The Impact of Informal Mining on Environmental Sustainability in Matabeleland

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ABSTRACT

Informal mining, a critical livelihood activity in Matabeleland, Zimbabwe, presents significant challenges to environmental sustainability. This study examines the multifaceted effects of mining practices on the region's ecological balance, employing both qualitative and quantitative research methods. Primary data were collected from sampled areas that were mostly affected by informal mining, such as Inyathi District, Filabusi, and Shangani. Photographs were taken of all affected areas. Communities gave testimonies of how informal mining activities are destroying the environment. The findings reveal substantial environmental degradation, including soil erosion, water pollution, and deforestation, consistent with the "Tragedy of the Commons" concept, where unregulated access to resources leads to overexploitation (Hardin, 1968). By examining perspectives from local communities, informal miners, and environmental stakeholders, this research highlights the urgent need for sustainable mining practices and policy interventions. The study emphasizes that the current informal mining activities in Zimbabwe are contributing negatively to the environment, and these activities are occurring in a region already vulnerable to climate change. Therefore, it is important to mitigate the adverse environmental effects and promote long-term ecological resilience, addressing concerns raised by frameworks such as Political Ecology, which underscores the power dynamics affecting resource use (Bryant & Bailey, 1997).

Keyterms: Informal mining and environmental sustainability.

INTRODUCTION AND BACKGROUND

Globally, informal mining, also known as artisanal and small-scale mining (ASM), is a significant economic activity in many developing countries, providing livelihoods for millions of people (Hilson, 2011). However, it is often associated with severe environmental degradation, such as deforestation, soil erosion, siltation of dams, and water pollution (Veiga & Hinton, 2002). The pressure to extract resources quickly and cheaply, often under unregulated conditions, contributes to unsustainable practices (Hinton, 2003). The global context reveals that resource-rich nations can sometimes experience a "resource curse," wherein mineral wealth leads to negative developmental externalities due to environmental damage and mismanagement of natural resources (Auty, 1993). This pattern is evident in many regions where informal mining predominates.

In Africa, informal mining plays a crucial role in rural economies, particularly in countries with abundant mineral resources (Hentschel, 2002). For example, in countries like Ghana and the Democratic Republic of Congo (DRC), ASM employs a large segment of the population, often in areas where alternative livelihood options are limited (Banchirigah, 2008; Hilson & McQuilken, 2009). However, the environmental impacts in Africa are substantial, with widespread water contamination from mercury and cyanide use, and significant deforestation contributing to biodiversity loss (Bebbington, 2008). The issues of environmental justice are also pertinent, as marginalized communities often bear the brunt of environmental degradation caused by mining activities (Bullard, 1990). The continent experiences a high level of informal economic activity, and mining is a large portion of that informal economy.

In Zimbabwe, particularly in Matabeleland, informal mining has become increasingly prevalent, driven by economic hardships and limited formal employment opportunities (Maponga & Ngorima, 2003). The region is

rich in gold, and the surge in informal mining has led to significant environmental challenges. The background of this study lies in the escalating environmental problems observed in Matabeleland, including land degradation, water contamination, and biodiversity loss, directly linked to the rapid expansion of informal mining (Chikwanha, 2018). The lack of effective regulatory frameworks and enforcement has exacerbated these issues, leading to unsustainable mining practices (Moyo, 2015). The region is also experiencing the effects of climate change, which further compounds the environmental vulnerabilities caused by informal mining. The study aims to provide a comprehensive analysis of the environmental impacts of informal mining in Matabeleland, contributing to a better understanding of the sustainability challenges and informing policy recommendations for effective environmental management. The research is critical because the region is currently experiencing the effects of climate change, and these mining activities are accelerating the negative impact, thus making it important to find sustainable ways for the mining to continue or stop.

LITERATURE REVIEW

The Tragedy of the Commons

Hardin (1968) posits the "Tragedy of the Commons,". This means individuals acting independently and rationally in pursuit of their self-interest behave contrary to the best interests of the majority by depleting a common resource. This theory is highly relevant to informal mining in Matabeleland, where unregulated access to mineral resources leads to overexploitation and environmental degradation. Recent studies have highlighted how this principle applies to various resource management challenges, including water resources (Ostrom, 2015; Zimbabwe Environmental Law Association, 2012), forests (Agrawal, 2014), and fisheries (Worm, 2009). In the context of informal mining, miners, driven by immediate economic needs, often disregard the long-term environmental consequences, leading to unsustainable practices. Further, the lack of effective governance and enforcement mechanisms exacerbates this problem, allowing for the rapid depletion of resources and the degradation of ecosystems in Matabeleland. The presence of external pressures, like economic hardship, further accelerates the land degradation. (Young, 2010; Cox, Arnold, & Villamayor Tomás, 2010; Feeny et al., 1990)

Ecological Modernization Theory

Mol (1996) postulated, Ecological Modernization Theory (EMT). This suggests that industrial societies can achieve environmental sustainability through technological innovation and policy reforms. This theory proposes that economic growth and environmental protection can be mutually reinforcing. In the context of informal mining, EMT can be applied to promote the adoption of cleaner technologies and more efficient resource utilization. Recent applications of EMT have explored its relevance to sustainable mining practices (York & Rosa, 2003; Spaargaren & Mol, 2008). For example, the introduction of mercury-free gold extraction methods and the implementation of environmental management systems can contribute to reducing the environmental footprint of informal mining. Furthermore, policy interventions that incentivize sustainable practices and promote collaboration between miners, government, and civil society can facilitate the transition towards ecological modernization in the mining sector (Fisher & Freudenburg, 2001; Mol, Sonnenfeld, & Spaargaren, 2009; Murphy & Gouldson, 2000).

Political Ecology Theory

Bryant & Bailey, (1997) postulated the Political Ecology theory. This theory emphasizes that environmental problems are often rooted in the political and economic structures of the country. In Matabeleland, the unequal distribution of power and resources contributes to the environmental impacts of informal mining. Marginalized communities, driven by economic necessity, are often forced to engage in environmentally damaging mining practices, while powerful actors benefit from the exploitation of mineral resources (Robbins, 2011). Recent studies have examined the role of political ecology in understanding environmental conflicts related to mining (Watts, 2004; Bebbington, 2012). The theory also helps to explain how environmental regulations are often influenced by political and economic interests, leading to weak enforcement of environmental laws and ineffective environmental management. The theory helps to understand how the global economy impacts local environments (Greenberg & Park, 1994; Peet, Robbins, & Watts, 2011; Zimmerer & Bassett, 2003).

Sustainable Livelihoods Framework

Scoones (1998) developed the Sustainable Livelihoods Framework (SLF), which examines how people make a living and the factors that influence their livelihood strategies. This framework is particularly relevant to informal mining, which provides a critical source of income for many communities in Matabeleland. The SLF emphasizes the importance of understanding the assets, vulnerabilities, and strategies of informal miners. Recent applications of the SLF have explored the trade-offs between economic benefits and environmental costs in resource-dependent livelihoods (Ellis, 2000; Chambers & Conway, 1992). For example, while informal mining can improve immediate livelihoods, it can also lead to long-term environmental degradation, undermining the sustainability of future livelihoods. The framework also highlights the importance of diversifying livelihood options to reduce reliance on environmentally damaging activities and enhance resilience to shocks and stresses (Ashley & Carney, 1999; Morse & McNamara, 2013; Bebbington, 1999).

Environmental Justice Theory

Environmental Justice Theory explores the disproportionate environmental burdens placed on marginalized communities due to extractive activities (Bullard, 1990). In Matabeleland, informal mining often exacerbates existing environmental injustices, as vulnerable communities bear the brunt of pollution and land degradation. Recent studies have examined the environmental justice implications of mining in various contexts (Agyeman, 2005; Walker, 2012). The theory highlights the need for equitable distribution of environmental benefits and burdens, and the importance of involving affected communities in decision-making processes. Environmental justice frameworks can also be used to advocate for policies that protect the rights of marginalized communities and promote sustainable resource management. (Pellow, 2016; Schlosberg, 2007; Taylor, 2014)

Resource Curse Theory

Resource Curse Theory explores the paradox of resource-rich countries experiencing less economic growth and worse development outcomes compared to resource-poor countries, often due to environmental degradation and mismanagement (Auty, 1993). In Matabeleland, the abundance of mineral resources has not translated into sustainable development, but rather into environmental degradation and social problems. Recent studies have examined the mechanisms through which the resource curse operates, including corruption, rent-seeking, and the neglect of non-resource sectors (Ross, 2012; Frankel, 2010). The theory suggests that effective governance and diversification of the economy are essential for avoiding the negative impacts of resource dependence. The resource curse theory helps to understand how the presence of natural resources can lead to environmental degradation and social inequality if not properly managed. (Humphreys, Sachs, & Stiglitz, 2007; Isham, Woolcock, & Pritchett, 2003; Van der Ploeg, 2011).

METHODOLOGY

This research employed a qualitative and quantitative approach to delve into the intricate environmental impact of informal mining in Matabeleland. Data was collected through semi-structured interviews of all sampled areas in Inyathi, Filabusi, and Shangani with local informal miners, community leaders, environmental experts, and government officials.

Focus group discussions were conducted to gather diverse perspectives on the environmental challenges and potential solutions. Observational data, including field notes and photographs, were used to document the physical impact of mining activities on the landscape. Illegal mining activities have led to the degradation of over 12560 hectares of land and affected over 18790 km of rivers in Mat South. In 2020, Matabeleland South had 195,000 hectares of natural forestry, spanning 3.06% of its land area, but it lost 68 hectares of natural forest in 2024.

Thematic analysis was used to identify recurring patterns and themes within the collected data. This approach allowed for an in-depth exploration of the social and ecological dimensions of informal mining, capturing the nuanced experiences and perceptions of the stakeholders involved. The research was conducted in selected areas within Matabeleland, chosen for their high concentration of informal mining activities. Ethical

considerations, including informed consent and confidentiality, were prioritized throughout the research process.

FINDINGS

The findings of this study reveal significant environmental degradation attributed to informal mining in Matabeleland, aligning with the "Tragedy of the Commons" theory (Hardin, 1968), where unregulated resource access leads to overexploitation. Soil erosion was widespread, with extensive areas stripped of vegetation and topsoil, resulting in increased sedimentation in rivers and dams. This aligns with findings from Maponga & Ngorima (2003), who documented similar issues in the Mazowe River catchment. However, the scale of erosion in Matabeleland appears to be amplified by the combined effects of deforestation and climate change, which exacerbate soil vulnerability. Photographs were taken in some areas, like Inyathi district, showing miners in a local dam extracting gold, leading to soil erosion and siltation. One of the photographs is also attached below.

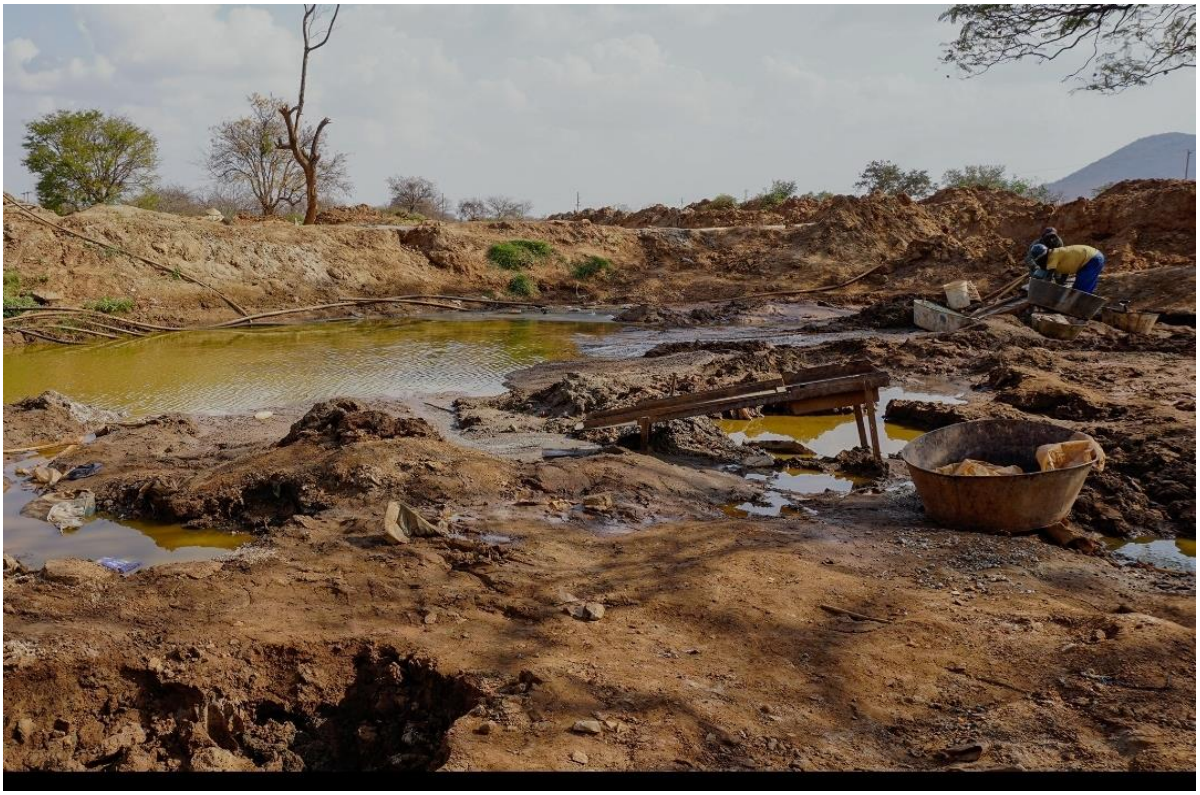

Figure 1: Eroded Area in Inyathi

Source: Inyathi District

Water pollution was a major concern, as miners frequently used mercury and cyanide in gold extraction, contaminating water sources used for domestic and agricultural purposes. This echoes the global concerns raised by the Zimbabwe Environmental Law Association (2012) about mercury contamination in mining regions. However, unlike some regions where miners have adopted cleaner technologies, as suggested by Ecological Modernization Theory (Mol, 1996), the miners in Matabeleland largely continue to use traditional, highly polluting methods due to a lack of access to resources and training. As one participant in a focus group discussion stated, *"We know mercury is bad, but it's the only way we know to get the gold quickly. We don't have money for other ways."* This reflects the economic pressures that override environmental concerns, as described in the Sustainable Livelihoods Framework (Scoones, 1998).

Deforestation was rampant, as miners cleared forests for fuelwood and to access mineral deposits, contributing to biodiversity loss and habitat destruction. This aligns with the findings of Chikwanha (2018), who reported similar deforestation impacts in the Penhalonga area. However, the study also revealed that deforestation in

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Matabeleland is driven by a combination of mining and the need for firewood, which is a significant factor due to power outages, a factor not always highlighted in other studies.

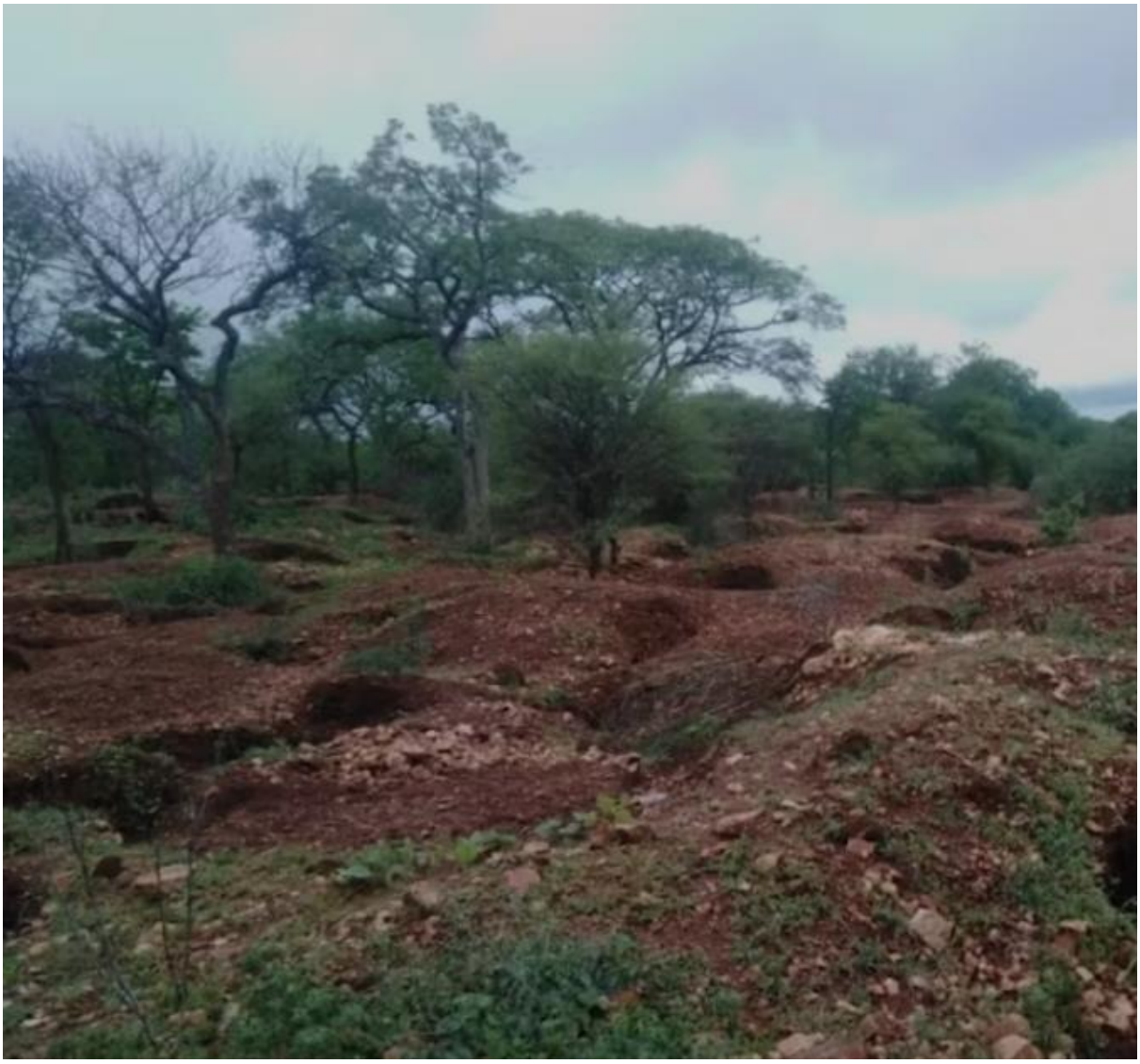

Figure 2: Deforested Area in Filabusi

Source: A Photograph from Filabusi

The above picture was captured in Filabusi, showing how informal mining is leading to heavy deforestation. Miners were cutting down trees and destroying their roots in the process of extracting gold, leaving the land heavily deforested.

Moreover, community members reported health issues, including respiratory problems and skin diseases, potentially linked to exposure to mining-related pollutants. This highlights the environmental justice concerns raised by Bullard (1990), where marginalized communities and nearest cities such as Bulawayo, Gwanda, and Plumtree bear the disproportionate burden of environmental degradation and a shortage of water. As another focus group participant shared, *"Our children are always coughing, and many have rashes. The water is dirty, but we have no other choice."* This statement starkly illustrates the health impacts of pollution and the lack of alternative resources, reflecting the unequal power dynamics that Political Ecology (Bryant & Bailey, 1997) seeks to explain.

The study also highlighted the lack of effective environmental regulations and enforcement, which exacerbated the environmental impacts. Miners often lacked awareness of sustainable mining practices and operated with limited resources and technical expertise. This contrasts with the ideals of Ecological Modernization Theory, which suggests that technological advancements and policy reforms can promote sustainable development.

The findings show that without proper education and resources, the miners continue to use the fastest, cheapest, and unreliable mining methods, even if they are destructive.

The economic pressures driving informal mining, coupled with limited alternative livelihood options, contributed to the persistence of environmentally damaging practices. This aligns with the Resource Curse Theory (Auty, 1993), which posits that resource abundance can lead to negative development outcomes due to mismanagement and environmental damage. The focus groups revealed that many miners are driven by desperation. Another miner said, *"If I don't mine, my family will starve. There are no other jobs here."* This highlights the trade-offs between immediate economic survival and long-term environmental sustainability, a central theme in the Sustainable Livelihoods Framework.

In comparison to the literature, our findings show that while the theoretical frameworks generally apply, the specific context of Matabeleland introduces unique challenges, such as the combined effects of climate change and economic hardship. The focus groups provide valuable insights into the lived experiences of miners and community members, highlighting the human cost of environmental degradation.

CONCLUSIONS AND RECOMMENDATIONS

Informal mining in Matabeleland has significantly degraded the environment, impacting soil, water, forests, and wildlife, driven by economic necessity and exacerbated by weak regulation. This study underscores the need for a paradigm shift towards sustainable practices, addressing environmental injustices, and aligning with ecological modernization principles. The study recommends immediate strengthening of environmental regulations, provision of training on sustainable mining techniques, community engagement in environmental management, and diversification of livelihood options to reduce reliance on damaging mining practices. It is recommended that a joint action be taken by the Forestry Commission of Zimbabwe, the Environmental Management agent, and the Zimbabwean Republic Police to deter the activities of the informal. These combined efforts are essential for balancing economic needs with ecological sustainability and ensuring long-term environmental health in the region.

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