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Environmental Impacts of Chinese Mining Operations in Zimbabwe, a Case of Hurungwe District.

BY

Mabhera Resca (B242019B)

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Supervisor: Dr. R. Chipaike

Bindura, Zimbabwe

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ABSTRACT

This study examined the environmental impacts of Chinese mining operations in Hurungwe District, Zimbabwe, within the context of China–Zimbabwe relations and the Look East Policy. The study sought to assess the factors affecting the environment in mining areas, examine the environmental impacts of Chinese mining activities, and propose strategies for effective environmental management. The study was guided by Dependency Theory and World-Systems Theory. An interpretivist research philosophy and qualitative research methodology were adopted to obtain an in-depth understanding of stakeholders' experiences and perceptions of mining-related environmental impacts. Purposive sampling was used to select information-rich participants, and 41 respondents were interviewed, comprising community members, mine workers, government and regulatory officials, and traditional leaders and community representatives. Data were collected through semi-structured interviews, direct observation and document analysis, and were analysed thematically. The findings showed that Chinese mining operations were associated with water pollution, land degradation, deforestation, air and noise pollution, community displacement and labour-related concerns. The main factors contributing to environmental degradation included limited environmental knowledge, weak enforcement of regulations, harmful mining methods, high mineral demand and political influence. The study concluded that existing environmental regulations were insufficiently effective because of institutional capacity constraints, weak enforcement, limited community participation and inadequate adoption of sustainable mining practices. It recommended strengthening the capacity of the Environmental Management Agency, enhancing monitoring and enforcement, adopting sustainable mining technologies, improving mine rehabilitation, increasing community participation in mining-related decision-making, and strengthening coordination among government institutions, mining companies, traditional leaders and local communities.

Declaration form

I B242019B hereby declare that this dissertation is my own solemnly work and that it has not been copied or lifted from any other sources without acknowledgement.

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Supervisor: Dr. Chipaike

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Chairperson

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DEDICATION

This research is dedicated to the rural communities of Hurungwe District whose lives, livelihoods, and environments continue to be shaped by mining activities. It is also dedicated to all environmental defenders, traditional leaders, and scholars committed to promoting environmental justice, sustainable development, and responsible resource governance in Zimbabwe and beyond

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Special appreciation is extended to environmental and human-rights organisations, particularly the Zimbabwe Environmental Law Association (ZELA) and the Centre for Natural Resources Governance (CNRG), whose reports and advocacy work provided critical reference material for this study. I also acknowledge scholars whose work on dependency theory, China–Africa relations, and environmental governance provided a strong theoretical foundation.

Finally, I extend heartfelt thanks to my family and friends for their moral support, patience, and encouragement throughout this academic journey. To all who contributed in any way, directly or indirectly, I am sincerely grateful.

LIST OF ABBREVIATIONS

Abbreviation	Full Meaning
AfDB	African Development Bank
ASM	Artisanal and Small-Scale Mining
CNRG	Centre for Natural Resources Governance
EIA	Environmental Impact Assessment
EMA	Environmental Management Agency
EPA	Environmental Protection Agency
FDI	Foreign Direct Investment
GIS	Geographic Information Systems
NGO	Non-Governmental Organisation
RDC	Rural District Council
RAU	Research and Advocacy Unit
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme
ZANU	Zimbabwe African National Union
ZELA	Zimbabwe Environmental Law Association

Abbreviation	Full Meaning
ZRA	Zambezi River Authority

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CHAPTER ONE

INTRODUCTION

1.1. Background to the study

The adoption of the Look East Policy in 2003 under former President Robert Mugabe led to a significant increase in Chinese investment in Zimbabwe. These relations were further strengthened through repeated diplomatic visits to China by Presiden

t Emmerson Mnangagwa since assuming office in 2017. During his tenure, Zimbabwe has entered into several major agreements with China, resulting in increased Chinese investment, particularly in infrastructure projects such as the expansion of Harare International Airport and the rehabilitation of railway systems. According to Moyo (2020), the Chinese-funded expansion of Harare International Airport forms part of a broader strategy aimed at improving Zimbabwe's connectivity and attracting international investment.

Zimbabwe and China have entered into trade agreements aimed at strengthening bilateral trade, including tariff arrangements and the promotion of Zimbabwean exports to China (Nyoni, 2020). Financial agreements have also been established, with China providing loans and development aid often linked to specific projects, which in turn facilitate further investment (Mutasa, 2019). Chinese investments span multiple sectors, including mining and agriculture. The mining sector, in particular, is a major contributor to Zimbabwe's economy, supporting the livelihoods of a significant portion of the population. It accounts for approximately 12% of GDP and provides employment for about 8% of the workforce (Chitiga,

2021), making it a key driver of economic growth (Moyo, 2016). Furthermore, Chinese mining companies in Zimbabwe have focused heavily on creating employment opportunities (Kambudzi, 2020).

However, Chinese investments in Zimbabwe's mining sector have also been associated with environmental degradation, including deforestation, pollution, and habitat destruction. The Center for Natural Resources Governance (CNRG, 2020) reports that Chinese mining companies in Zimbabwe have often been accused of neglecting environmental regulations and disregarding the concerns of local communities. For example, the operations of the Chinese-owned Anjin Investment in the Marange diamond fields have faced criticism for damaging local ecosystems and polluting water sources (Haglund, 2017).

Chinese operations in Zimbabwe's mining sector have been associated with human rights violations. Chinese companies have faced allegations violating labor rights, including providing poor working conditions, offering low wages, and intimidating workers. The Research and Advocacy Unit (RAU, 2019) reports that some Chinese mining companies in Zimbabwe have violated labor laws, exposing workers to hazardous conditions and providing insufficient compensation.

It is against this backdrop that the present study will be conducted, aiming to provide empirical insight into the situation on the ground, with particular emphasis on the impacts of Chinese mining companies on local communities.

1.2. Statement of the problem

The operations of Chinese mining companies in Hurungwe District have caused significant environmental and social challenges. For example, the Chinese-owned cement plant

in Magunje has been linked to water pollution and environmental degradation, affecting approximately 10,000 residents who rely on water from Kemureza Dam. Similarly, mining activities by alluvial gold companies have severely damaged ecosystems along major rivers, such as the Angwa River, which flows through Makonde and Hurungwe District, with an estimated 75% of its ecosystem impacted by land degradation. In addition to environmental harm, local communities have experienced displacement without adequate compensation. For instance, villagers in Magunje were reportedly forced off their grazing land by Labenmon, a Chinese company, which began constructing a cement plant without proper resettlement or compensation. This highlight the urgent need to investigate the environmental and social impacts of Chinese mining operations in Hurungwe District, providing evidence to inform sustainable practices, policy interventions, and community protection.

1.3. Aim

To examine the environmental impacts of Chinese mining operations in Hurungwe District and assess the effectiveness of environmental regulations in addressing these impacts.

1.4. Research objectives

i. To assess factors affecting environment in areas where Chinese mining activities are conducted.

ii. To examine the environmental impacts of Chinese mining operations in Hurungwe District

iii. To propose strategies for effective management of environment in areas being mined by Chinese companies.

1.5. Research questions

i. What factors affect the environment in areas where Chinese mining activities are conducted in Hurungwe District?

ii. What are the environmental impacts of Chinese mining operations in Hurungwe district?

iii. What strategies can be adopted to solve environmental challenges brought by Chinese mining operations?

1.6. Assumptions of the study

The study assumed that community members, mining workers, traditional leaders and relevant government and regulatory officials possessed relevant knowledge and experiences concerning mining activities and their environmental and social implications in Hurungwe District.

The study further assumed that the environmental regulatory framework governing mining activities was in place, although its implementation and enforcement could vary across mining operations and locations.

1.7. Significance of the study

This study is important as it examines the environmental effects of Chinese mining operations in Hurungwe District, Zimbabwe. The findings will provide policymakers and government authorities with evidence to improve environmental regulations, strengthen monitoring and enforcement, and support the development of sustainable and responsible mining policies.

Secondly, the study will contribute to academic knowledge by providing useful insights for students and scholars on mining and environmental management, with specific reference to Chinese investment in Zimbabwe, and will serve as a foundation for future research on foreign direct investment, environmental sustainability, and resource governance.

Thirdly, the study will benefit the Hurungwe community by drawing attention to environmental problems associated with mining activities, including land degradation, water pollution, and threats to local livelihoods, thereby raising awareness and supporting community participation and advocacy in mining-related decision-making.

Lastly, the findings will assist Chinese mining companies operating in Hurungwe District by highlighting environmental risks associated with their activities, thereby encouraging the adoption of sustainable mining practices, enhanced corporate social responsibility, and improved relations with local communities and regulatory bodies. Overall, the study supports a balanced approach to mining that promotes economic development while protecting environmental and social interests.

1.8. Delimitation

This study on the impact of Chinese mining operations in rural areas is limited to Hurungwe District only and therefore the findings may not be representative of the whole Zimbabwe and Africa or other mining contexts. The research also relied primarily on primary data collected through observations and interviews, which may be affected by limited access to respondents, response bias, and the accuracy of information provided.

1.9. Limitations

The researcher encountered several challenges during data collection, including limited cooperation from some mining companies, language barriers and restricted access to certain mining sites. These challenges were addressed through engagement with relevant authorities, the use of local translators where necessary, and triangulation of information obtained from interviews, observations and documentary sources. The study was also subject to the possibility of respondent bias, particularly where participants were reluctant to discuss sensitive issues concerning mining operations. The researcher addressed this by assuring participants of confidentiality and allowing them to provide information voluntarily.

1.10. Definition of key words

Mining is the extraction of minerals and geological materials from the earth's crust for commercial use, encompassing exploration, extraction, processing, and waste disposal (Mudd et al., 2021).

The environment refers to the interconnected biophysical systems of air, water, soil, and biodiversity, together with human social systems, that sustain life and livelihoods (IPCC, 2021; United Nations Environment Programme [UNEP], 2022).

Environmental degradation: The deterioration of the natural environment through processes such as pollution, deforestation, soil erosion, habitat destruction and loss of ecological resources.

Environmental governance**:** The systems, institutions, policies and processes through which environmental resources are regulated, monitored and managed.

Environmental impact: A change to the physical, biological or social environment resulting from human activities, including mining operations.

Sustainable mining**:** Mining practices that seek to generate economic benefits while minimizing environmental damage and protecting the interests and wellbeing of present and future generations.

Environmental regulation: Laws, standards, institutions and enforcement mechanisms established to control activities that may adversely affect the environment.

1.11. Dissertation outline

This dissertation has five chapters. Chapter 1 gives the background to the study and explains the research topic, problem, objectives, and significance of the study. Chapter 2 looks at what other scholars have already written about the topic and builds the literature review. It also articulates the theories used to guide the study. Chapter 3 describes how the study was done, including the research design, methods, and tools used to collect data. The qualitative approach was employed. Chapter 4 presents the data that was collected and explains what it means. Chapter 5 provides the overall conclusion of the study and gives recommendations based on the findings.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1. Introduction

The aim of this chapter is to review existing literature on the environmental impacts of Chinese mining company operations. The chapter synthesises and analyses previous and contemporary studies relevant to the research topic. According to Saunders et al. (2017), a critical review of literature provides a strong foundation for research by enhancing subject knowledge and clarifying research questions. Reviewing literature on the environmental impacts of Chinese mining operations enables a deeper understanding of the phenomenon under investigation and assists in identifying established findings, methodological approaches, and gaps that warrant further inquiry.

2.2. Theoretical framework

This study is grounded in Dependency Theory and World-Systems Theory, which provide critical lenses for analysing the environmental impacts of Chinese mining operations in Zimbabwe.

2.2.1. Dependency Theory

Dependency Theory emerged in the late 1950s and 1960s, developed by Latin American economists and sociologists such as Raúl Prebisch (1950), Andre Gunder Frank (1967), and later Samir Amin (1976). These scholars argued that underdevelopment in the Global South is not an inevitable stage of economic growth, but rather a historically created

condition resulting from unequal economic relationships between wealthy industrialized nations and poorer resource-exporting countries. Frank (1967) proposed that capitalist expansion produces a global hierarchy of "core" and "periphery," with core nations accumulating wealth through the extraction of raw materials, labor, and surplus from peripheral regions. Similarly, Prebisch (1950) demonstrated that deteriorating terms of trade force peripheral economies to continue exporting low-value primary goods while relying on high-value manufactured imports, perpetuating economic vulnerability (Dos Santos, 1970; Chilcote, 1984).

In Zimbabwe, Dependency Theory helps explain why Chinese mining investments often fail to generate widespread development benefits despite substantial capital inflows. Carmody and Hampwaye (2015) note that China's contemporary engagement in Africa, framed as look east policy, frequently mirrors traditional core–periphery dynamics, positioning China as a new center of accumulation. Research by Mawowa (2018) and Lee (2014) shows that Chinese mining firms in Zimbabwe often operate through enclave-style extraction, exporting minerals like gold, chrome, and lithium in raw form, with minimal local processing, limited technology transfer, and restricted involvement of domestic enterprises. This aligns with Amin's (1976) concept of "dependent accumulation," where growth occurs but the structural position of the host country remains unchanged.

Dependency theorists also emphasize the unequal bargaining power between foreign investors and host states, particularly in contexts of weak governance. Zimbabwe's regulatory environment, characterized by inconsistent enforcement and political patronage, often allows foreign firms to externalize environmental and social costs (Saunders, 2019; Chigumira & Mujere, 2020). Evidence of water pollution, deforestation, and community displacement linked

to Chinese mining in Hurungwe District illustrates Frank's (1967) claim that external capital frequently exacerbates socio-ecological harm in peripheral regions while benefits are repatriated to the core. As a result, Zimbabwe continues to rely on external capital, skills, and markets rather than developing its own technological and industrial capacity (Adebajo, 2016; Moyo & Yeros, 2020).

The theory's concept of "dependent development," where localized growth does not translate into broader national development (Cardoso & Faletto, 1979), is evident in Zimbabwe's Chinese-dominated mining sector. While mining generates foreign currency, local communities bear the environmental and social costs, including land degradation, water contamination, and human rights abuses (Moyo, 2015; Chikowore, 2022). This supports the argument of Bond (2006) and Makochekanwa (2018) that foreign dominance in extractive industries undermines sustainable development and entrenches structural inequalities in African economies.

2.2.2. World-Systems Theory

World-Systems Theory, developed by Immanuel Wallerstein (1974), builds on Dependency Theory by framing the global economy as a unified system divided into core, semi-periphery, and periphery regions. According to Wallerstein (1980), core nations maintain dominance through control of technology, finance, and global trade, while peripheral nations remain largely confined to raw material extraction with minimal value addition. China's emergence as a semi-peripheral power gives it a unique position, allowing it to exert influence over weaker peripheral states while competing with established Western core powers (Lee, 2017).

Studies by Hanlon (2014), Carmody (2016), and Zeng (2016) show that China's approach in Africa particularly infrastructure-for-minerals deals reinforces unequal exchange, as African countries continue to export largely unprocessed minerals into global value chains dominated by Chinese manufacturers. In Zimbabwe, minerals extracted by Chinese companies are typically exported with minimal local beneficiation, exemplifying Wallerstein's (2004) concept of "peripheralization," where regions remain locked into low-value positions within global production networks (Ndlovu-Gatsheni, 2018; Mutopo, 2020).

Environmental harm linked to Chinese mining such as air pollution, river siltation, mercury contamination, and habitat destruction further illustrates the World-Systems perspective that ecological costs are disproportionately borne by peripheral regions (Foster et al., 2011). Consequently, World-Systems Theory provides a deeper understanding of why Chinese mining operations in Zimbabwe perpetuate dependency and underdevelopment, despite their portrayal as investment partnerships.

2.3. China–Zimbabwe Relations: Historical, Political, and Economic Context

Understanding Chinese mining operations in Zimbabwe requires situating them within the broader historical, political, and economic ties between the two countries. Sino-Zimbabwe relations date back to Zimbabwe's liberation struggle, during which China provided military training, financial support, and ideological backing to the Zimbabwe African National Union (ZANU) (Mlambo, 2014; McGreal, 2017). This early alliance laid the groundwork for post-independence cooperation, which intensified after Zimbabwe became politically and economically isolated from Western nations in the early 2000s (Chingono & Nakana, 2019).

Economically, China has become one of Zimbabwe's key trading and investment partners. Since the adoption of the Look East Policy in 2003, bilateral trade has grown substantially, with Zimbabwe exporting minerals, tobacco, and agricultural products while importing machinery, electrical equipment, and manufactured goods from China (UNCTAD, 2022; Zhou & Nyamuda, 2017). Scholars note that this trade structure reflects core–periphery dynamics, as Zimbabwe mainly exports low-value raw materials while importing higher-value manufactured goods (Carmody & Kragelund, 2016).

Chinese foreign direct investment (FDI) in Zimbabwe has increased significantly, particularly in mining, energy, agriculture, and infrastructure. Major projects financed by Chinese firms include the Kariba South Hydro Extension, expansion of the Hwange Thermal Power Station, and telecommunications upgrades through companies such as Huawei and ZTE (Lee, 2014; African Development Bank, 2021). These investments are often backed by concessional loans, grants, or resource-backed financing, providing crucial capital amid Zimbabwe's liquidity challenges, though they also increase long-term dependence on Chinese credit and technology (Brautigam, 2019; Taylor, 2016).

Politically, the partnership is framed as look east policy with Zimbabwe repeatedly emphasizing China as an "all-weather friend," particularly in response to Western sanctions (Moyo & Yeros, 2018). China views Zimbabwe as a strategic partner within its broader African engagement, driven by resource security, diplomatic alliances, and expansion of business networks (Alden & Large, 2019). Analysts caution, however, that the relationship is asymmetrical, with China holding greater influence due to its economic power and global reach (Carmody, 2016; Ndlovu-Gatsheni, 2018).

China's growing presence in Zimbabwe has generated both opportunities and controversies. Supporters argue that Chinese investments have revitalized key sectors, expanded infrastructure, and provided alternative funding outside Western institutions (Zhou, 2017; Chikowore, 2022). Critics point to challenges such as opaque contracts, weak accountability, labor rights abuses, environmental degradation, and limited technology transfer (Saunders, 2019; Matyzak, 2018). These concerns are particularly pronounced in the mining sector, where Chinese companies have rapidly expanded into gold, chrome, lithium, and granite extraction.

Overall, the historical, political, and economic dimensions of China-Zimbabwe relations provide the context for understanding the scale and influence of Chinese mining investments. Zimbabwe's reliance on Chinese capital, technology, and markets, combined with China's strategic interest in mineral resources, frames the environment within which mining activities occur. This context is essential for analyzing the environmental, and socio-economic impacts of Chinese mining operations discussed later in the chapter.

2.4. Understanding Mining

Mining refers to the process of extracting minerals and other valuable geological materials from the Earth's crust for human use (Down & Stocks, 1997, cited in Acheampong, 2016). It involves recovering minerals from ore bodies, veins, seams, or reefs that hold economic value for the miner (Bebbington, 2013). Similarly, the *Encarta* encyclopedia defines mining as the selective extraction of minerals or materials, excluding recently formed organic matter, from the Earth's crust (Encarta, 2005).

Mining can take several forms. Surface mining involves removing soil, rocks, and overburden to access mineral deposits (Mudd, 2010), while underground mining extracts minerals from beneath the Earth's surface. Other methods include placer mining, which recovers minerals from alluvial deposits such as river sands and gravels, in-situ mining, and open-pit mining, where minerals are extracted from large excavated pits (Garnett, 2016). These mining activities can have significant environmental and health impacts, including deforestation, soil erosion, water contamination, and noise pollution, as observed in Chinese mining operations.

2.5. Factors affecting environment in mining

2.5.1. *Limited knowledge*.

A lack of education related to environmental development contributes to limited knowledge and skills, increasing vulnerability to health risks and environmental harm in the mining sector. Improper handling of mercury, for example, poses severe dangers to both workers and the environment in Zimbabwe. Even low-level exposure to mercury can cause cognitive impairments, while high-level exposure leads to serious neurological damage. During mineral processing, mercury is often released into the worker's immediate breathing zone, yet many miners are not provided with essential personal protective equipment such as gloves, safety shoes, goggles, or properly fitted hard hats (Bose-O'Reilly et al., 2018).

2.5.2. Nature of work related

The type of work performed in mining significantly influences exposure to physical hazards. Workers are often at risk of injuries due to machinery with moving parts, sharp edges,

or hot surfaces, which can cause cuts, burns, or other accidents if handled improperly (White et al., 2013). Occupational hearing loss is a common work-related injury globally; in the United States alone, approximately 22 million workers are exposed to hazardous noise levels, resulting in an estimated $242 million annually in workers' compensation claims.

Physical hazards in mining also include exposure to extreme heat, vibrations, falls, explosions, flooding, and airborne particles such as dust and aerosols, which can have fibro genic or carcinogenic effects (Aswathanarayana, 2003). Additionally, ionizing radiation is recognized as a significant physical hazard in certain mining operations. These risks highlight the critical importance of safety measures and protective equipment to safeguard workers' health.

2.6. Environmental impacts of mining

According to Chimonyo et al. (2012), large areas of land and vegetation have been cleared to accommodate surface mining activities. Mining companies were primarily responsible for the extensive deforestation, as they removed vast tracts of land to access mineral deposits. Local villagers expressed concern over the loss of important fruit trees, such as the baobab (*Adansonia digitata*), which were destroyed without consideration for their social and economic value to the community. In the absence of enforced mine rehabilitation, the long-term environmental future of Hurungwe remains uncertain (Chimonyo et al., 2018).

2.6.1. Air pollution

Mining activities, particularly those by Chinese companies involved in alluvial gold extraction along the Sanyati River, have significantly contributed to both surface and groundwater pollution (Zimbabwe Environmental Law Association [ZELA], 2012). Many

underground mines engage in practices such as lowering the water table or diverting rivers, which disrupt the quality and availability of water for local communities. Residents in areas such as Rengwe, Matusadonha National Park, Mahwido Falls, and Gandavaroyi Falls rely on the Sanyati River for drinking water, domestic chores, and bathing, making them particularly vulnerable to contamination (ZELA, 2012).

Air pollution is another critical concern. Mercury and other pollutants emitted during mining can travel long distances, posing health risks far from the source (Boulanger & Gorman, 2016). Mining operations and supporting activities release particulate matter into the air, including respirable dust from site clearance, road construction, open-pit drilling and blasting, ore and waste handling, and vehicular movement. Communities have reported grievances related to black smoke, noise, vibrations, and airborne dust. Prolonged exposure to fine dust can lead to respiratory illnesses and exacerbate conditions such as asthma and arthritis. ZELA (2012) also highlighted the importance of preventive measures to reduce air pollution and protect both human health and the environment.

2.6.2. *Noise pollution*

Noise and vibration in mining areas primarily result from mobile machinery, air blasts, and blasting operations. Prolonged exposure to high-decibel noise can damage hearing, cause structural cracks in buildings, and disrupt local vegetation (Akabzaa et al., 2012). Wildlife is also affected, as excessive noise can interfere with mating, trigger stress, and even cause abortions, leading to declines in animal populations (Chimonyo et al., 2012).

2.6.3. *Displacement of local communities*

Mining expansion has led to the displacement of local communities, disrupting livelihoods, social networks, and cultural heritage sites. In Magunje, Hurungwe District, villagers were reportedly evicted by a Chinese mining company without adequate compensation, highlighting the social costs of large-scale mining operations (Saunders, 2015; Chikowore, 2022).

2.7. Strategies to deal with negative effects of mining

2.7.1. *Capacity building*

Raising public awareness is critical in addressing environmental challenges associated with mining. Media campaigns, community programs, and public education initiatives help people understand the human impact on the environment and encourage responsible practices. Agencies such as the Environmental Protection Agency (EPA) set standards to safeguard drinking water by limiting contaminants, including microorganisms. Mining activities in regions across Africa, Asia, and South America have contributed to river pollution, which is linked to millions of waterborne diseases annually worldwide (Haward, 2016).

Key environmental issues in mining such as water and air pollution, land degradation, and waterlogged pits-pose significant risks to human health and ecological sustainability. Public education goes beyond clean-up initiatives; it involves teaching communities and workers about the proper handling and disposal of hazardous chemicals, like cyanide, to prevent contamination and protect water resources (UNEP Africa, 2006).

2.7.2. Engineering innovation

Engineering interventions play a vital role in reducing health and environmental risks in mining. Occupational health and safety measures, informed by research and training, can prevent workplace hazards. Technologies such as GIS and remote sensing can support disaster management by aiding in prevention, monitoring, and response to environmental emergencies (Goodchild, 2007).

Investment in green mining technologies focusing on cleaner processing methods, water conservation, and energy efficiency is essential. Research and development in this area, as demonstrated by Australia's multi-million-dollar mining research initiatives since the 1980s, has led to more efficient surveying and drilling techniques (Green Mining Initiative, 2011; Hogan, 2004). Continued innovation is critical to ensuring sustainable and environmentally responsible mining practices in the future.

2.8. Chapter summary

This chapter reviewed literature on Chinese mining, environmental degradation and environmental governance, with particular attention to the Zimbabwean context. Dependency Theory and World-Systems Theory provided the theoretical basis for understanding the relationship between foreign investment, resource extraction, power asymmetries and the distribution of environmental and socio-economic costs. The reviewed literature showed that mining can contribute to economic development while simultaneously generating environmental challenges, including water pollution, land degradation, deforestation, air pollution and displacement of communities.

The literature further indicated that the severity of mining-related environmental impacts is influenced by factors such as mining methods, environmental awareness, regulatory enforcement, institutional capacity and community participation. However, the reviewed studies provided limited context-specific evidence integrating these factors with the experiences of communities and regulatory stakeholders in Hurungwe District. This study therefore sought to address this gap by examining the environmental impacts of Chinese mining operations in Hurungwe and assessing strategies for improving environmental management. The next chapter presents the methodology and research design used to investigate the research problem.

CHAPTER THREE

METHODOLOGY AND RESEARCH DESIGN

3.1. Introduction

This chapter presents the methodological framework employed to examine the environmental impacts of Chinese mining operations in Hurungwe District. The study adopts a qualitative research approach, widely regarded as appropriate for examining complex socio-environmental issues that require in-depth engagement with human experiences and local contexts. This chapter therefore details the research design, study area, target population, sampling strategies, data collection instruments, data analysis methods, and ethical considerations that collectively ensure a rigorous, credible, and contextually grounded investigation of the environmental impacts of Chinese mining activities.

3.2. Research Philosophy

The study adopted an interpretivist research philosophy. Interpretivism recognises that social reality is constructed through the meanings and experiences that individuals attach to their circumstances. This philosophy was appropriate for the study because the research sought to understand how community members, mining workers, traditional leaders and regulatory officials perceived and experienced the environmental and social consequences of Chinese mining operations in Hurungwe District. It also enabled the researcher to explore different stakeholder perspectives regarding environmental degradation, regulatory enforcement and community participation. The interpretivist philosophy was therefore consistent with the

qualitative nature of the study and its focus on understanding experiences within their social, political and environmental contexts.

3.3. Research Methodology

The study adopted a qualitative research methodology. A qualitative approach was considered appropriate because the study sought to obtain detailed accounts of stakeholders' experiences, perceptions and interpretations of the environmental impacts of Chinese mining operations. The methodology enabled the researcher to explore complex issues such as environmental degradation, community displacement, regulatory challenges and local participation in environmental decision-making. Rather than seeking statistical generalisation, the study focused on obtaining rich, contextual information from participants with direct knowledge or experience of mining activities in Hurungwe District.

3.4. Research design

This study employed a qualitative research design, which is well-suited for investigating complex, context-specific social and environmental issues. Qualitative research prioritises depth over breadth, making it ideal for understanding human experiences, perceptions, and social processes within real-world settings (Creswell, 2014; Denzin & Lincoln, 2018). Given the study's focus on sensitive topics such as environmental degradation, community displacement, human rights concerns, and governance challenges related to Chinese mining companies, a qualitative approach provides the flexibility needed to capture nuanced perspectives from diverse stakeholders, including local villagers, traditional leaders, EMA officials, and NGO representatives. This approach aligns with previous Zimbabwean

studies on mining, deforestation, water pollution, and community displacement (Chimonyo et al., 2012; ZELA, 2012; Moyo, 2015).

The study is based on the interpretivist paradigm, which understands reality as socially constructed and interprets it through the meanings that individuals attach to their experiences (Bryman, 2016; Schwandt, 2014). Interpretivism allows for a detailed examination of how communities perceive environmental changes, how regulatory authorities experience enforcement challenges, and how workers navigate Chinese-operated mining environments. It is particularly effective for examining power asymmetries between foreign investors and local communities, as highlighted in Dependency Theory and World-Systems Theory (Frank, 1967; Amin, 1976; Wallerstein, 1974). These frameworks necessitate approaches capable of unpacking structural inequalities and vulnerabilities, supporting the coherence of a qualitative design.

The qualitative approach also complements the study's methodological strategy, which integrates interviews, observations, and secondary documents to provide a grounded understanding of mining impacts in Hurungwe District. It facilitates the generation of rich, contextualized descriptions of human-environment interactions (Geertz, 1973; Tracy, 2020) and allows for adaptive questioning and exploration of emerging themes an important feature in politically sensitive contexts involving governance, livelihoods, and community rights (Saunders, 2019; Lee, 2014). Overall, qualitative research was deemed the most appropriate and theoretically aligned approach to address the study's objectives and investigate the environmental consequences of Chinese mining operations in Hurungwe District.

3.5. Study area

The study was conducted in Hurungwe District in Mashonaland West Province, an area significantly affected by the expansion of Chinese mining operations. Hurungwe is characterised by a mixture of communal lands, river systems such as Sanyati and Angwa Rivers, and agricultural zones that have increasingly been encroached upon by mining activities. According to Zimbabwe Environmental Law Association (2012), Chinese alluvial gold mining along Sanyati River has contributed to severe water pollution, sedimentation, and reduction of potable water sources for surrounding communities. Similarly, Chimonyo et al. (2012) observed widespread deforestation in Hurungwe due to land clearance for open cast mining, resulting in loss of biodiversity and destruction of fruit-bearing trees such as Adansonia digitata.

Hurungwe is also home to communities who have reported displacement and loss of grazing land due to the operations of companies such as Labenmon, which allegedly constructed a cement plant on communal land without proper consultation or compensation (Chikowore, 2022). The district therefore provides an appropriate context for examining the intersection between foreign investment, environmental degradation, and community wellbeing.

3.6. Population and sampling

The population and sampling techniques used by the researcher are explained on the following sub-headings.

3.6.1. *Population*

The target population for this study comprised of individuals and institutions directly or indirectly affected by Chinese mining operations in Hurungwe District, reflecting the ecological, social, and governance dimensions of the research problem. This included local community members living near mining sites who experience environmental impacts such as water pollution, deforestation, and land degradation. Traditional leaders responsible for land allocation, conflict resolution, and cultural heritage protection were also included, alongside Environmental Management Agency (EMA) officers tasked with monitoring compliance and ecological damage. The population further encompassed Rural District Council officials involved in land-use planning and local development, as well as current and former employees of Chinese mining companies with direct knowledge of operational practices, labor conditions, and workplace environmental standards. Representatives from civil society organizations, including the Centre for Natural Resources Governance (CNRG) and the Zimbabwe Environmental Law Association (ZELA), were included due to their engagement in monitoring environmental and human rights violations linked to Chinese mining.

3.6.2. *Sampling*

The study employed purposive sampling, which is a non-probability method frequently used in qualitative research, to intentionally select participants who possessed specific knowledge, experiences, or involvement pertinent to the research issue (Patton, 2015; Creswell, 2014). Focusing on the environmental and social impacts of Chinese mining operations, this method allowed the researcher to engage individuals directly affected by mining, including villagers living near polluted rivers and grazing lands, traditional leaders managing land disputes, EMA officers monitoring environmental compliance, and workers or

former employees familiar with operational practices. This approach aligns with the interpretivist paradigm, which prioritises information-rich cases capable of providing comprehensive insights into complex social and environmental dynamics (Bryman, 2016; Denzin & Lincoln, 2018). Participants were selected based on their proximity to mining activities, professional roles, or experiential knowledge of issues such as water pollution, land degradation, displacement, and workplace conditions. Sampling continued until data saturation was reached, ensuring a diverse and relevant set of perspectives that enhanced the credibility, depth, and contextual accuracy of the findings (Guest et al 2016).

3.6.3. *Sample size*

A total of 41 respondents were interviewed, representing key stakeholder groups directly affected by or involved in Chinese mining activities. The sample included 18 local community members; farmers, village heads, and household representatives from Magunje and surrounding wards, whose livelihoods are closely linked to mining activities. Eleven mine workers employed by Chinese-operated companies also participated, representing machine operators, panners, and general laborers. Seven government and regulatory officials from the Environmental Management Agency (EMA), the Rural District Council, and local administrative offices provided insights into governance and regulatory challenges. Additionally, five traditional leaders and community representatives, including village heads and elders responsible for land allocation, cultural practices, and community welfare, were interviewed. The inclusion of these diverse respondents facilitated triangulation of environmental, social, and governance perspectives, enhancing the credibility, depth, and reliability of the findings.

3.7. Data collection method

The study collected data using three interrelated qualitative approaches semi-structured interviews, direct observations, and document analysis to achieve thorough understanding, triangulation, and contextual precision in evaluating the environmental impacts of Chinese mining activities in Hurungwe District.

3.7.1. *Semi structured*

Semi-structured interviews were conducted with villagers, traditional leaders, EMA officers, council officials, NGO representatives, and workers from Chinese mining companies. This approach allowed the researcher to examine participants' perspectives and lived experiences while providing the flexibility to delve deeper into specific issues. such as water pollution, land degradation, displacement, and labour conditions, all widely documented in previous studies (Chimonyo et al., 2012; Moyo, 2015; ZELA, 2012).

3.7.2. *Direct observation*

Direct observation captured visible environmental effects including silted rivers, open pits, deforested areas, dust emissions, and structural damage from blasting, supplementing interview data with real-time evidence, a method recommended in ecological and mining research (Babbie, 2016; Akabzaa et al., 2012).

3.7.3. Document analysis

Document analysis of EIAs, EMA inspection reports, NGO publications, policy documents, and scholarly literature provided a broader regulatory, historical, and theoretical context, aligning with the methodological framework outlined in Chapter One and the literature reviewed in Chapter Two. Together, these methods produced a rich, triangulated understanding of the socio-environmental dynamics of Chinese mining in Hurungwe, enhancing the credibility and comprehensiveness of the findings (Patton, 2015; Bowen, 2009).

3.8. Data presentation and analysis

Data were analyzed using thematic analysis, a qualitative method that enables the identification, organization, and interpretation of patterns within textual and observational data (Braun & Clarke, 2013). The analysis followed an iterative process, starting with familiarization through repeated reading of interview transcripts, observation notes, and document sources. Key segments related to environmental degradation, community displacement, regulatory challenges, and local perceptions issues highlighted in Chapters One and Two were systematically coded. These codes were then grouped into broader themes that captured recurring concerns across data sources, allowing for a deeper understanding of how Chinese mining operations impact both the environment and local communities.

Thematic analysis was well suited to this study because it complements the interpretivist qualitative approach, which aims to understand how participants perceive and interpret their experiences within wider socio-political and ecological contexts (Bryman, 2016; Creswell, 2014). Analytic rigor was enhanced through triangulation with observational data

and document analysis, ensuring that emerging findings were reliable, consistent, and grounded in multiple sources of evidence, a recommended practice for examining complex environmental phenomena (Yin, 2018; Patton, 2015). Overall, thematic analysis provided a systematic yet flexible framework for uncovering the underlying patterns and dynamics associated with Chinese mining activities in Hurungwe District.

3.9. Validity and reliability

To ensure the credibility, dependability, and overall reliability of the study, several qualitative validation strategies were employed. The research utilised triangulation by comparing data obtained through interviews, direct observation, and document analysis, a process widely recommended to enhance accuracy and reduce researcher bias in qualitative environmental research (Denzin, 2012; Patton, 2015). Member checking was undertaken by allowing participants to review and verify the accuracy of the interpreted findings, which enhanced the study's credibility (Lincoln & Guba, 1985). Thick description was used to provide detailed contextual accounts of environmental impacts, community experiences, and governance dynamics, enabling transferability to similar mining contexts (Creswell, 2014). An audit trail documenting sampling decisions, field notes, interview procedures, and coding processes ensured dependability and allowed for methodological transparency (Yin, 2018). These strategies were consistent with the methodological considerations outlined in Chapter One and aligned with the need to rigorously validate findings derived from complex socio-environmental settings such as those described in Chapter Two

3.10. Ethical considerations

Given the sensitivity of Chinese mining operations and their documented environmental and social impacts in Hurungwe District, strict adherence to ethical research principles was paramount. The study ensured informed consent, with participants fully briefed on the research purpose, their rights, and how the collected data would be used, in line with established guidelines for qualitative research (Orb, Eisenhauer & Wynaden, 2001). Confidentiality and anonymity were upheld by assigning pseudonyms and storing all data securely, a critical measure given the political and economic tensions surrounding foreign mining activities in Zimbabwe (Moyo, 2015; Saunders, 2019). Participation was entirely voluntary, and participants were informed that they could withdraw from the study at any time without facing any repercussions. Permissions were obtained from local authorities, traditional leaders, and relevant institutions, respecting community protocols and ethical gatekeeping procedures. The researcher also adhered to the principle of non-maleficence, avoiding questions or activities that could expose participants to intimidation, retaliation, or other risks, reflecting sensitivity to the human rights and displacement issues discussed in Chapters One and Two. Collectively, these ethical measures ensured the study was conducted with integrity, respect, and a clear awareness of the vulnerable contexts in which participants live.

3.11. Chapter summary

This chapter presented the methodological framework guiding the investigation into the environmental impacts of Chinese mining operations in Hurungwe District. Through a qualitative design supported by purposive sampling, semi-structured interviews, direct observation, and document analysis, the study established a robust structure for collecting and analysing data. Thematic analysis, combined with trustworthiness measures and ethical

safeguards, establishes a robust basis for presenting the study's findings. The next chapter will present and analyse the results based on the themes derived from the fieldwork.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

4.1. Introduction

This chapter outlines the study's results and offers a detailed discussion of the environmental effects of Chinese mining activities in Hurungwe District, based on evidence gathered from interviews, field observations, and document review.

4.2. Theoretical Interpretation (Dependency + World Systems)

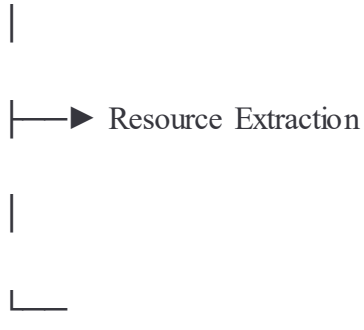
Global Demand for Minerals



China as Semi-Core Power



Zimbabwe as Peripheral State





Ecological & Social Costs

Figure 4.2 Application of Dependency and World-Systems Theory to Chinese mining operations in Zimbabwe

4.3. Factors Affecting the Environment in Chinese Mining Operations

Results revealed multiple interrelated factors that predispose the environment in Hurungwe District to degradation under Chinese mining activities.

Factor	**Description**	**Percentage of Respondents Mentioning (%)**
Limited environmental knowledge	Workers lack training on chemical handling, waste disposal, and sustainable mining	68%
Weak enforcement of regulations	EMA monitoring limited by resources & political constraints	74%
Harmful mining methods	Open-cast & riverbank mining that disturbs ecosystems	81%
High mineral demand	Pressure to maximise production leading to corner-cutting	59%

Political influence	Government prioritises FDI over environmental protection	47%

Figure 4.3: Factors that predispose the environment

Most workers employed by Chinese mining companies reportedly had limited formal education or training in environmental management. Respondents indicated that hazardous chemicals, particularly mercury and cyanide, were frequently handled without appropriate protective equipment or proper guidance. This aligns with studies showing that improper mercury handling can result in serious ecological and health impacts (Bose-O'Reilly et al., 2008; Billard et al., 2004). Community members also reported instances of untreated mine waste being discharged into rivers, highlighting gaps in environmental awareness and inadequate monitoring of workplace practices.

One mine worker explained:

"We were never trained on how to use chemicals safely. We just copy what others do, even with mercury and cyanide." (Mine worker, Hurungwe)

A community member similarly observed:

"They throw waste into the river because they do not understand the danger. No one teaches them about the environment." (Community member, Magunje)

These statements highlight how inadequate training directly leads to unsafe handling of chemicals and environmental pollution, supporting previous research on mercury misuse in artisanal and small-scale mining (Bose-O'Reilly et al., 2008). EMA officials identified limited resources, understaffing, and political interference, particularly in cases where mining

operations are linked to influential business or political actors as major obstacles to effective monitoring. Council officers expressed frustration that some mining companies commence operations before completing Environmental Impact Assessments (EIAs) or exceed their permitted boundaries without repercussions. These findings are consistent with existing literature documenting governance and regulatory weaknesses in Zimbabwe's mining sector (Matyzak, 2018; Saunders, 2019; Chigumira & Mujere, 2020).

EMA officials and local authorities emphasised enforcement challenges. One EMA officer stated:

"We know some companies are operating outside their EIA conditions, but we lack vehicles, fuel, and sometimes political backing to act." (EMA official)

A council officer added:

"Some mines start working before completing the EIA, and when we report, nothing happens." (RDC official)

These responses clearly demonstrate institutional capacity constraints and political interference, reinforcing governance-related explanations discussed in the literature (Matyzak, 2018; Saunders, 2019)

Chinese mining companies were reported to rely heavily on environmentally aggressive techniques such as riverbed excavation, open-cast mining, and use of heavy earth-moving machinery. Interviews revealed that such methods frequently disturb soil profiles, increase erosion, and cause river siltation. Observations confirmed that these methods leave

large craters, unrehabilitated pits, and widespread vegetation clearance patterns described in Chimonyo et al. (2012) and the Zimbabwe Environmental Law Association (2012)

Community members frequently referred to destructive mining techniques. One respondent remarked:

"They dig deep pits and leave them open. Our cattle fall in, and the land becomes useless." (Farmer, Hurungwe)

Direct observation confirmed extensive open pits and unrehabilitated land, validating respondents' experiences and aligning with findings by Chimonyo et al. (2012)

Community leaders and local officials noted that the global demand for gold, lithium, and other minerals has intensified extraction pressures. Chinese companies often work continuously, day and night, to maximize output with limited regard for ecological sustainability. This high-pressure extraction cycle increases the strain on water bodies, soils, and forests, intensifying environmental damage. Respondents suggested that Zimbabwe's economic challenges create conditions in which the government prioritizes foreign direct investment, sometimes at the expense of environmental protection. The Look East Policy has strengthened Chinese economic influence, creating an environment where environmental regulation is sometimes subordinated to economic gains—a concern consistent with literature on China–Zimbabwe relations and dependency dynamics (Mlambo, 2014; Carmody, 2016).

4.4. Environmental Impacts of Chinese Mining Operations in Hurungwe District

This section presents the environmental consequences documented through interviews, observations, and document analysis.

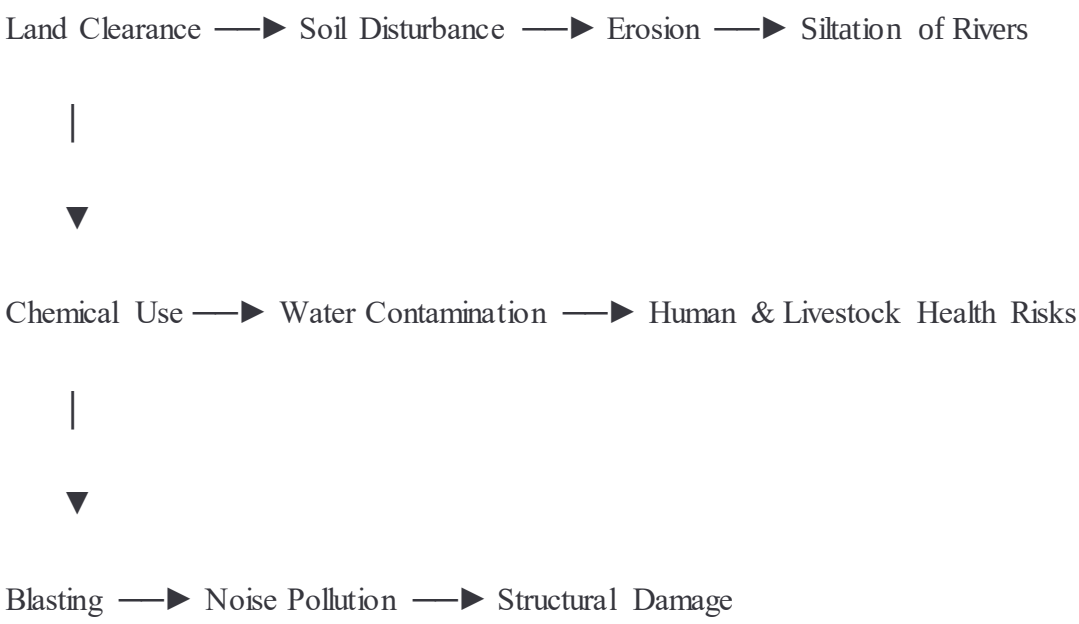
Type of Impact	Observed Effects	Severity Level (High/Medium/Low)	Frequency Mentioned (%)
Water pollution	Siltation, chemical contamination	High	85%
Land degradation	Open pits, soil erosion	High	90%
Deforestation	Loss of fruit trees, sacred sites	Medium–High	78%
Air pollution	Dust from haulage trucks, blasting	Medium	63%
Noise & blasting	Cracks in houses, livestock disruption	Medium	55%
Displacement	Loss of farmland, grazing areas	High	49%
Labour abuse	Poor working conditions	Medium	52%

4.4.1. Environmental Impact Chain of Chinese Mining

Mining Activities

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▼



Participants reported widespread contamination of rivers such as the Sanyati, Angwa, and smaller tributaries. Livestock deaths, fish scarcity, and changes in water color were cited as indicators of pollution. Observations confirmed significant siltation, reduced water flow, and visible sediment plumes associated with alluvial mining.

Respondents described visible changes in river conditions. One villager noted:

"The river used to be clear. Now it is always brown, and our animals refuse to drink the water." (Community member, Sanyati River)

Another added:

"Fish disappeared after mining started. We suspect chemicals." (Village head)

These testimonies support observed siltation and contamination and strengthen the link between mining activities and hydrological disruption

These findings support earlier reports that mining disrupts hydrological systems and introduces toxic pollutants into water bodies (Zimbabwe Environmental Law Association, 2012; Boulanger & Gorman, 2004). Villagers noted increased incidences of skin irritations and stomach illnesses, suggesting potential human health impacts. The study found that extensive land scarring, open pits, and soil displacement were widespread in mining zones. Some pits exceeded several metres in depth and presented direct dangers to livestock and children. The lack of rehabilitation means that disturbed soils remain vulnerable to erosion during rainy seasons. Traditional leaders expressed concern over land and cultural loss:

"Sacred trees were cut without consulting us. This is not just environmental damage; it is cultural *destruction."* (Traditional leader)

Such statements reinforce the social and cultural dimensions of environmental degradation already identified in your analysis.This pattern resembles findings from prior studies that link alluvial mining to severe landscape transformation (Down & Stocks, 1997; Aswathanarayana, 2003)

These observations highlight the social and cultural dimensions of environmental degradation identified earlier in the analysis. The pattern is consistent with prior research linking alluvial mining to extensive landscape alteration (Down & Stocks, 1997; Aswathanarayana, 2003). Large-scale tree clearing was conducted to make way for access roads, camps, and processing areas. Sacred and fruit-bearing trees, including Adansonia digitata (baobab), were removed, disrupting local food sources, cultural practices, and essential ecosystem services. This reflects findings by Chimonyo et al. (2012), who reported rapid vegetation loss in Hurungwe due to mining activities. Respondents living near mining sites also reported persistent dust clouds generated by truck traffic, machinery, and blasting. These

airborne particulates have been associated with respiratory issues, increased coughing in children, and aggravated asthma symptoms. Field observations confirmed poor air quality, particularly along haul roads, aligning with studies that link fine mining dust to significant human health risks (Akabzaa et al., 2012).

Frequent blasting from mining operations caused structural damage, including cracks in houses, broken windows, and destabilized livestock enclosures. Noise disturbances were reported to disrupt schoolchildren, wildlife, and general community life, echoing findings from Akabzaa et al. (2012) and other studies on mining-induced vibrations in African contexts. Several communities, particularly near Magunje, were displaced by companies such as Labenmon, often without adequate compensation or relocation support. Villagers described losing grazing land, farmland, and sacred sites, reinforcing accounts by Chikowore (2022) and Saunders (2015) documenting forced relocations in Chinese-operated mining areas. Workers reported low wages, absence of formal contracts, verbal abuse, and unsafe working conditions, while community members described intimidation when raising environmental concerns. These patterns reflect broader labour rights abuses documented by Moyo (2015) and RAU (2019). The lived experiences of displacement and occupational hardship were vividly recounted by respondents.

"We were told to leave the land quickly. There was no proper compensation." (Displaced farmer, Magunje)

Mine workers reported labour concerns:

"We work long hours with no contracts. If you complain, you are threatened." (Mine worker)

These direct voices strengthen the credibility of labour and displacement findings and align with earlier studies on Chinese mining labour practices (Moyo, 2015; RAU, 2019)

4.5. Strategies for Managing Environmental Impacts

Stakeholders cited the need for enhanced training on sustainable practices, proper chemical handling, and community environmental awareness. Respondents argued that both workers and communities require knowledge to minimise environmental harm. These views align with international models recommending education as a key strategy for environmental protection (EPA, 2016; UNEP Africa, 2006)

Strategy	**Description**	**Community Support (%)**
Environmental education	Training workers & communities	82%
Stronger regulation	More EMA inspections & penalties	88%
Engineering technologies	GIS, remote sensing, dust control tech	69%
Community participation	Inclusion in mining decisions	75%
Mandatory rehabilitation	Replanting, backfilling, land restoration	91%

Figure 4.4.2: Strategies for Managing Environmental Impacts and community support

4.5.1. Governance Failure Model (Based on Findings)

Weak State Capacity



Respondents stressed the need for stronger legal frameworks and penalty mechanisms. EMA officers emphasized challenges in monitoring vast areas with limited resources and recommended increased funding, regular inspections, and political support for enforcement. Improved enforcement could mitigate issues such as illegal riverbank mining and non-compliance with EIAs. Respondents strongly supported rehabilitation and regulation. One EMA officer stated:

"If rehabilitation was enforced strictly, many of these problems would reduce."

A community leader added:

"We want to be involved before mining starts, not after damage is done."

These views reinforce the argument for participatory environmental governance and mandatory land restoration. Participants recommended using GIS mapping, satellite monitoring, and improved mining technologies to reduce environmental damage. Literature supports these interventions, noting that technological innovations increase environmental monitoring accuracy (Goodchild, 2007; Hogan, 2004; Green Mining Initiative, 2011)

Respondents argued that effective environmental governance requires involving local communities in decision-making processes. Many communities feel excluded from mining agreements and seek a more participatory approach to promote transparency and accountability. EMA officers and community members recommended enforcing mandatory land reclamation practices, including backfilling pits, replanting trees, and restoring disturbed ecosystems.

4.6. Factors Influencing Environmental Degradation in Chinese Mining Operations

Findings indicate that environmental degradation results from a combination of human, political, institutional, and technological factors. Dependence on foreign capital has weakened regulatory enforcement, consistent with Dependency Theory's emphasis on unequal power dynamics between core and peripheral states (Frank, 1967; Amin, 1976) . Zimbabwe's economic reliance on Chinese investment creates asymmetries that limit state capacity to enforce environmental safeguards. The absence of robust training programs further exacerbates

poor environmental practices, confirming earlier claims that low environmental literacy leads to increased risk of ecosystem destruction (Bose-O'Reilly et al., 2008).

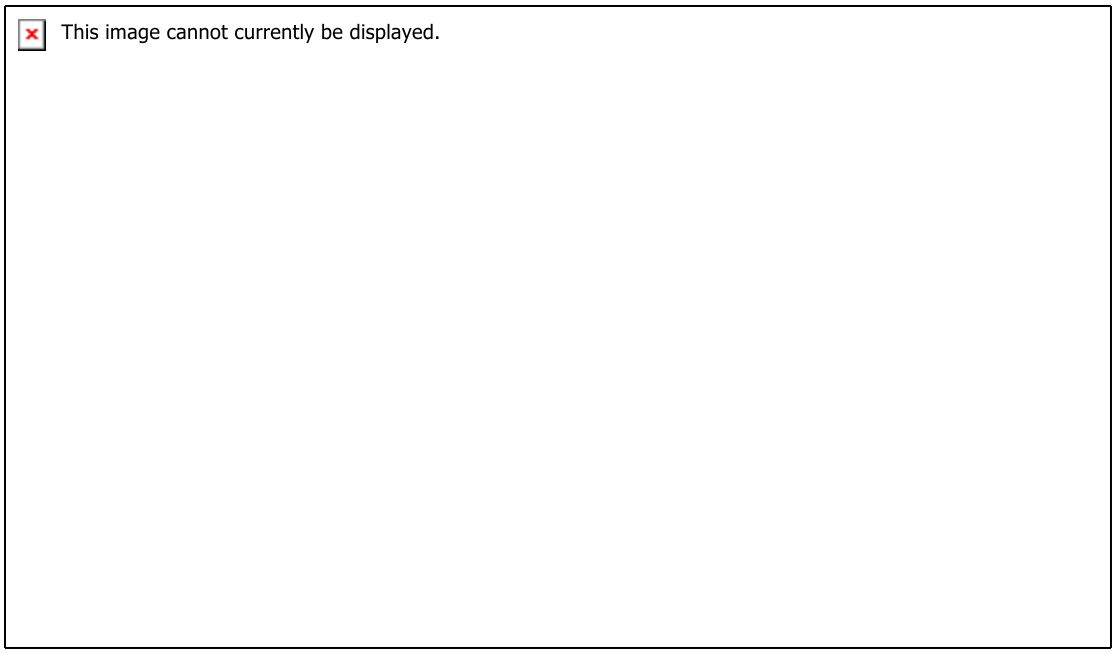


Figure 4.5: Factors contributing to environmental degradation as perceived by participants

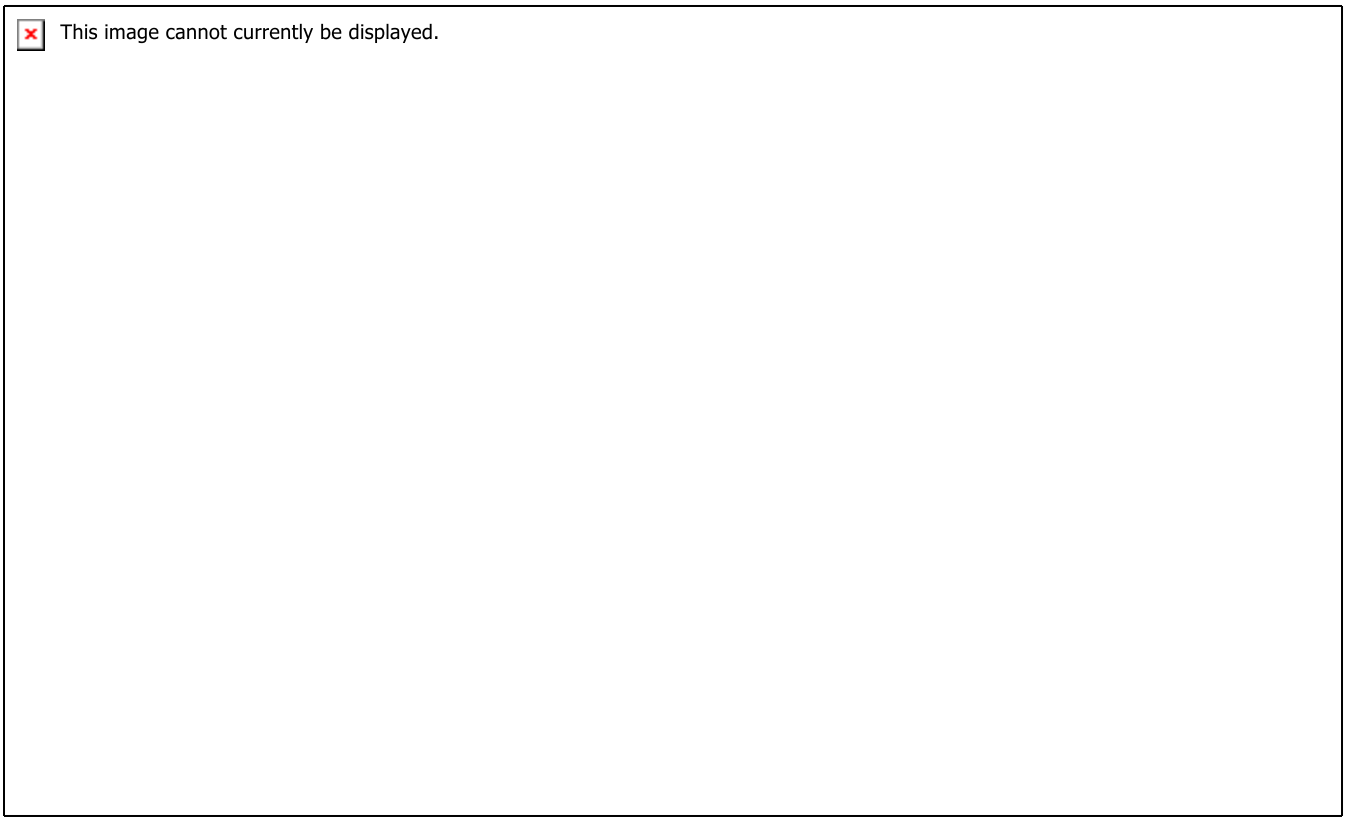


Figure 4.7: Levels of community support for proposed environmental management strategies.

The severity of water pollution, land degradation, and deforestation mirrors findings in Zimbabwe and other resource-dependent African economies. Wallerstein's World-Systems Theory argues that peripheral nations such as Zimbabwe experience ecological extraction because they occupy a subordinate role in the global division of labour (Wallerstein, 1974; Hornborg, 1998). Chinese mining practices especially raw mineral extraction with minimal beneficiation reinforce this peripheralization. This aligns with Carmody & Kragelund (2016), who argued that Chinese investments often deepen resource dependence while externalizing environmental costs.

Current mitigation strategies remain inadequate due to enforcement weaknesses, limited community involvement, and insufficient investment in sustainable technologies. As Saunders (2019) notes, governance systems in Zimbabwe's mining sector are strained by political patronage and capacity gaps. The findings support this argument, showing that environmental laws exist but are poorly implemented. The call for stronger regulatory mechanisms echoes similar proposals in environmental governance literature (Chigumira & Mujere, 2020). Community participation is also central to sustainable resource management, yet communities in Hurungwe remain marginalised in decision-making processes.

4.7. Chapter Summary

This chapter presented detailed findings and an in-depth discussion of the environmental impacts of Chinese mining operations in Hurungwe District. The results indicate that limited environmental knowledge, weak regulatory enforcement, and unsustainable mining practices are major drivers of environmental degradation. Key impacts include water pollution, deforestation, land degradation, community displacement, and human rights violations. While existing interventions such as environmental education, engineering solutions, and legal enforcement have potential, their effectiveness is constrained by structural, political, and institutional challenges. The discussion further linked these outcomes to Dependency Theory and World-Systems Theory, illustrating how Zimbabwe's peripheral position exacerbates both environmental and socio-economic vulnerabilities under Chinese mining activities.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

This chapter synthesises the research findings presented in Chapter Four and draws conclusions aligned with the research objectives, theoretical framework, and methodological approach used in the study. The conclusions reflect insights obtained through interviews, direct observation, and document analysis as outlined in Chapter Three. The chapter is structured into three categories of conclusions: scientific conclusions, educational conclusions, and governance and policy conclusions, to clearly separate ecological, social, and institutional implications. Furthermore, the chapter presents evidence-based recommendations targeted at key stakeholders, including the Environmental Management Agency (EMA), Ministry of Mines and Mining Development, local authorities, traditional leaders, Chinese mining companies, and local communities. Finally, the chapter outlines the limitations of the study and proposes areas for future research.

Summary of the Study

The study examined the environmental impacts of Chinese mining operations in Hurungwe District within the broader context of China–Zimbabwe relations and the Look East Policy. The study sought to assess the factors affecting the environment in mining areas, examine the environmental impacts of Chinese mining operations, and propose strategies for effective environmental management.

The study adopted an interpretivist research philosophy and a qualitative research methodology. Purposive sampling was used to select information-rich participants, resulting in 41 respondents drawn from relevant community, mining, government, regulatory and traditional leadership groups. Data were collected through semi-structured interviews, direct observation and document analysis and were analysed using thematic analysis.

The findings showed that environmental degradation associated with mining was influenced by limited environmental knowledge, weak enforcement of regulations, harmful mining methods, high mineral demand and political influence. The major environmental impacts identified were water pollution, land degradation, deforestation, air and noise pollution, community displacement and labour-related concerns. Participants identified stronger environmental regulation, environmental education, improved technologies, community participation and mandatory rehabilitation as important measures for addressing these challenges.

5.2. Conclusions

5.2.1. Factors affecting the Environment

The study concluded that environmental degradation associated with Chinese mining operations in Hurungwe resulted from interacting human, institutional, political and technological factors. Limited environmental awareness and inadequate training contributed to unsafe mining and waste-management practices, while weak regulatory enforcement

reduced the effectiveness of existing environmental safeguards. Harmful mining methods and pressure to maximise mineral production further increased environmental risks.

5.2.2. Environmental Impacts

The study concluded that Chinese mining operations had significant environmental and social consequences in the study area. Water pollution, land degradation and deforestation were among the most prominent impacts identified by participants and observed during fieldwork. Mining-related air and noise pollution, displacement and loss of community resources also affected local livelihoods and wellbeing. The findings indicate that the economic benefits associated with mining need to be balanced against environmental protection and community interests.

5.2.3. Environmental Management Systems

The study concluded that existing environmental management measures were constrained by limited institutional capacity, inadequate monitoring, weak enforcement and insufficient community participation. Although environmental education, improved technologies, stronger regulation and rehabilitation have the potential to reduce environmental damage, their effectiveness depends on consistent implementation and coordination among regulatory institutions, mining companies, local authorities and affected communities.

The findings are consistent with the central arguments of Dependency Theory and World-Systems Theory, particularly the unequal distribution of benefits and environmental costs associated with resource extraction. The findings suggest that the environmental consequences of mining cannot be separated from wider questions of institutional capacity, power relations and resource governance.

5.3. Recommendations

Following are recommendations to specific organizations.

5.3.1. Recommendations to EMA

To prioritize building institutional capacity by increasing the number of environmental inspectors and improving logistical and operational support, as current resource constraints have severely limited effective enforcement a challenge.

To move beyond sporadic, one-off inspections and adopt a system of continuous, structured monitoring of Environmental Impact Assessments (EIAs) to ensure that mining companies consistently comply with approved environmental standards throughout their project lifecycles. The agency should also integrate modern monitoring technologies such as drones, Geographic Information Systems (GIS), and remote sensing which have proven effective in detecting illegal mining, monitoring vegetation loss, and identifying water pollution, in line with Goodchild's (2007) recommendations on technological innovation in environmental management.

To enforce stricter penalties for non-compliance, including fines, suspension of mining licences, and mandatory site rehabilitation, ensuring that environmental regulations carry meaningful consequences. Such measures would deter environmentally harmful practices and promote sustainable mining operations across Hurungwe District.

5.3.2. Recommendations to the Ministry of Mines

To tackle the persistent environmental problems caused by mining in Hurungwe District, the Ministry of Mines and Mining Development should place emphasis on developing

a thorough national policy for mine rehabilitation. This policy should clearly define enforceable mine closure regulations, rehabilitation timelines, and post-mining land restoration obligations, as the current regulatory framework provides insufficient guidance for long-term environmental recovery.

The Ministry should enhance transparency in the allocation of mining rights by publicly disclosing mining agreements, licensing criteria, and environmental obligations. Such measures would strengthen accountability and reduce opportunities for corruption or politically influenced decision-making.

The Ministry should collaborate closely with the Environmental Management Agency (EMA), Rural District Councils (RDCs), and other relevant institutions to ensure coordinated inspections, consistent monitoring of mining activities, and shared enforcement responsibilities. This approach aligns with Saunders (2019), who notes that fragmented oversight undermines the capacity of regulatory bodies to prevent environmental degradation.

5.3.3. *Recommendations to Chinese Mining Companies*

To prioritize the adoption of sustainable mining practices and technologies, including dust suppression systems, lined tailing ponds, and low-impact excavation machinery, to minimize ecological disruption and prevent pollution at the source.

To implement mandatory environmental training programmes for all employees, ensuring workers possess the knowledge and skills necessary for safe chemical handling, proper waste management, and full compliance with environmental regulations, consistent with best practices outlined by the Environmental Protection Agency (EPA, 2016).

To establish dedicated Environmental Management Units staffed with qualified officers responsible for overseeing daily operations, conducting internal audits, and ensuring adherence to national environmental standards.

To respect cultural and ecological sites by avoiding interference with sacred groves, burial grounds, grazing areas, and other landscapes valued by local communities. Environmental stewardship should extend beyond regulatory compliance to include cultural sensitivity and the protection of local heritage, livelihoods, and ecosystem integrity.

5.3.4. *Recommendations to Local Authorities and Traditional Leaders*

To revitalise and support local environmental committees responsible for monitoring mining activities, documenting violations, and collaborating directly with the Environmental Management Agency (EMA) for timely intervention. These committees can serve as grassroots watchdogs, ensuring that environmental concerns are addressed before they escalate into crises.

Local authorities must advocate for benefit-sharing agreements with mining companies so that mining revenues contribute to essential community development projects such as clinics, schools, water infrastructure, and road maintenance. Complementing these governance efforts, traditional leaders should promote community-based conservation programmes including tree planting, soil conservation initiatives, and water quality monitoring to restore degraded areas and strengthen ecological resilience in the wake of mining-induced environmental damage.

5.4. Areas for further research

Future research should build on this study by employing more rigorous scientific and comparative approaches. First, systematic water quality testing is needed to quantify hazardous pollutants such as mercury, cyanide, and arsenic in rivers impacted by Chinese mining, providing concrete evidence of ecological and human health risks. Comparative studies across other mining-intensive districts, including Mazowe, Mutoko, and Hwange, would help determine whether the environmental and governance challenges observed in Hurungwe are nationally consistent or context-specific. It should investigate public health impacts, particularly how exposure to mining-related pollutants affects disease prevalence, nutrition, and child development in affected communities. Long-term ecological restoration studies are also crucial to assess the effectiveness of land rehabilitation and reclamation models suitable for Zimbabwe's semi-arid rural landscapes. Finally, governance and policy-focused research could shed light on how political economy dynamics, state–investor relations, and institutional capacity influence the regulation of foreign mining operations, providing guidance for strengthening environmental governance frameworks.

5.5. Chapter summary

This chapter presented the study's key conclusions and actionable recommendations regarding the environmental, social, and governance impacts of Chinese mining operations in Hurungwe District. Sustainable environmental management depends on collaborative engagement among government agencies, mining companies, traditional leaders, and local communities, aimed at promoting responsible mining practices, protecting natural resources, and safeguarding the well-being of both current and future generations.

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APPENDICES

APPENDIX 1: INTERVIEW GUIDE

Environmental Impacts of Chinese Mining Operations in Hurungwe District

A. INTERVIEW GUIDE FOR ORDINARY COMMUNITY MEMBERS

Section 1: Background Information

1. How long have you lived in this community?
2. What are your main sources of livelihood?

Section 2: Environmental Changes

3. What environmental changes have you observed since Chinese mining operations began in this area?
4. How have these changes affected water sources, grazing lands, and forests?

Section 3: Livelihood Impacts

5. In what ways have mining activities affected your household livelihood (e.g., farming, fishing, livestock, access to resources)?
6. Have you experienced any displacement or loss of land? If yes, please explain.

Section 4: Social Impacts

7. How has mining influenced community cohesion, health, or daily life?
8. Have you noticed any changes in safety, noise levels, or pollution?

Section 5: Community–Mining Relations

9. Have mining companies engaged or communicated with your community? How?

10. What challenges or conflicts have arisen between the community and mining companies?

Section 6: Perceptions and Recommendations

11. What do you think should be done to reduce negative environmental impacts?

12. What recommendations would you offer to government or mining companies?

B. INTERVIEW GUIDE FOR TRADITIONAL LEADERS (Chiefs, Headmen, Village Heads)

Section 1: Context and Land Governance

1. Describe your role in land allocation and community governance.

2. How were you consulted before Chinese mining operations started in your area?

Section 2: Mining and Cultural Governance

3. What conflicts or grievances have emerged as a result of mining activities?

4. Have mining activities affected cultural or sacred sites? If so, how?

Section 3: Environmental Observations

5. What environmental impacts have you observed on land, water, forests, or grazing areas?

6. How have these environmental changes affected traditional livelihoods?

Section 4: Displacement and Community Welfare

7. Have any households been displaced? Describe the process and its impact.
8. How has mining affected vulnerable groups such as the elderly, women, and children?

Section 5: Engagement with Mining Companies

9. What kind of engagement or consultation exists between leaders and mining companies?
10. Are compensation and grievance mechanisms working effectively?

Section 6: Governance and Recommendations

11. What role should traditional leaders play in managing mining impacts?
12. What actions should government and mining companies take to improve accountability?

C. INTERVIEW GUIDE FOR EMA OFFICIALS & RURAL DISTRICT COUNCIL (RDC) OFFICIALS

Section 1: Institutional Mandate

1. What is your institution's role in regulating mining and environmental protection in Hurungwe?
2. How do you monitor compliance by Chinese mining companies?

Section 2: Environmental Issues

3. What key environmental impacts have been recorded from Chinese mining operations?
4. Have there been any cases of pollution, deforestation, or land degradation? Please elaborate.

Section 3: Compliance and Enforcement

5. How compliant are Chinese mining companies with EMA regulations?
6. What enforcement mechanisms do you use, and how effective are they?

Section 4: Challenges

7. What challenges do you face in monitoring or enforcing environmental regulations? (e.g., political interference, resource limitations, legal gaps)
8. Are there gaps in legislation or institutional capacity that hinder effective regulation?

Section 5: Inter-agency Coordination

9. How does EMA/RDC coordinate with traditional leaders, NGOs, or other government institutions?
10. What trends have you noted regarding environmental governance in mining areas?

Section 6: Recommendations

11. What policy improvements are needed to manage foreign-owned mining operations?
12. What recommendations do you have for strengthening environmental protection?

D. INTERVIEW GUIDE FOR NGO REPRESENTATIVES (ZELA, CNRG, etc.)

Section 1: Organisational Role

1. What role does your organisation play in monitoring mining activities in Hurungwe District?

2. What reports or findings have you documented regarding Chinese mining impacts?

Section 2: Environmental and Social Impacts

3. What are the key environmental issues associated with mining in this area?

4. Have there been cases of displacement, human rights concerns, or community grievances?

Section 3: Governance and Accountability

5. How do Chinese mining companies respond to complaints or reports of violations?

6. Are existing regulations sufficient to protect communities and the environment?

Section 4: Community Engagement

7. How have communities participated in monitoring or resisting harmful mining practices?

8. What support do communities require in terms of advocacy or legal protection?

Section 5: Policy Recommendations

9. What should government institutions improve regarding mining governance?

10. What reforms would enhance environmental justice in mining areas?

E. INTERVIEW GUIDE FOR MINE WORKERS / FORMER WORKERS

Section 1: Employment Background

1. How long have you worked or previously worked in Chinese mining operations?

2. What are/were your main duties?

Section 2: Environmental Practices

3. Describe how waste, chemicals, or tailings are managed at the mine.

4. Are there internal policies on pollution control or land rehabilitation?

Section 3: Health and Safety

5. How would you describe the health and safety conditions at the mining site?

6. Are workers provided with adequate protective equipment and training?

Section 4: Labour and Working Conditions

7. Are working conditions fair, safe, and compliant with labour standards?

8. Have you observed any conflicts between workers and management?

Section 5: Community and Environmental Impact

9. What impacts do you think the mine has on surrounding communities and the environment?

10. Are workers aware of environmental regulations or community grievances?

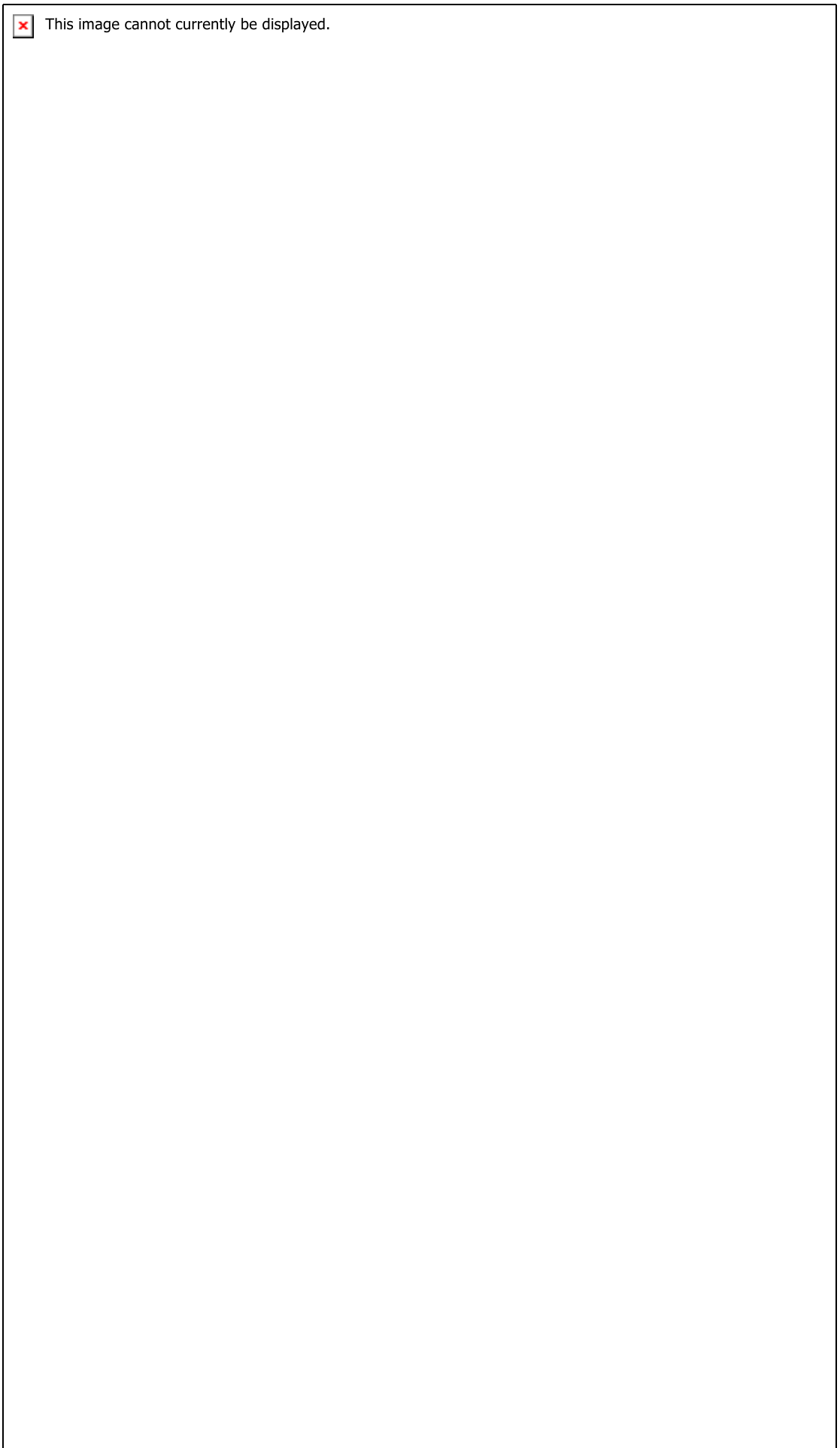
Section 6: Recommendations

11. What improvements should be made to environmental and safety practices?

12. What advice would you give to policymakers regarding Chinese mining operations?

APPENDIX 2

TURNITIN


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