) Universitas Palangkaraya.

Zhang, Y., et al. (2008). "Air quality and health impacts of mining." Journal of Environmental Health Perspectives