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An Assessment on the Livelihood Impacts of Lithium Mining on Rural Households: A Case of Ward 11, Bikita District, Zimbabwe

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This study investigated the impact of lithium mining on rural households' livelihoods in Ward 11, Bikita District, Zimbabwe. The study employed a mixed-methods approach, combining qualitative and quantitative data collection and analysis methods. A sample of 100 research participants was drawn from a target population of approximately 4687 persons from 1000 households. The study found that lithium mining has had both positive and negative impacts on the local community, including employment creation, improved infrastructure, and increased revenue, as well as displacement of communities, adverse health impacts, and environmental degradation. The study highlights the importance of community participation and benefit-sharing in mining projects and the need for mining companies to prioritize environmental sustainability and social responsibility. Based on the research findings, the study recommends that mining companies should prioritize community participation and benefit-sharing, environmental sustainability, and social responsibility in their operations, prioritise transparency and accountability in their operations and ensure that local communities have access to information about the mining activities, provide capacity-building programs for local communities to enhance their skills and knowledge and enable them to benefit from the mining activities and that the government and regulatory agencies should establish a robust monitoring and evaluation framework to ensure that mining companies comply with environmental and social regulations

Key Words: Lithium Mining, Rural Households, Livelihood Impacts, Community Participation, Benefit-Sharing, Social Responsibility and Environmental Sustainability

1. Introduction and Background to the Study

The world is transitioning towards a low-carbon economy, driven by the need to mitigate climate change and ensure sustainable development. Lithium, a key component in the production of batteries for electric vehicles and renewable energy storage systems, has become a critical mineral in this transition (IEA, 2021). As the demand for lithium continues to rise, concerns about the environmental and social impacts of lithium mining have also grown (Grant et al., 2020). In Zimbabwe, lithium mining has been ongoing for several decades, with the Bikita lithium mine being one of the largest lithium producers in the country. Individuals need to understand the livelihood impacts of lithium mining so that they will contribute to the development of sustainable and responsible mining practices that prioritize the well-being of local communities. The significance of this study lies in its potential to inform policy and decision-making processes related to lithium mining in Zimbabwe.

However, the impacts of lithium mining on rural households in Zimbabwe have not been adequately studied hence the need to conduct this study

Lithium mining has been associated with various environmental and social impacts globally. Studies have shown that lithium mining can lead to water pollution, land degradation, and loss of biodiversity (Grant et al., 2020; Adam et al., 2021). For example, the Atacama salt flat in Chile, which is one of the largest lithium reserves in the world, has experienced significant environmental impacts due to lithium mining, including water scarcity and land degradation (Flexer et al., 2018). Additionally, lithium mining has been linked to social impacts such as displacement of local communities, changes in traditional livelihoods, and social conflicts (Ndlovu, 2017). In Australia, for instance, lithium mining has been associated with conflicts over land and resources, particularly in the context of indigenous communities (O'Faircheallaigh, 2017). In Africa, lithium mining has been gaining attention in recent years, particularly in countries such as Zimbabwe, Namibia, and the Democratic Republic of Congo. The African continent is rich in lithium deposits, and many countries are exploring the potential of lithium mining to drive economic development (Warren, 2021).

However, concerns about the environmental and social impacts of lithium mining have also been raised, highlighting the need for sustainable and responsible mining practices. In Southern Africa, for example, lithium mining has been associated with environmental degradation and social impacts, particularly in areas with high conservation value (Limpitlaw, 2018). In Zimbabwe, lithium mining has been ongoing for several decades, with the Bikita lithium mine being one of the largest lithium producers in the country. The government of Zimbabwe has been promoting lithium mining as a key sector for economic development, with plans to increase lithium production and export earnings (EMA, 2021). However, concerns about the environmental and social impacts of lithium mining have also been raised, highlighting the need for effective regulation and monitoring of mining activities. In recent years, the government has implemented policies aimed at promoting sustainable mining practices, including the development of an environmental management plan for the mining sector (GoZ, 2020). Despite these efforts, the impacts of lithium mining on rural households in Zimbabwe remain poorly understood, highlighting the need for further research in this area.

1.1. Theoretical Framework and its Applicability to the Study

This study is grounded in four theoretical frameworks that provide a comprehensive understanding of the socio-economic, socio-cultural, and environmental impacts of lithium mining on rural households in Ward 11, Bikita District, Zimbabwe. These frameworks include the Resource Curse Theory (RCT), Political Ecology Theory (PET), Social Impact Assessment (SIA), and Environmental Justice Theory (EJT). The Resource Curse Theory, initially developed by Richard Auty in 1993, suggests that countries with an abundance of natural resources, particularly mineral and oil deposits, tend to have lower economic growth, increased inequality, and greater political instability (Ross, 2012). This theory is relevant to this study as it highlights the potential negative socio-economic impacts of lithium mining on rural households, such as environmental degradation, displacement of communities, social conflicts, and unequal distribution of wealth. The Political Ecology Theory, which gained prominence in the 1980s and 1990s with the works of scholars such as Piers Blaikie, Michael Watts, and Paul Robbins, examines the relationships between political, economic, and social factors with environmental issues (Al Bouchi & Caraway, 2023; Blin et al., 2022). This theory is applicable to this study as it analyses how power dynamics, environmental policies, and community resistance influence the impact of mining activities on the livelihoods of communities in Ward 11.

The Social Impact Assessment (SIA) is a methodology used to evaluate the potential social impacts of a proposed project, program, or policy. This framework is relevant to this study as it helps identify and understand the potential positive and negative impacts of lithium mining on local communities, including employment opportunities, social cohesion, and cultural heritage issues (Vanclay, Esteves, & Aucamp, 2015). The Environmental Justice Theory, initially propounded in the early 1980s by activists and scholars such as Robert

Bullard, Nicholas Freudenberg, and Beverly Wright, focuses on the fair distribution of environmental benefits and burdens, particularly in relation to marginalized populations (Walker, 2012). This theory is also applicable to this study as it examines how the establishment of lithium mining activities impacts local communities in terms of pollution, land degradation, and access to natural resources. The applicability of these theoretical frameworks to this study lies in their ability to provide a comprehensive understanding of the complex socio-economic, socio-cultural, and environmental impacts of lithium mining on rural households in Ward 11. The use of these theoretical frameworks will help the study to identify the potential negative impacts of lithium mining and develop strategies to mitigate them, ultimately promoting sustainable mining practices that prioritize the well-being of local communities.

2. Related Literature Review

The impact of mining activities on surrounding communities has been extensively studied, with both positive and negative outcomes reported. On the one hand, mining activities create employment opportunities, stimulate local economies, and contribute to infrastructure development (Heredia et al., 2020; Hernandez & Newell, 2022). For example, a study by O'Faircheallaigh and Babidge (2023) found that lithium mining in Australia has created jobs and stimulated local economies, contributing to the well-being of local communities. On the other hand, mining activities lead to environmental degradation, displacement of communities, and social conflicts (Giglio, 2021; González & Snyder, 2022). Studies have shown that lithium mining, in particular, can have significant environmental impacts, including water pollution, land degradation, and loss of biodiversity (Adam et al., 2021; Marconi et al., 2022). For instance, a study by Liu and Agusdinata (2020) found that lithium mining in Chile has led to water pollution and land degradation, affecting the livelihoods of local communities. In Zimbabwe, the impact of mining activities on local communities has been studied, with concerns raised about the environmental and social impacts of mining (EMA, 2021).

The government of Zimbabwe has implemented policies aimed at promoting sustainable mining practices, including the development of an environmental management plan for the mining sector (GoZ, 2020). However, more needs to be done to ensure that mining activities are conducted in a responsible and sustainable manner. Lithium mining has been associated with various environmental impacts, including water pollution, land degradation, and loss of biodiversity (Adam et al., 2021; Marconi et al., 2022). Water pollution is a significant concern, as lithium mining requires large amounts of water, which can lead to the depletion of local water resources and pollution of nearby water bodies (Liu and Agusdinata, 2020). Land degradation is another significant impact, as lithium mining can lead to the destruction of habitats and ecosystems, resulting in loss of biodiversity (Marconi et al., 2022). Lithium mining can also have significant social impacts, including displacement of local communities, changes in traditional livelihoods, and social conflicts (Ndlovu, 2017). Displacement of local communities can occur when mining activities require the relocation of communities to make way for mining operations (Giglio, 2021). Changes in traditional livelihoods can also occur, as mining activities can disrupt traditional economic activities such as agriculture and fishing (González & Snyder, 2022). The literature review highlights the need for sustainable mining practices that prioritize the well-being of local communities. Sustainable mining practices can include measures such as environmental impact assessments, community engagement, and benefit-sharing agreements (Vanclay, Esteves, & Aucamp, 2015). By understanding the potential impacts of lithium mining, this study can develop strategies to mitigate them, ultimately promoting sustainable development and environmental protection.

3. Research Methodology

This study employed a mixed-methods approach to investigate the impact of lithium mining on rural households' livelihoods in Ward 11, Bikita District, Zimbabwe (Creswell, 2014). The study adopted a pragmatism research paradigm, allowing for flexibility and adaptability in the research design (Tashakkori & Teddlie, 2010). The target population consisted of approximately 4687 persons from 1000 households, including community leaders, health

workers, civil servants, BLM management, EMA personnel, and members of NGOs working in the area (Zimbabwe National Statistics Agency, 2020). A representative sample of 100 research participants was drawn from the target population, comprising community leadership, health workers, civil servants, BLM management, EMA personnel, NGO members, youths, and other community members (Kothari, 2004). The study used a range of research instruments, including questionnaires, interview guides, observation guides, and focus group discussion guides (Bryman, 2016). Questionnaires were administered to 80% of the participants, while face-to-face interviews were conducted with 20% of the participants. Direct observations were made in the study area, and focus group discussions were conducted with community members. The study employed both quantitative and qualitative data analysis approaches, using descriptive statistics to summarize quantitative data and thematic analysis, content analysis, and narrative analysis to analyse qualitative data. The data analysis plan involved several steps, including data cleaning and validation, descriptive statistics, thematic analysis, content analysis, and narrative analysis. The combination of these research methods has provided a comprehensive understanding of the impact of lithium mining on rural households' livelihoods in Ward 11, Bikita District, Zimbabwe.

4. Research Findings

The study investigated the impact of lithium mining on rural households' livelihoods in Ward 11, Bikita District, Zimbabwe. The research findings are based on the data collected from 100 research participants, including community leadership, health workers, civil servants, BLM personnel, EMA personnel, NGO members, youths, and other community members. The research findings are presented below:

4.1. Socio-Economic Impacts

The study revealed that lithium mining in Ward 11 has had both positive and negative socio-economic impacts on the local community.

- **Employment Creation:** 80% of the research participants reported that the mining activities have created employment opportunities for the local community, with 40% of the participants reporting that they have been employed directly or indirectly by the mining companies.
- **Improved Infrastructure:** 75% of the research participants reported that the mining activities have improved the infrastructure in the area, including roads, water, and power infrastructure.
- **Increased Revenue:** 90% of the research participants reported that the mining activities have generated revenue for the local government through taxes and royalties.
- **Transfer of Skills and Knowledge:** 85% of the research participants reported that the mining companies have provided training and skill development programs for the local community.

However, the study also revealed significant negative socio-economic impacts, including:

- **Displacement of Communities:** 60% of the research participants reported that the mining activities have resulted in the displacement of communities and loss of fertile agricultural land.
- **Adverse Health Impacts:** 55% of the research participants reported that the mining activities have resulted in adverse health impacts, including respiratory problems and skin irritation.
- **Unequal Distribution of Benefits:** 70% of the research participants reported that the benefits of the mining activities have not been distributed equally, leading to social tensions and conflicts within the community.

4.2. Environmental Impacts

The study revealed that lithium mining in Ward 11 has resulted in significant environmental degradation, including:

- **Deforestation:** 65% of the research participants reported that the mining activities have resulted in deforestation and loss of biodiversity.
- **Soil Erosion:** 60% of the research participants reported that the mining activities have resulted in soil erosion and degradation of land.

- **Water Pollution:** 55% of the research participants reported that the mining activities have resulted in pollution of water sources.

4.3. Socio-Cultural Impacts

The study revealed that lithium mining in Ward 11 has resulted in significant socio-cultural impacts, including:

- **Disruption of Traditional Land-Use Practices:** 70% of the research participants reported that the mining activities have disrupted traditional land-use practices and cultural heritage.
- **Increased Crime Rates:** 60% of the research participants reported that the influx of miners and other outsiders has resulted in increased crime rates and social disruption.
- **Health Impacts:** 55% of the research participants reported experiencing adverse health impacts, including respiratory problems and skin irritation.

4.5. Analysis and Discussion of Research Findings

The research findings on the impact of lithium mining on rural households' livelihoods in Ward 11, Bikita District, Zimbabwe, reveal a complex picture of both positive and negative socio-economic and environmental impacts. The findings are consistent with the literature review, which highlights the potential benefits and drawbacks of mining activities in local communities. The study found that lithium mining in Ward 11 has created employment opportunities, improved infrastructure, and generated revenue for the local government. These findings are consistent with the literature review, which notes that mining activities can contribute to economic development and poverty reduction in local communities (Kusi, 2017; Akabzaa, 2009). The creation of employment opportunities and improved infrastructure can improve the standard of living for local communities and contribute to their overall well-being. However, the study also found that lithium mining in Ward 11 has resulted in significant negative impacts, including displacement of communities, adverse health impacts, and environmental degradation. These findings are consistent with the literature review, which notes that mining activities can result in significant environmental and social costs, including displacement of communities, loss of livelihoods, and adverse health impacts (Kitula, 2006; Mensah, 2015).

The displacement of communities and loss of fertile agricultural land can have significant impacts on the livelihoods of local communities, particularly in rural areas where agriculture is a primary source of income. The adverse health impacts, including respiratory problems and skin irritation, can also have significant impacts on the well-being of local communities. The study found that lithium mining in Ward 11 has resulted in significant environmental degradation, including deforestation, soil erosion, and pollution of water sources. These findings are consistent with the literature review, which notes that mining activities can result in significant environmental impacts, including deforestation, soil degradation, and water pollution (Kitula, 2006). The study highlights the importance of community participation and benefit-sharing in mining projects. The findings suggest that the local community in Ward 11 feels that they have not benefited equally from the mining activities, leading to social tensions and conflicts. This is consistent with the literature review, which notes that community participation and benefit-sharing are critical components of sustainable mining practices (Kusi, 2017).

The findings highlight the complex picture of both positive and negative socio-economic and environmental impacts. The findings are consistent with the literature review and highlight the importance of community participation and benefit-sharing, environmental sustainability, and social responsibility in mining projects. To minimize the negative impacts of mining activities and ensure that local community’s benefit from the mining activities, it is essential to prioritize community participation and benefit-sharing, environmental sustainability, and social responsibility. The research findings are consistent with the literature review, which highlights the potential benefits and drawbacks of mining activities in local communities. The study's findings on the positive impacts of lithium mining, such as employment creation and improved infrastructure, are consistent with the literature review (Kusi, 2017; Akabzaa, 2009). The study's findings on the negative impacts of lithium mining,

such as displacement of communities and adverse health impacts, are also consistent with the literature review (Kitula, 2006; Mensah, 2015). The study's findings on the importance of community participation and benefit-sharing in mining projects are consistent with the literature review, which notes that community participation and benefit-sharing are critical components of sustainable mining practices (Kusi, 2017). The study's findings on the need for environmental sustainability and social responsibility in mining projects are also consistent with the literature review, which notes that mining activities can result in significant environmental and social impacts (Kitula, 2006; Mensah, 2015). Overall, the research findings highlight the importance of considering the perspectives of local communities in the development of mining projects and the need for mining companies to prioritize environmental sustainability and social responsibility. By prioritizing community participation and benefit-sharing, environmental sustainability, and social responsibility, mining companies can minimize the negative impacts of mining activities and ensure that local community's benefit from the mining activities.

5. Conclusions and Recommendations

The study concludes that lithium mining in Ward 11, Bikita District, Zimbabwe, has both positive and negative impacts on rural households' livelihoods. The positive impacts include employment creation, improved infrastructure, and increased revenue for the local government. However, the negative impacts include displacement of communities, adverse health impacts, and environmental degradation. The study highlights the importance of community participation and benefit-sharing in mining projects and the need for mining companies to prioritize environmental sustainability and social responsibility. Based on the research findings, the following recommendations are made:

- Mining companies should prioritize community participation and benefit-sharing in the development of mining projects. This includes ensuring that local communities benefit equally from the mining activities and are involved in decision-making processes.
- Mining companies should prioritize environmental sustainability and take measures to minimize the environmental impacts of mining activities.
- Mining companies should prioritize social responsibility and take measures to minimize the negative social impacts of mining activities.
- Mining companies should prioritize the health and safety of local communities and take measures to minimize the adverse health impacts of mining activities.
- Mining companies should provide fair compensation and resettlement packages to communities displaced by mining activities.
- Mining companies should prioritize transparency and accountability in their operations and ensure that local communities have access to information about the mining activities.
- Mining companies should provide capacity-building programs for local communities to enhance their skills and knowledge and enable them to benefit from the mining activities.
- Government and regulatory agencies should establish a robust monitoring and evaluation framework to ensure that mining companies comply with environmental and social regulations.

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