

Gold Panning and Youth: Socio-Economic Dynamics, Governance Challenges and Prospects for Sustainable Development in the Communes of Maevatanana I, Maevatanana II, Antanimbary and the Gold Mining Site of Antsiafabositra (Betsiboka Region, Madagascar)

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Abstract

Artisanal gold mining is one of the main economic activities in the Betsiboka Region of Madagascar, particularly in the municipalities of Maevatanana I, Maevatanana II, Antanimbary and the Antsiafabositra mining site. Owing to its significant gold potential, the region attracts a growing number of young people from different parts of the country seeking better economic opportunities in a context characterized by unemployment, low agricultural income and limited access to stable employment. This study examines the factors driving youth participation in artisanal gold mining and analyzes its economic, social, health, environmental and institutional implications for the affected territories.

The research adopts a qualitative approach based on documentary analysis of scientific publications, institutional reports, legal and regulatory texts, and available information concerning Madagascar's artisanal mining sector. The findings indicate that artisanal gold mining plays a dual role. On the one hand, it provides an immediate source of income for many households, stimulates local trade, transport-related supports activities and contributors to local economic dynamics. On the other hand, it generates significant challenges, including school dropout, internal migration, occupational hazards, growing insecurity, environmental degradation, informal gold trade and persistent governance weaknesses in the management of artisanal mining activities.

The study argues that achieving sustainable management of gold resources requires an integrated strategy combining the formalization of artisanal mining, stronger public governance, environmental protection, improved occupational safety and the promotion of diversity livelihood opportunities for young people. Such an approach would enable artisanal gold mining to contribute more effectively to sustainable territorial development in the Betsiboka Region.

Keywords: Artisanal Gold Mining, Youth, Mining Governance, Territorial Development, Sustainable Development, Betsiboka Region

1. Introduction

Artisanal and small-scale gold mining is one of the most widespread forms of mining in the developing world today. It represents a vital source of income for millions of people living in rural areas, where formal employment opportunities remain limited [1]. However, despite its socioeconomic importance, this activity is also associated with numerous challenges related to governance, worker safety, environmental protection, and the

regulation of gold marketing channels¹.

In Madagascar, the gold sector plays a strategic role in the national economy. Artisanal gold mining has been practiced for several decades and provides a livelihood for many rural families. However, the sector remains largely informal, which limits tax revenue and complicates the implementation of an effective governance system². Deficiencies in administrative oversight,

weak production traceability, and the growth of the illicit gold trade are recurring problems identified by regulatory bodies³.

The Betsiboka region, particularly the communes of Maevatanana I, Maevatanana II, Antanimbary, and the Antsiafabositra gold mining site, is among the country's main gold-bearing basins [2]. These areas are experiencing a significant increase in artisanal gold mining activity due to the availability of easily exploitable alluvial deposits. This situation attracts a large migrant population, primarily composed of young people from various regions of Madagascar, seeking quick income and better living conditions³.

The involvement of young people in gold panning can be explained by a combination of structural and social factors. High unemployment, precarious agricultural incomes, a lack of qualifying vocational training, and limited local economic opportunities are the main causes of this migration to mining sites. In this context, gold panning appears as an immediate economic alternative, although it is often characterized by significant income instability and increased exposure to social and occupational risks⁴.

Beyond its direct economic impacts, artisanal gold mining also raises major challenges in public governance and territorial development. Local authorities must cope with the rapid growth of informal mining activities while simultaneously ensuring environmental protection, public safety, and the mobilization of tax revenue. However, institutional shortcomings, weak administrative oversight, and the complexity of gold marketing channels limit the effectiveness of implemented public policies⁶.

Despite the economic and social importance of gold panning in the Betsiboka region, specific studies focusing on young people in the communes of Maevatanana I, Maevatanana II, Antanimbary, and the Antsiafabositra site remain limited [3,4]. This research therefore aims to analyze the factors influencing their involvement in this activity, examine its multidimensional impacts, and identify associated governance challenges, in order to contribute to a better understanding of local dynamics and the formulation of more appropriate public policies.

1.2. Study Context

The Betsiboka region, located in west-central Madagascar, is one of the country's main gold bearing areas. It is characterized by a diversity of geological formations favorable to the presence of alluvial gold deposits, which explains the intensity of artisanal mining activities observed for several decades⁵.

From an administrative and territorial perspective, the study focuses specifically on the municipalities of Maevatanana I, Maevatanana II, and Antanimbary, as well as the gold mining site of Antsiafabositra. These localities are characterized by a high concentration of artisanal mining activities, attracting a significant migrant population composed primarily of young people seeking economic opportunities. This migratory dynamic contributes to rapid local population growth, often without urban planning or adaptation of public infrastructure⁸.

Maevatanana, considered one of the historical centers of gold mining in Madagascar, plays a central role in organizing gold-related economic flows [5]. Activities there are dominated by informal artisanal mining, using traditional techniques with little mechanization. This form of exploitation relies primarily on human labor, which leads to a high concentration of young, unskilled workers⁶.

In rural communities like Antanimbary and at gold mining sites such as Antsiafabositra, artisanal gold mining often constitutes the main, or even sole, economic activity for a large part of the working population. The lack of structured economic alternatives, combined with the weakness of the agricultural sector during the dry season, exacerbates households' dependence on this mining activity¹⁰.

However, this concentration of extractive activities is accompanied by numerous socio-spatial transformations. These include increased pressure on natural resources, progressive degradation of agricultural land, and profound changes in traditional ways of life. The rise of gold panning also fosters the emergence of informal commercial activities, particularly in the transport, catering, and mining equipment sales sectors¹¹.

Furthermore, young people constitute the most represented social category in the gold mining sites studied. Their presence is explained by several interdependent factors, including structural unemployment, rural poverty, limited access to education, and the perception of quick profits from gold mining. This situation reflects early entry into labor-intensive but economically unstable activities¹².

Finally, the region's institutional context remains marked by governance challenges in the artisanal mining sector. Mechanisms for production control, operator monitoring, and taxation remain inadequate, which fosters the spread of informality and limits economic benefits for local communities¹³. These factors justify the need for an in-depth analysis of local dynamics to better understand the interactions between artisanal gold mining, youth, and territorial development.

1.3. Problem Statement

Artisanal gold mining is a major economic activity in many rural areas of Madagascar, particularly in the Betsiboka region. While it represents a significant source of income for local populations, it is also associated with complex dynamics involving social, economic, environmental, and institutional issues. In this context, the strong involvement of young people in the gold mining sites of Maevatanana I, Maevatanana II, Antanimbary, and Antsiafabositra raises major scientific questions about the determinants of their involvement and the consequences of this activity on their life trajectories⁷.

The central issue of this study rests on a twofold observation. On the one hand, artisanal gold mining appears as an immediate economic opportunity for young people facing structural unemployment,

rural poverty, and inadequate vocational training [6,7]. On the other hand, this activity generates ambivalent effects, combining temporary improvements in living conditions with exposure to multiple social, health, and environmental risks⁸.

This situation highlights a tension between the logic of economic survival and the imperatives of sustainable development. Indeed, although gold panning contributes to local economic activity, it often takes place within an informal framework characterized by weak institutional regulation, insufficient administrative oversight, and limited redistribution of the wealth generated [8]. This configuration limits the positive impacts for local communities and exacerbates the vulnerabilities of young workers⁹.

Furthermore, the lack of structured economic alternatives in the rural areas studied reinforces the attractiveness of gold panning. This situation raises questions about the capacity of public policies to offer sustainable solutions for the professional integration of young people [9,10]. It also raises the issue of natural resource governance in a context marked by migratory pressure, the rapid growth of mining sites, and the fragility of local ecosystems¹⁰.

Thus, the general problem of this research can be formulated as follows:

To what extent does artisanal gold mining influence the socio-economic trajectories of young people in the communes of Maevatanana I, Maevatanana II, Antanimbary and the site of Antsiabositra, and what are the governance issues associated with this dynamic in a sustainable development perspective?

This main issue can be broken down into several specific questions:

- What are the socioeconomic and structural factors that explain the involvement of young people in artisanal gold mining? What are the economic, social, health and environmental impacts of this activity on young people and their communities?
- How do current governance mechanisms influence the organization and control of gold mining in the Betsiboka region?
- What strategies can be considered to reconcile gold mining, youth integration and sustainable development?

Analyzing these questions will allow us to better understand the reasons why young people become involved in gold mining and to propose governance approaches adapted to local realities¹⁸.

1.4. Research Objectives

The overall objective of this study is to analyze the dynamics related to the involvement of young people in artisanal gold mining in the communes of Maevatanana I, Maevatanana II, Antanimbary and the site of Antsiabositra, as well as to assess the socio-economic, environmental and governance issues associated with this activity from a sustainable development perspective¹⁹.

In a context marked by the growth of artisanal gold mining in rural areas, this research aims to understand the factors that attract young people to this activity, as well as to identify its effects on their living conditions, social trajectories, and economic integration. It

adopts an interdisciplinary approach, drawing on social sciences, development economics, and natural resource governance²⁰.

Specific Objectives

More specifically, this study pursues the following objectives:

1. Identify the socioeconomic, cultural and structural factors that explain the massive involvement of young people in artisanal gold mining in the Betsiboka region.
2. Analyze the economic effects of gold panning on young people and households, particularly in terms of income, financial stability and local dynamics of commercial activities.
3. Assess the social impacts of artisanal gold mining, particularly in terms of schooling, youth migration, family cohesion and social vulnerabilities.
4. Examine the health and environmental consequences linked to gold panning practices in the sites studied, taking into account working conditions and ecosystem degradation.
5. To study the governance mechanisms of the artisanal gold sector, highlighting institutional limitations, informal practices and challenges related to administrative control.
6. To propose operational recommendations aimed at improving the governance of the artisanal mining sector and promoting sustainable economic alternatives for young people²¹.

These objectives allow the analysis to be structured around an integrated approach, taking into account the economic, social, environmental, and institutional dimensions of artisanal gold mining [11]. They also aim to contribute to a better understanding of the interactions between natural resource exploitation and territorial development in rural areas of Madagascar²².

2. Methodology

This study adopts a qualitative, analytical approach focused on understanding the socioeconomic and institutional dynamics related to youth involvement in artisanal gold mining in the Betsiboka region. This approach is justified by the complex and multidimensional nature of the phenomenon under study, which requires an in-depth analysis of behaviors, social representations, and local economic logics¹¹.

2.1. Search Type

The research is descriptive and analytical in nature. It aims, firstly, to describe the conditions under which young people become involved in artisanal gold mining and, secondly, to analyze the economic, social, health, and environmental effects of this activity. It also adopts an interdisciplinary perspective, drawing on the sociology of development, the informal economy, and natural resource governance¹².

2.2. Data Sources

The data used in this study are exclusively secondary and come from:

- National institutional reports (in particular those of control bodies and public administrations);
- Peer-reviewed scientific publications;
- Reports from international organizations (World Bank, ILO,

-
- UN Environment);
 - Legislative and regulatory texts relating to the mining sector in Madagascar; academic studies focusing on artisanal gold mining in sub-Saharan Africa.

This triangulation of sources helps to guarantee the reliability and relevance of the information used²⁵.

2.3. Analysis Techniques

The data analysis is based on a thematic approach. The information collected was grouped according to four main themes:

- Factors influencing youth engagement in gold panning;
- The socio-economic impacts of the activity;
- The health and environmental consequences;
- The governance and regulatory challenges of the artisanal mining sector.

This method makes it possible to identify the convergences and divergences between the different sources and to construct a coherent interpretation of the phenomenon studied¹³.

2.4. Limitations of the Research

This study has some limitations. It relies primarily on secondary data, which may restrict access to certain realities on the ground, particularly the individual experiences of young gold miners.

Furthermore, the lack of up-to-date quantitative data specific to the studied municipalities limits the possibility of conducting a thorough statistical analysis. Finally, the variability of available sources may influence the accuracy of some interpretations¹⁴.

2.5. Scientific Justification

Despite these limitations, this approach provides a comprehensive and structured understanding of the phenomenon of artisanal gold mining in the Betsiboka region. It also offers a solid analytical basis for understanding the interactions between natural resource exploitation, youth social dynamics, and territorial governance within a context of fragile rural development¹⁵.

3. Results

Analysis of documentary and institutional data reveals several key findings regarding youth involvement in artisanal gold mining in the municipalities of Maevatanana I, Maevatanana II, Antanimbary, and the Antsiafabositra site [12,13]. These findings are organized around factors influencing engagement, socioeconomic effects, health and environmental impacts, and governance issues.

3.1. Factors Influencing Youth Engagement in Gold Panning

The results show that youth involvement in artisanal gold mining is primarily driven by structural economic factors. High unemployment, precarious agricultural incomes, and a lack of formal employment opportunities are the main motivations observed¹⁶. In the rural areas studied, gold mining appears as a survival strategy in the face of limited economic alternatives.

In addition to these factors, social and cultural elements also play a role, including peer influence, the presence of family members already involved in the activity, and the perception of rapid enrichment. The lack of formal vocational training also increases the appeal of this activity for young people who have dropped out of school¹⁷.

3.2. Economic Effects of Gold Panning

From an economic standpoint, gold panning contributes significantly to generating immediate income for young people and households. It also fosters the development of related activities such as trade, restaurants, transportation, and the sale of mining equipment. This dynamic leads to an increase in the circulation of money in the communities concerned¹⁸.

However, these incomes remain highly unstable and unpredictable. Some young people earn significant sums in short periods, while others work without any meaningful return. This economic volatility leads to low savings capacity and limits long-term productive investments.

3.3. Social Impacts

The results also reveal significant social effects. One of the most striking phenomena is the dropout rate among young people, attracted by the prospect of quick income offered by gold mining. There is also a significant migration of young people to mining sites, leading to the disruption of traditional family structures¹⁹.

Furthermore, the concentration of young people in gold mining areas promotes the emergence of social problems such as prostitution, alcohol consumption, illicit substance use and an increase in interpersonal conflicts related to access to mining sites.

3.4. Health and Environmental Impacts

Working conditions at gold mining sites expose young people to numerous health risks, including landslides, physical injuries, respiratory illnesses, and various infections. Poor hygiene conditions exacerbate these vulnerabilities²⁰.

From an environmental perspective, artisanal gold mining leads to the progressive degradation of ecosystems. The main forms of degradation observed include deforestation, soil erosion, water pollution, and the destruction of agricultural land [14]. These impacts are particularly visible in the Antanimbary and Antsiafabositra areas, where mining activity is highly intensive²¹.

3.5. Governance Issues

Finally, the results highlight significant shortcomings in the governance of the artisanal gold mining sector. Administrative oversight of mining operations remains limited, production traceability is poor, and the informal gold trade remains widespread. These dysfunctions reduce tax revenues for local authorities and foster the persistence of unregulated economic channels²².

4. Discussion

The results obtained highlight a strong link between the

socioeconomic vulnerabilities of young people and the expansion of artisanal gold mining in the Betsiboka region [15,16]. This situation is part of a broader trend observed in several developing countries, where artisanal mining constitutes a survival strategy in the face of insufficient formal economic opportunities³⁶.

4.1. Gold Panning as an Economic Adaptation Strategy for Young People

The analysis confirms that youth involvement in gold mining is primarily driven by structural factors related to unemployment and rural poverty. This observation is consistent with the work of the World Bank and the ILO, which emphasize that artisanal mining often constitutes a direct response to poverty and the lack of stable employment²³.

However, while this activity may provide an immediate increase in income, it does not guarantee lasting economic integration. The income instability observed in the studied areas limits young people's ability to invest in long-term productive activities, thus reinforcing a cycle of dependence on the informal economy.

4.2. Ambivalence of Socioeconomic Effects

The results show a strong ambivalence in the effects of gold panning. On the one hand, this activity stimulates local economies through the creation of direct and indirect jobs and the increase in monetary flows within communities. On the other hand, it contributes to the weakening of social structures, particularly through school dropout rates and youth migration²⁴.

This duality is widely documented in the scientific literature on informal extractive economies, which highlights the paradox between local economic growth and the reproduction of social inequalities.

4.3. Social and Health Vulnerabilities

The results also confirm the high exposure of young gold miners to health and social risks. Precarious working conditions, the lack of safety standards, and high population density at the sites contribute to the increase in accidents and occupational illnesses. These observations are consistent with the World Health Organization's analyses of the risks associated with artisanal mining²⁵.

On a social level, family disorganization, the rise in risky behaviors and the deterioration of living conditions reflect a weakening of traditional community structures.

4.4. Governance Challenges and Persistent Informality

One of the most significant findings concerns governance failures in the gold sector. The lack of effective oversight, weak traceability, and the prevalence of informal gold trading limit the state's ability to regulate the activity and generate tax revenue from it²⁶.

This situation corresponds to what several authors describe as “hybrid governance” of natural resources, where formal norms coexist with informal practices deeply rooted in local realities.

4.5. Implications for Sustainable Development

Finally, the results highlight the need for an integrated approach to territorial development. Gold panning cannot be considered solely as an economic activity, but must be analyzed as a comprehensive social phenomenon involving economic, environmental, and institutional dimensions.

Better regulation of the sector, combined with the diversification of economic opportunities for young people, appears to be an essential condition for transforming this activity into a lever for sustainable development in the Betsiboka region²⁷.

5. Recommendations

In light of the results obtained and the analyses carried out, several recommendations can be formulated in order to better regulate artisanal gold mining in the Betsiboka region and to reduce its negative effects on young people, while strengthening its contribution to sustainable territorial development.

5.1. Strengthening Governance of the Artisanal Mining Sector

It appears necessary to strengthen the institutional framework for managing artisanal gold mining in order to improve the traceability of gold production and limit informal channels. This implies the implementation of more effective control mechanisms, the simplification of administrative procedures, and improved coordination between central authorities and local communities⁴².

5.2. Formalization of Gold Panning Activities

The gradual formalization of artisanal gold mining is a crucial measure. This could involve issuing operator permits, creating mining cooperatives, and providing technical support to artisanal miners. This approach would reduce informality while increasing tax revenue for local communities²⁸.

5.3. Promotion of Youth Employment

To reduce young people's dependence on gold panning, it is essential to develop viable economic alternatives. This involves creating local jobs, supporting rural entrepreneurship, and implementing vocational training programs tailored to the realities of the labor market²⁹.

5.4. Strengthening the Education System

Combating school dropout must be a priority. Support mechanisms for families, awareness programs, and incentives for youth education are necessary to limit the number of young people leaving school for gold mining. Education is a fundamental lever for preventing future economic hardship³⁰.

5.5. Health Protection and Safety at Work

Working conditions at gold mining sites require enhanced health and safety oversight. It is recommended to implement programs to raise awareness of occupational risks, improve access to healthcare, and promote safer mining practices³¹.

5.6. Environmental Protection

Ecological restoration efforts must be undertaken in severely

degraded areas. This includes reforestation, soil rehabilitation, and the management of abandoned sites. Integrating environmental standards into artisanal mining is essential to limit long-term ecological impacts³².

5.7. Combating Fraud and the Informal Gold Trade

Strengthening gold trade control mechanisms is essential to reducing fraud and improving public revenue. This requires better traceability, increased monitoring of marketing channels, and enhanced cooperation among the relevant institutional actors⁴⁸.

6. General Conclusion

The analysis carried out on the involvement of young people in artisanal gold mining in the communes of Maevatanana I, Maevatanana II, Antanimbary and the site of Antsiafabositra highlights a complex reality, characterized by a strong articulation between economic, social, environmental and institutional issues.

The results show that for many young people, gold panning is a direct response to the structural difficulties of the rural labor market, particularly unemployment, poverty, and insufficient vocational training opportunities. This activity thus acts as an economic safety net, generating immediate income and stimulating local economies.

However, this economic function comes with significant negative consequences. The study reveals the high vulnerability of young gold miners, marked by school dropout rates, migration, income instability, health risks, workplace accidents, and the progressive degradation of the environment [17]. These impacts reflect the limitations of a development model based on the informal exploitation of natural resources.

Furthermore, the analyses highlight significant shortcomings in the governance of the gold sector. The prevailing informality, weak control mechanisms, the difficulty of tracing gold, and the persistence of illicit trade limit the economic benefits for local communities and reduce the effectiveness of public policies.

In this context, the initial research question finds a clear answer: gold panning strongly influences the socioeconomic trajectories of young people, offering them immediate economic opportunities while simultaneously exposing them to multidimensional risks [18]. This dynamic highlights the need for a structural transformation of the sector to better integrate it into a sustainable development framework.

Thus, in order for gold mining to truly contribute to the development of the Betsiboka region, it is essential to strengthen mining governance, formalize artisanal activities, protect environmental resources and above all to diversify the economic opportunities

offered to young people.

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